Appendix J.2

Water Quality Management Plan (WQMP)
Proactive Engineering, 2021

Travertine SPA
Draft EIR
SCH# 201811023
Technical Appendices

October 2023

Project Specific
Water Quality Management Plan

For: **TRAVERTINE PROJECT**

City of La Quinta, County of Riverside

DEVELOPMENT NO. **TENTATIVE TRACT MAP 37387**
DESIGN REVIEW NO.

Prepared for:
Hofmann Land Development Co.
P.O. Box 907
Concord, CA 94522
Telephone: (925) 478-2000

Prepared by:
Mark Anderson, PE
Proactive Engineering Consultants
27042 Towne Centre Drive, Suite 110
Foothill Ranch, CA 92610
Telephone: (949) 716-7460

REGISTERED PROFESSIONAL ENGINEER
MARK S. ANDERSON
NO. 26821
CIVIL
STATE OF CALIFORNIA

Original Date Prepared: September 2021

Revision Date(s):

OWNER'S CERTIFICATION

This project-specific Water Quality Management Plan (WQMP) has been prepared for:

> **Hofmann Land Development Co** for the project known as **Travertine Project** in the City of La Quinta, Riverside County

This WQMP is intended to comply with the requirements of **City of La Quinta** for **Travertine Project TTM 37387** which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under **City of La Quinta** Water Quality Ordinance (Municipal Code Section **493**).

If the undersigned transfers its interest in the subject property/project, the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

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

____
Owner's Signature

Lisa Hofmann Morgan
Owner's Printed Name

____
Owner's Title/Position

____
Date

Hofmann Land Development Co.
P.O. Box 907
Concord, CA 94522

ATTEST

____
Notary Signature

____
Printed Name

____
Title/Position

____
Date

THIS FORM SHALL BE NOTARIZED BEFORE ACCEPTANCE OF THE
FINAL PROJECT SPECIFIC WQMP

Contents

SECTION PAGE

I. Project Description 1
II. Site Characterization 4
III. Pollutants of Concern 6
IV. Hydrologic Conditions of Concern 7
V. Best Management Practices 8
  V.1 SITE DESIGN BMP CONCEPTS, LID/SITE DESIGN AND TREATMENT CONTROL BMPS 8
    V.1.A SITE DESIGN BMP CONCEPTS AND LID/SITE DESIGN BMPS 10
    V.1.B TREATMENT CONTROL BMPS 18
    V.1.C MEASURABLE GOAL SUMMARY 19
  V.2 SOURCE CONTROL BMPS 20
  V.3 EQUIVALENT TREATMENT CONTROL BMP ALTERNATIVES 23
  V.4 REGIONALLY-BASED BMPS 23
VI. Operation and Maintenance Responsibility for BMPs 24
VII. Funding 25

TABLES

TABLE 1. POLLUTANT OF CONCERN SUMMARY 6
TABLE 2. BMP SELECTION MATRIX BASED UPON POLLUTANT OF CONCERN REMOVAL EFFICIENCY 9
TABLE 3. IMPLEMENTATION OF SITE DESIGN BMP CONCEPTS 11
TABLE 4. LID/SITE DESIGN BMPS MEETING THE LID/SITE DESIGN MEASURABLE GOAL 17
TABLE 5: TREATMENT CONTROL BMP SUMMARY 18
TABLE 6: MEASURABLE GOAL SUMMARY 19
TABLE 7. SOURCE CONTROL BMPS 20

APPENDICES

A. CONDITIONS OF APPROVAL
B. VICINITY MAP, WQMP SITE PLAN, AND RECEIVING WATERS MAP
C. SUPPORTING DETAIL RELATED TO HYDROLOGIC CONDITIONS OF CONCERN (IF APPLICABLE)
D. EDUCATIONAL MATERIALS
E. SOILS REPORT (IF APPLICABLE)
F. STRUCTURAL BMP AND/OR RETENTION FACILITY SIZING CALCULATIONS AND DESIGN DETAILS
G. AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS, BMP MAINTENANCE AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP
H. PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS
I. PROJECT-SPECIFIC WQMP SUMMARY DATA FORM

I. Project Description

Project Owner: Hofmann Land Development Co.
P.O. Box 907
Concord, CA 94522

WQMP Preparer: Mark Anderson, PE

Proactive Engineering Consultants

Towne Centre Drive, Suite 110

Foothill Ranch, CA 92610

(949) 716-7460

Project Site Address:	**West of Madison Street, East of Jefferson Street along Avenue 62** **City of La Quinta, CA**
Planning Area/ Community Name/ Development Name:	**Coachella Valley Planning Area** **City of La Quinta** **Travertine Project, TTM 37387**
APN Number(s):	**766-110-003, 766-110-004, 766-110-007, 766-110-009, 766-120-001, 766-120-002, 766-120-003, 766-120-006, 766-120-016, 766-120-018, 766-120-015, 766-120-021, 766-120-023, 766-280-057, 764-280-059, 764-280-061, 753-040-014, 753-040-017, 753-040-016, 743-050-029, 753-050-007, 753-060-003.**
Latitude & Longitude:	**33.60194444, -116.26111111**
Receiving Water:	**None – The site retains 100% of the runoffs behind dike #4**
Project Site Size:	**855.4 acres, 514.2 acres disturbed**

Formation of Home Owners' Association (HOA)
or Property Owners Association (POA): Y ☒ N ☐

Additional Permits/Approvals required for the Project:

AGENCY	Permit required
State Department of Fish and Wildlife, Fish and Game Code §1602 Streambed Alteration Agreement	Y ☒ N☐
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Certification	Y ☒ N☐
US Army Corps of Engineers, CWA Section 404 permit	Y ☐ N☒
US Fish and Wildlife, Endangered Species Act Section 7 biological opinion	Y ☒ N☐
Statewide Construction General Permit Coverage	Y ☒ N☐
Statewide Industrial General Permit Coverage	Y ☐ N☒
Other *(please list in the space below as required)* City of La Quinta Building Permit City of La Quinta Grading Permit	

The Travertine Project is an 855.4-acre site with 514.2-acre being disturbed for development. The project is located west of Madison Street, and east of Jefferson Street along Avenue 62 in the City of La Quinta. Currently, the site is undeveloped and includes an abandoned vineyard. Drainages sheet flow from the west San Jacinto and Santa Rosa mountain ranges. There are several dikes that have been constructed to protect the vineyard areas from the mountain slope drainages. The project site is located upstream behind CVWD Dike #4. The drainages are contained behind the dike where storm water runoff is retained and infiltrated.

The proposed project is a residential and park development. Several improvements are planned for the development including road improvements, drainage systems, two infiltration basins and water/sewer systems to serve the proposed community. The project is generally bounded by mountain ranges to the west, Coachella Valley Water District (CVWD) spreading basins and Madison Street to the east, and 62nd Street and undeveloped area to the south. The preliminary drainage plan for the Travertine Project proposes a system of underground storm drains and catch basins to intercept and convey the runoffs generated by the project site.

The project site is unique because it is located upstream behind CVWD dike #4 Groundwater Recharge Facility (see Travertine site map). 100% of the pre and post development drainages are contained behind the dike where they are retained and infiltrated. The two proposed infiltration basins within the project site are water quality basins designed to capture and infiltrate the 2-yr. storm event. Additionally the 100 year 24-hr runoff volume delta between the existing and proposed condition will infiltrate through the proposed basins. Peak flows will be outletted at or below existing condition peak flows. Emergency overflow spillways have been designed to route flows to the area behind Dike #4 as in the existing condition.

Appendix A of this project-specific WQMP includes a complete copy of the final Conditions of Approval. Appendix B of this project-specific WQMP includes:

a. A Vicinity Map identifying the project site and surrounding planning areas in sufficient detail; and

b. A Site Plan for the project. The Site Plan included as part of Appendix B depicts the following project features:

  - Location and identification of all structural BMPs, including Source Control, LID/Site Design and Treatment Control BMPs.
  - Landscaped areas.
  - Paved areas and intended uses (i.e., parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.).
  - Number and type of structures and intended uses (i.e., buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.).
  - Infrastructure (i.e., streets, storm drains, etc.) that will revert to public agency ownership and operation.
  - Location of existing and proposed public and private storm drainage facilities (i.e., storm drains, channels, basins, etc.), including catch basins and other inlets/outlet structures. Existing and proposed drainage facilities should be clearly differentiated.
  - Location(s) of Receiving Waters to which the project directly or indirectly discharges.
  - Location of points where onsite (or tributary offsite) flows exit the property/project site.
  - Delineation of proposed drainage area boundaries, including tributary offsite areas, for each location where flows exit the project site and existing site (where existing site flows are required to be addressed). Each tributary area should be clearly denoted.
  - Pre- and post-project topography.

Appendix I is a one page form that summarizes pertinent information relative to this project-specific WQMP.

II. Site Characterization

Land Use Designation or Zoning: **Current Zoning: Low Density Residential, Golf Course, Neighborhood and Tourist Commercial, Medium High Density Residential and Commercial Park.**

Current Property Use: **Vacant and Undeveloped**

Proposed Property Use: **Residential, Commercial, Golf Course & Open Space**

Availability of Soils Report: Y ☒ N ☐ *Note: A soils report is required if infiltration BMPs are utilized. Attach report in Appendix E.*

Phase 1 Site Assessment: Y ☐ N ☒ *Note: If prepared, attached remediation summary and use restrictions in Appendix H.*

Receiving Waters for Urban Runoff from Site

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use Designated Receiving Waters
None			

*There are no runoffs to the receiving water. 100% of the runoffs is contained behind dike #4.

III. Pollutants of Concern

Table 1. Pollutant of Concern Summary

Pollutant Category	Potential for Project and/or Existing Site	Causing Receiving Water Impairment
Bacteria/Virus (Pathogens)	Y	None – 100% Containment behind Dike #4
Heavy Metals	Y	None – 100% Containment behind Dike #4
Nutrients	Y	None – 100% Containment behind Dike #4
Toxic Organic Compounds	Y	None – 100% Containment behind Dike #4
Sediment/Turbidity	Y	None – 100% Containment behind Dike #4
Trash & Debris	Y	None – 100% Containment behind Dike #4
Oil & Grease	Y	None – 100% Containment behind Dike #4
Toxaphene, Dieldrin, DDT, PCB, Toxicity Ammonia	N	None – 100% Containment behind Dike #4

Note: Toxaphene, Dieldrin, DDT& PCB are banned substances in the US.

IV. Hydrologic Conditions of Concern

Local Jurisdiction Requires On-Site Retention of Urban Runoff:

Yes ☐ The project will be required to retain urban runoff onsite in conformance with local ordinance (See Table 6 of the WQMP Guidance document, "Local Land use Authorities Requiring Onsite Retention of Stormwater"). This section does not need to be completed; however, retention facility design details and sizing calculations must be included in Appendix F.

No ☒ This section must be completed.

This Project meets the following condition:

☒ **Condition A**: 1) Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4 or engineered and maintained channel, 2) the discharge is in full compliance with local land use authority requirements for connections and discharges to the MS4 (including both quality and quantity requirements), 3) the discharge would not significantly impact stream habitat in proximate Receiving Waters, **and** 4) the discharge is authorized by the local land use authority.

☐ **Condition B**: The project disturbs less than 1 acre and is not part of a larger common plan of development that exceeds 1 acre of disturbance. The disturbed area calculation must include all disturbances associated with larger plans of development.

☐ **Condition C**: The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by, where applicable, complying with the local land use authority's on-site retention ordinance, or minimizing impervious area on a site and incorporating other Site-Design BMP concepts and LID/Site Design BMPs that assure non-exceedance of pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the local land use authority.

☐ **None:** Refer to Section 3.4 of the Whitewater River Region WQMP Guidance document for additional requirements.

Supporting engineering studies, calculations, and reports are included in Appendix C.

	2 year – 24 hour		10 year – 24 hour	
	Precondition	**Post-condition**	**Precondition**	**Post-condition**
Discharge (cfs)	N/A-SEE APPENDIX C		N/A-SEE APPENDIX C	
Velocity (fps)				
Volume (cubic feet)				
Duration (minutes)				

V. Best Management Practices

This project implements Best Management Practices (BMPs) to address the Pollutants of Concern that may potentially be generated from the use of the **Project Site**. These BMPs have been selected and implemented to comply with Section 3.5 of the WQMP Guidance document, and consist of Site Design BMP concepts, Source Control, LID/Site Design and, if/where necessary, Treatment Control BMPs as described herein.

V.1 SITE DESIGN BMP CONCEPTS, LID/SITE DESIGN AND TREATMENT CONTROL BMPS

Local Jurisdiction Requires On-Site Retention of Urban Runoff:

Yes ☐ The project will be required to retain Urban Runoff onsite in conformance with local ordinance (See Table 6 of the WQMP Guidance document, "Local Land use Authorities Requiring Onsite Retention of Stormwater). **The LID/Site Design measurable goal has thus been met (100%), and Sections V.1.A and V.1.B do not need to be completed**; however, retention facility design details and sizing calculations must be included in Appendix F, and '100%' should be entered into Column 3 of Table 6 below.

No ☒ Section V.1 must be completed.

This section of the Project-Specific WQMP documents the LID/Site Design BMPs and, if/where necessary, the Treatment Control BMPs that will be implemented on the project to meet the requirements detailed within Section 3.5.1 of the WQMP Guidance document. Section 3.5.1 includes requirements to implement Site Design Concepts and BMPs, and includes requirements to address Pollutants of Concern with BMPs. Further, sub-section 3.5.1.1 specifically requires that Pollutants of Concern be addressed with LID/Site Design BMPs to the extent feasible.

LID/Site Design BMPs are those BMPs listed within Table 2 below which promote retention and/or feature a natural treatment mechanism; off-site and regionally-based BMPs are also LID/Site Design BMPs, and therefore count towards the measurable goal, if they fit these criteria. This project incorporates LID/Site Design BMPs to fully address the Treatment Control BMP requirement where and to the extent feasible. If and where it has been acceptably demonstrated to the local land use authority that it is infeasible to fully meet this requirement with LID/Site Design BMPs, Section V.1.B (below) includes a description of the conventional Treatment Control BMPs that will be substituted to meet the same requirements.

In addressing Pollutants of Concern, BMPs are selected using Table 2 below.

Table 2. BMP Selection Matrix Based Upon Pollutant of Concern Removal Efficiency (1)

(Sources: Riverside County Flood Control & Water Conservation District Design Handbook for Low Impact Development Best Management Practices, dated September 2011, the Orange County Technical Guidance Document for Water Quality Management Plans, dated May 19, 2011, and the Caltrans Treatment BMP Technology Report, dated April 2010 and April 2008)

Pollutant of Concern	Landscape Swale[2, 3]	Landscape Strip[2, 3]	Biofiltration (with underdrain)[2, 3]	Extended Detention Basin[2]	Sand Filter Basin[2]	Infiltration Basin[2]	Infiltration Trench[2]	Permeable Pavement[2]	Bioretention (w/o underdrain)[2, 3]	Other BMPs Including Proprietary BMPs[4, 6]
Sediment & Turbidity	M	M	H	M	H	H	H	H	H	Varies by Product[5]
Nutrients	L/M	L/M	M	L/M	L/M	H	H	H	H	
Toxic Organic Compounds	M/H	M/H	M/H	L	L/M	H	H	H	H	
Trash & Debris	L	L	H	H	H	H	H	L	H	
Bacteria & Viruses (also: Pathogens)	L	M	H	L	M	H	H	H	H	
Oil & Grease	M	M	H	M	H	H	H	H	H	
Heavy Metals	M	M/H	M/H	L/M	M	H	H	H	H	

Abbreviations:

L: Low removal efficiency M: Medium removal efficiency H: High removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Expected performance when designed in accordance with the most current edition of the document, "Riverside County, Whitewater River Region Stormwater Quality Best Management Practice Design Handbook".

(3) Performance dependent upon design which includes implementation of thick vegetative cover. Local water conservation and/or landscaping requirements should be considered; approval is based on the discretion of the local land use authority.

(4) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP (including proprietary filters, hydrodynamic separators, inserts, etc.), or newly developed/emerging stormwater treatment technologies.

(5) Expected performance should be based on evaluation of unit processes provided by BMP and available testing data. Approval is based on the discretion of the local land use authority.

(6) When used for primary treatment as opposed to pre-treatment, requires site-specific approval by the local land use authority.

V.1.A SITE DESIGN BMP CONCEPTS AND LID/SITE DESIGN BMPS

This section documents the Site Design BMP concepts and LID/Site Design BMPs that will be implemented on this project to comply with the requirements detailed in Section 3.5.1 of the WQMP Guidance document.

- Table 3 herein documents the implementation of the Site Design BMP Concepts described in sub-sections 3.5.1.3 and 3.5.1.4.
- Table 4 herein documents the extent to which this project has implemented the LID/Site Design goals described in sub-section 3.5.1.1.

Table 3. Implementation of Site Design BMP Concepts

Design Concept	Technique	Specific BMP	Included			Brief Reason for BMPs Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 1	**Minimize Urban Runoff, Minimize Impervious Footprint, and Conserve Natural Areas** **(See WQMP Section 3.5.1.3)**	Conserve natural areas by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition.	☒	☐	☐	The south of the project site is preserved as Open space
		Conserve natural areas by incorporating the goals of the Multi-Species Habitat Conservation Plan or other natural resource plans.	☒	☐	☐	The south of the project site is preserved as Open space
		Preserve natural drainage features and natural depressional storage areas on the site.	☒	☐	☐	The south of the project site is preserved as Open space
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☐	☒	☐	Project site will be a fill site. In addition, there are no existing native trees or shrubs
		Use natural drainage systems.	☐	☒	☐	The majority of on-site drainages are disturbed by grading for residential pads
		Where applicable, incorporate Self-Treating Areas	☒	☐	☐	Areas of landscaping and/or vegetation are included for Self-Treating Areas
		Where applicable, incorporate Self-Retaining Areas	☒	☐	☐	Areas of landscaping and/or vegetation are included for Self-Treating Areas
		Increase the building floor to area ratio (i.e., number of stories above or below ground).	☐	☐	☒	Development is for Residential Use
		Construct streets, sidewalks and parking lot aisles to minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.	☒	☐	☐	Streets, sidewalks and parking lot aisles are constructed to minimize widths necessary, provided that public safety & a walkable environment for pedestrians are not compromised.
		Reduce widths of streets where off-street parking is available.	☒	☐	☐	Widths of streets are reduced where off-street parking is available.
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	☒	☐	☐	Decorative concrete can be used within landscape area in place of concrete to minimize the impervious surfaces.

		Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☐	☐	☒	None available

Table 3. Site Design BMP Concepts (continued)

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 2	**Minimize Directly Connected Impervious Area** **(See WQMP Section 3.5.1.4)**	Design residential and commercial sites to contain and infiltrate roof runoff, or direct roof runoff to landscaped swales or buffer areas.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Incorporate landscaped buffer areas between sidewalks and streets.	☒	☐	☐	Landscape area between sidewalks and streets could be used to treat the impervious surface of the sidewalk.
		Use natural or landscaped drainage swales in lieu of underground piping or imperviously lined swales.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Where soil conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Maximize the permeable area by constructing walkways, trails, patios, overflow parking, alleys, driveways, low-traffic streets, and other low-traffic areas with open-jointed paving materials or permeable surfaces such as pervious concrete, porous asphalt, unit pavers, and granular materials.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Use one or more of the following:				
		Rural swale system: street sheet flows to landscaped swale or gravel shoulder, curbs used at street corners, and culverts used under driveways and street crossings.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to landscaped swale or biofilter.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
		Dual drainage system: first flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder; high flows connect directly to MS4s.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☐	☐	☒	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Use one or more of the following for design of driveways and private residential parking areas:				
		Design driveways with shared access, flared (single lane at street), or wheel strips (paving only under the tires).	☐	☐	☒	Does not meet City standards
		Uncovered temporary or guest parking on residential lots paved with a permeable surface, or designed to drain into landscaping.	☐	☐	☒	Does not meet City standards

Table 3. Site Design BMP Concepts (continued)

Design Concept	Technique	Specific BMP	Included Yes	 No	 N/A	Brief Reason for Each BMP Indicated as No or N/A
Site Design BMP Concept 2 (cont'd)	**Minimize Directly Connected Impervious Area** **(See WQMP Section 3.5.1.4)**	Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☐	☐	☒	None available
		Use one or more of the following for design of parking areas:				
		Where landscaping is proposed in parking areas, incorporate parking area landscaping into the drainage design.	☐	☒	☐	Storm runoff will be conveyed via drive aisle, streets and underground storm drain system and discharged into retention/infiltration basins.
		Overflow parking (parking stalls provided in excess of the Permittee's minimum parking requirements) may be constructed with permeable pavement.	☐	☐	☒	No overflow parking proposed
		Other comparable and equally effective Site Design BMP (or BMPs) as approved by the local land use authority (Note: Additional narrative required describing BMP and how it addresses site design concept).	☐	☐	☒	None available

Project Site Design BMP Concepts:

The project will implement two (2) separate retention/infiltration basins to treat the required stormwater runoff. Runoff from roof drains and other impervious area will be conveyed to each basin by way of drive aisles, streets and underground storm system. These basins will also infiltrate the delta of the largest volume 100 year storm, for full details see Hydrology study contained in Appendix F.

Table 4. LID/Site Design BMPs Meeting the LID/Site Design Measurable Goal

(1) DRAINAGE SUB-AREA ID OR NO.	(2) LID/SITE DESIGN BMP TYPE* (See Table 2)	(3) POTENTIAL POLLUTANTS OF CONCERN WITHIN DRAINAGE SUB-AREA (Refer to Table 1)	(4) POTENTIAL POLLUTANTS WITHIN SUB-AREA CAUSING RECEIVING WATER IMPAIRMENTS (Refer to Table 1)	(5) EFFECTIVENESS OF LID/SITE DESIGN BMP AT ADDRESSING IDENTIFIED POTENTIAL POLLUTANTS (U, L, M, H/M, H; see Table 2)	(6) BMP MEETS WHICH DESIGN CRITERIA? (Identify as V_{BMP} OR Q_{BMP})	(7) TOTAL AREA WITHIN DRAINAGE SUB-AREA (Nearest 0.1 acre)
A	INFILTRATION BASIN	SEDIMENT & TURBIDITY, NUTRIENTS, TOXIC ORGANIC COMPOUNDS, TRASH & DEBRIS, BACTERIA & VIRUSES, OIL & GREASE AND HEAVY METALS	PATHOGENS	H	V_{BMP}	218.5
B	INFILTRATION BASIN		PATHOGENS	H	V_{BMP}	295.7
TOTAL PROJECT AREA TREATED WITH LID/SITE DESIGN BMPs (NEAREST 0.1 ACRE)						514.2

*** LID/Site Design BMPs listed in this table are those that <u>completely</u> address the 'Treatment Control BMP requirement' for their drainage sub-area.**

Justification of infeasibility for sub-areas not addressed with LID/Site Design BMPs

Open space within the project site do not need to be addressed with LID/Site Design BMPs. These areas are slopes, parks and are usually pervious. Some of these areas may be even areas that are undisturbed. Drainages from these areas are routed behind Dike #4 where it is retained and infiltrated. For Madison Street, the entire length of the street slope towards the dike #4. It is infeasible to bring a pipe up in order to drain back to the basin #1 (See WQMP site map).

V.1.B TREATMENT CONTROL BMPS

Conventional Treatment Control BMPs shall be implemented to address the project's Pollutants of Concern as required in WQMP Section 3.5.1 where, and to the extent that, Section V.1.A has demonstrated that it is infeasible to meet these requirements through implementation of LID/Site Design BMPs.

☒ The LID/Site Design BMPs described in Section V.1.A of this project-specific WQMP completely address the 'Treatment Control BMP requirement' for the entire project site (and where applicable, entire existing site) as required in Section 3.5.1.1 of the WQMP Guidance document. Supporting documentation for the sizing of these LID/Site Design BMPs is included in Appendix F. ***Section V.1.B does not need to be completed**.

☐ The LID/Site Design BMPs described in Section V.1.A of this project-specific WQMP do **NOT** completely address the 'Treatment Control BMP requirement' for the entire project site (or where applicable, entire existing site) as required in Section 3.5.1.1 of the WQMP. ***Section V.1.B must be completed.**

Table 5: Treatment Control BMP Summary – N/A

V.1.C MEASURABLE GOAL SUMMARY

This section documents the extent to which this project has met the measurable goal described in WQMP Section 3.5.1.1 of addressing 100% of the project's 'Treatment Control BMP requirement' with LID/Site Design BMPs. Projects required to retain Urban Runoff onsite in conformance with local ordinance are considered to have met the measurable goal; for these instances, '100%' is entered into Column 3 of the Table.

Table 6: Measurable Goal Summary

(1) **Total Area Treated with LID/Site Design BMPs** **(Last row of Table 4)**	**(2)** **Total Area Treated with Treatment Control BMPs** **(Last row of Table 5)**	**(3)** **% of Treatment Control BMP Requirement addressed with LID/Site Design BMPs**
514.2	0	100%

V.2 SOURCE CONTROL BMPS

This section identifies and describes the Source Control BMPs applicable and implemented on this project.

Table 7. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	☒	☐	
Activity Restrictions	☒	☐	
Irrigation System and Landscape Maintenance	☒	☐	
Common Area Litter Control	☒	☐	
Street Sweeping Private Streets and Parking Lots	☒	☐	
Drainage Facility Inspection and Maintenance	☒	☐	
Structural Source Control BMPs			
Storm Drain Inlet Stenciling and Signage	☒	☐	
Landscape and Irrigation System Design	☒	☐	
Protect Slopes and Channels	☒	☐	
Provide Community Car Wash Racks	☐	☒	No community car wash Racks
Properly Design*:			
Fueling Areas	☐	☒	No fueling areas on-site
Air/Water Supply Area Drainage	☐	☒	No air/water supply area drainage on-site
Trash Storage Areas	☒	☐	
Loading Docks	☐	☒	No loading docks on-site
Maintenance Bays	☐	☒	No maintenance bay on-site
Vehicle and Equipment Wash Areas	☐	☒	No vehicle and equipment wash areas on-site
Outdoor Material Storage Areas	☐	☒	No outdoor material storage areas on-site
Outdoor Work Areas or Processing Areas	☐	☒	No outdoor work areas or processing areas on-site
Provide Wash Water Controls for Food Preparation Areas	☐	☒	No food preparation areas on-si

*Details demonstrating proper design must be included in Appendix F.

Appendix D includes copies of the educational materials (described in Section 3.5.2.1 of the WQMP Guidance document) that will be used in implementing this project-specific WQMP.

Education for Property Owners, Operators, Tenants, Occupants or Employees – For developments with no Property Owners Association (POA) or with POAs of less than fifty (50) dwelling units, practical information materials will be provided to the first residents/occupants/tenants on general good housekeeping practices that contribute to protection of storm water quality initially these materials will be provided by the developer. Thereafter such materials will be available through the Permittees' education program. Different materials for residential, office commercial, retail commercial, vehicle-related commercial, and industrial uses will be involved.

For developments with POA and residential projects of more than fifty (50) dwelling units, project conditions of approval will require that the POA provide environmental awareness education materials, mad available by the municipalities, to all members periodically. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property. With no discharge of specified wastes via hosing or other direct discharge to gutters, catch basins and storm drains.

Activity Restrictions – If a POA is formed, conditions, covenants, and restrictions shall be prepared by the developer for the purpose of surface water quality protection. Alternatively, use restrictions may be developed by a building operator through lease terms, etc.

Irrigation System and Landscape Maintenance – Landscape Management Includes:

- Mitigation of the potential dangers of fertilizer and pesticide usage through the incorporation of an Integrated Pest Management Program (IPM).
- Monitor for runoff and efficiency regularly
- Implementation of a water budget
- Irrigation systems shall be automatically controlled and designed, installed and maintained so as to minimize overspray and runoff onto streets, sidewalks, driveways, structures, windows, walls and fences.
- Use of native and drought tolerant species when replanting.

Common Area Litter Control – For developments with POAs, the POA will be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The Associations may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common area, and noting trash disposal violations by homeowners or businesses and reporting the violations to the Association for investigation.

Street Sweeping Private Streets and Parking Lot – For developments with POAs and privately owned streets and parking lots, require the streets and parking lots be swept prior to the storm season, no later than October 15 each year.

Drainage Facility Inspection and Maintenance – 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. 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 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 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.

Storm Drain Inlet Stenciling and Signage – Phrase "No Dumping – Drains to Ocean" or equally effective phrase to be stenciled on catch basins to alert the public to the destination of pollutants discharged into stormwater.

Protect slopes and Channels – Convey runoff safely from the tops of slopes. Avoid disturbing steep or unstable slopes. Avoid disturbing natural channels. Stabilize disturbed slopes as quickly as possible. Vegetate slopes with native or drought tolerant vegetation. Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems. Stabilize temporary and permanent channel crossings as quickly as possible and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel. Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters. Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives. Consider other design principles that are comparable and equally effective.

Trash Storage Areas – Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the areas(s) to avoid run-on. This might include berm 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. 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.

V.3 EQUIVALENT TREATMENT CONTROL BMP ALTERNATIVES

Not applicable

V.4 REGIONALLY-BASED BMPS

Not applicable

VI. Operation and Maintenance Responsibility for BMPs

Appendix G of this project-specific WQMP includes copies of CC&Rs, Covenant and Agreements, BMP Maintenance Agreement and/or other mechanisms used to ensure the ongoing operation, maintenance, funding, transfer and implementation of the project-specific WQMP requirements.

VII. Funding

Funding for this project will be provided by the owner:

Hofmann Land Development Co.
P.O. Box 907
Concord, CA 94522

Appendix A

Conditions of Approval

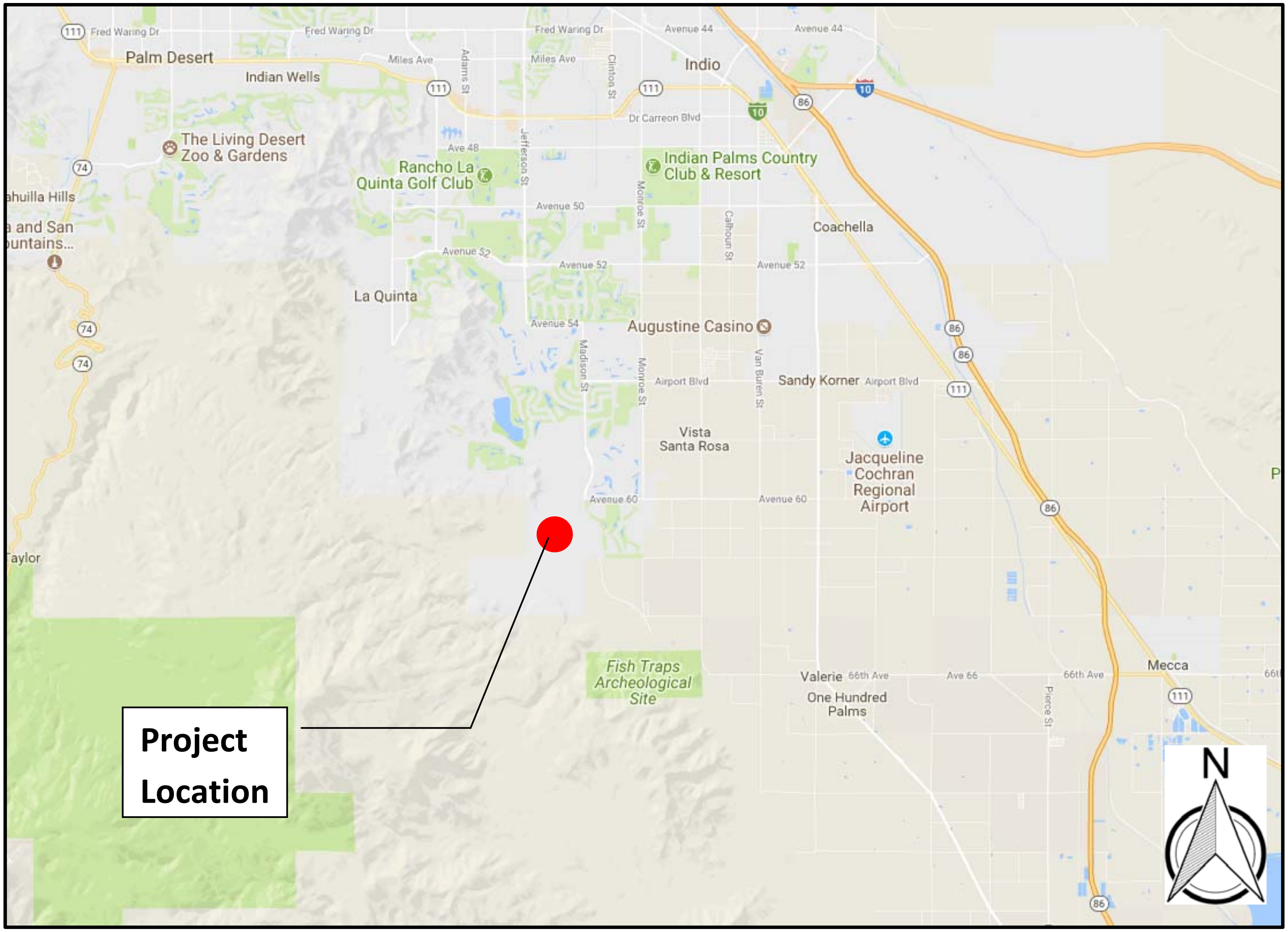
Planning Commission Resolution _____

Dated _____

Not applicable; project is in the preliminary phase. COA will be provided when available

Appendix B

Vicinity Map, WQMP Site Plan, and Receiving Waters Map



VICINITY MAP

N.T.S.

N:\20.053.000\DLV\PLANS\ENT\HY\PROP_HYD.DWG J_LANGDON 8/4/20 2:16 pm

PROJECT AREA TOTAL:
855.4 Ac.

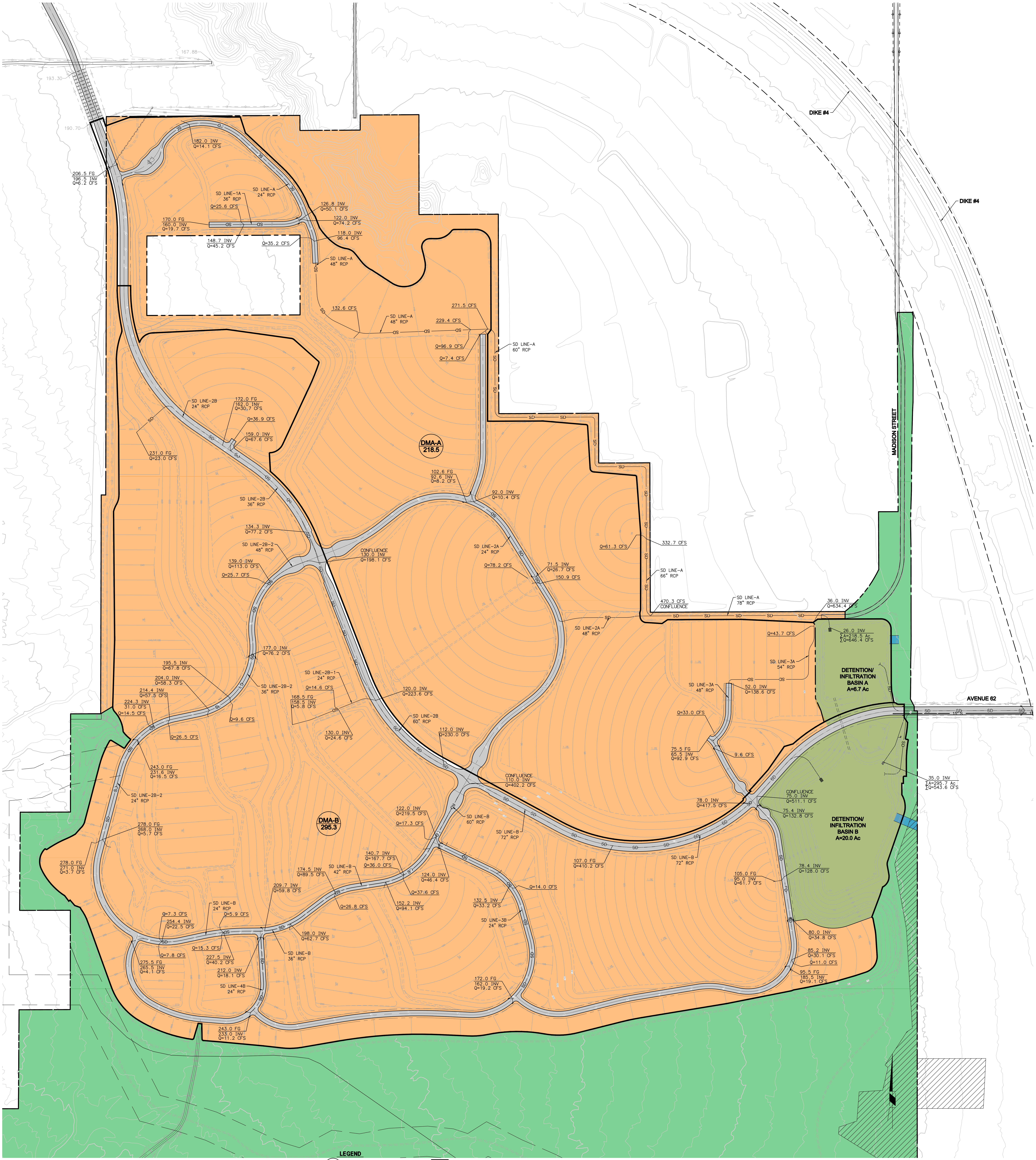
PROJECT DEVELOPED AREA:
514.2 Ac.

PROACTIVE
ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.NET (949) 716-7460
27042 Towne Centre Drive, Suite 110, Foothill Ranch, CA 92610

TRAVERTINE
SITE MAP

CITY OF LA QINTA

1 OF 1



LEGEND

- DMA 2.8 — DRAINAGE MANAGEMENT AREA / SUBAREA AREA – Acre
- xxx.x — ELEVATION
- Q =1.2 CFS — FLOW AT NODE – 100 YR STORM
- ▬ AREA TRIBUTARY BOUNDARY
- ▨ PAVED STREETS
- 🟧 DEVELOPED AREA
- 🟩 DETENTION BASIN
- 🟩 OPEN SPACE
- 🟦 EMERGENCY OVERFLOW SPILLWAY

200 100 0 200 400 600

SCALE: 1"=200'

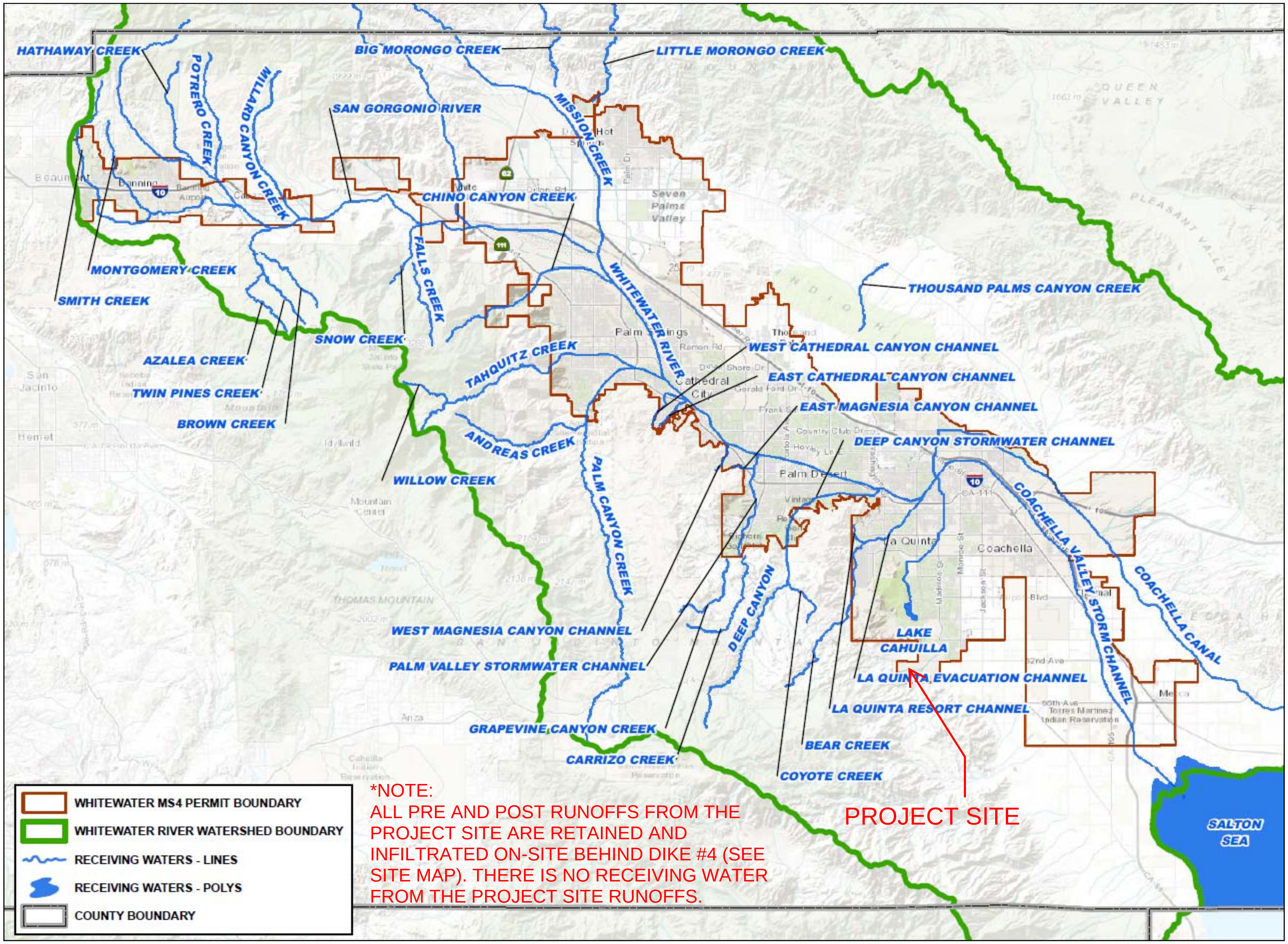
PROACTIVE
ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.NET (949) 716-7460
27042 Towne Centre Drive, Suite 110, Foothill Ranch, CA 92610

TRAVERTINE
TENTATIVE TRACT MAP 37387
WQMP SITE MAP

CITY OF LA QINTA

1 OF 1

Figure 2. Whitewater River Region Receiving Waters Map



*NOTE:
ALL PRE AND POST RUNOFFS FROM THE PROJECT SITE ARE RETAINED AND INFILTRATED ON-SITE BEHIND DIKE #4 (SEE SITE MAP). THERE IS NO RECEIVING WATER FROM THE PROJECT SITE RUNOFFS.

PROJECT SITE

Appendix C

Supporting Detail Related to Hydrologic Conditions of Concern

Not applicable at this stage of the project; The existing conditions and proposed condition 2-year 24-hour and 10-year 24-hour hydrology and basin routing calculations will be performed during the final engineering stage.

Furthermore, existing and post development stormwater flows will be 100% retained behind Dike#4, therefore there is no concern for downstream hydraulic conditions.

Appendix D

Educational Materials

See Project Operation & Maintenance Plan

WQMP
Operation & Maintenance (O&M) Plan

Project Name: Travertine Project (TTM 37387)

City of La Quinta, County of Riverside, State of California

Prepared on:

September 23, 2020

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

APN: 766-110-003, 766-110-004, 766-110-007, 766-110-009, 766-120-001, 766-120-002, 766-120-003, 766-120-006, 766-120-016, 766-120-018, 766-120-015, 766-120-021, 766-120-023, 766-280-057, 764-280-059, 764-280-061, 753-040-014, 753-040-017, 753-040-016, 743-050-029, 753-050-007, 753-060-003.

Address: West of Madison Street, East of Jefferson Street along Avenue 62, La Quinta, CA

Site Size: 855.4 acres

List Structural BMPs, number of each, etc.: Two (2) retention/infiltration basins

How many dwelling units, commercial tenants, etc.: Mixed residential and resort development.

All stormwater runoff generated on-site will be conveyed via drive isles, streets and underground storm drain piping and discharged into retention/ infiltration basins.

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Hofmann Land Development Co.
P.O. Box 907
Concord, CA 94522
(925) 478-2000

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in Appendix C of this document.

The **WQMP Verification Form** (Appendix D) shall be completed accurately and submitted, with associated documentation, to the City of La Quinta by September 30 of each year, or as requested by the City. **Failure to complete and submit the verification form will result in a noncompliance and enforcement actions may be taken.**

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. Autocad files and/or GIS coordinates of BMPs shall also be submitted to the City.

8.1.5 Vector Control

Standing water which exists for longer than 72 hours may contribute to mosquito breeding areas. Best Management Practices (BMPs) shall be inspected for standing water on a regular basis. Standing water may indicate that the BMP is not functioning properly and proper action to remedy the situation shall be taken in a timely manner.

Elimination of standing water and managing garbage, lawn clippings, and pet droppings, can help decrease the presence of mosquitoes and flies in the area.

8.1.6 Required Permits

No additional permits are required.

8.1.7 Inspections

The City may conduct a site inspection to evaluate compliance with the Project WQMP, at any time, in accordance with City of La Quinta Water Quality Ordinance (Ordinance No. 493).

8.1.8 Monitoring Plan

The City or other agencies may require a monitoring plan. Details regarding monitoring plan, such as parameters to be tested, frequency, testing locations, laboratory, etc. shall be included as appropriate.

No monitoring is required for this project.

8.1.9 Operation and Maintenance Requirements

BMP	Implementation, Inspection and Maintenance Requirements	Frequency
N1. Education for Property Owners, Tenants and Occupants	RP will insure that all owners & tenants will be given a copy of the recorded CC&R's which will contain a section outlining the environmental awareness education materials at the close of escrow. RP shall distribute appropriate materials to owners, tenants and/or occupants via contract language, mailings, website or meeting. Brochures can be requested or downloaded from www.ocwatersheds.com. Brochures and educational articles for RP distribution can also be requested from City Water Quality Engineer.	Information to be initially provided to owners & tenants upon sale or lease agreement. Educational materials will be provided to owners and/or tenants annually, thereafter.
N2. Activity Restriction	Within the CC&R's or lease agreement, the following activity restrictions shall be enforced:	Continuous.

BMP	Implementation, Inspection and Maintenance Requirements	Frequency
N3. Common Area Landscape Management & Efficient Landscape Design	Landscape Management Includes: • Mitigation of the potential dangers of fertilizer and pesticide usage through the incorporation of an Integrated Pest Management Program (IPM). • Monitor for runoff and efficiency regularly. • Implementation of a water budget. • Irrigation systems shall be automatically controlled and designed, installed, and maintained so as to minimize overspray and runoff onto streets, sidewalks, driveways, structures, windows, walls, and fences. • Use of native and drought tolerant species when replanting	Inspected once a week.
N11. Common Area Litter Control	Weekly sweeping and trash pick up as necessary within all project areas and common landscape areas. Daily inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations by homeowners and reporting the violations to the HOA/RP for investigation.	Daily inspection and weekly sweeping and clean-up or as needed.
N12. Contractor/Employee Training	All contractors shall be trained and made aware of this WQMP and operation and maintenance requirements of BMPs.	At first hire and annually thereafter for POA personnel and employees, to include the educational materials contained in the approved Water Quality Management Plan.
N14. Common Area Catch Basin Inspection	Catch basins will be owned, inspected and maintained by the HOA/RP. Catch basins will be inspected at a minimum on a yearly basis, and prior to the storm season, no later than October 1st of each year.	At a minimum, basins will be inspected and cleaned around October 1ST of each year, prior to “first flush” storm, or as necessary after large storm events to clear inlets of trash, debris and silt.
N15. Street Sweeping Private Streets and Parking Lots	Vacuum street sweeping will occur on a weekly basis.	Streets will be vacuumed and swept on a weekly basis.
SD-13 Provide Storm Drain System Stenciling and Signage	All catch basins where applicable in paved areas, will be marked or stenciled with “No Dumping - Drains to Ocean, No Descargue Basura” language. This will be done in a location that can be clearly seen by all and will be routinely inspected and re-labeled, as necessary. Thereafter, the owner/operator shall routinely inspect and re-label the catch basins, as necessary.	Catch basin labels will be inspected once annually and re-labeled as necessary to maintain legibility.

BMP	Implementation, Inspection and Maintenance Requirements	Frequency
Sd-32 Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction	Trash will be removed by the local private solid waste management contractor on a weekly basis for proper disposal of the trash to landfill; with recyclable materials and green wastes to be processed offsite.	Trash dumpster shall be kept in a non-leaking condition.

After the Storm

A Citizen's Guide to Understanding Stormwater

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

United States
Environmental Protection
Agency

EPA 833-B-03-002
January 2003

Internet Address (URL) ● HTTP://www.epa.gov
Recycled/Recyclable ● Printed With Vegetable
Oil Based Inks on 100% Postconsumer,
Process Chlorine Free Recycled Paper

What is stormwater runoff?

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

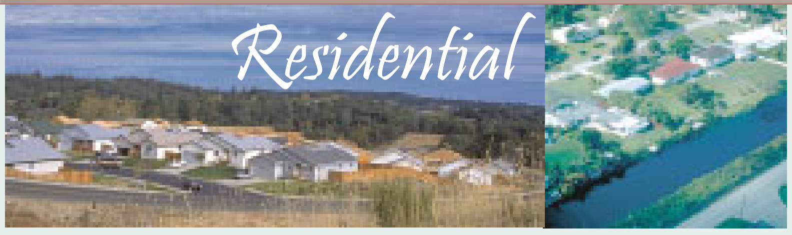
The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.
- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Stormwater Pollution Solutions

Residential



Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Auto care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Septic systems

Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste

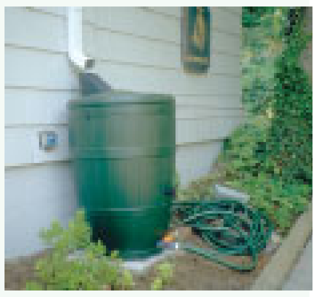
Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.



Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

Commercial

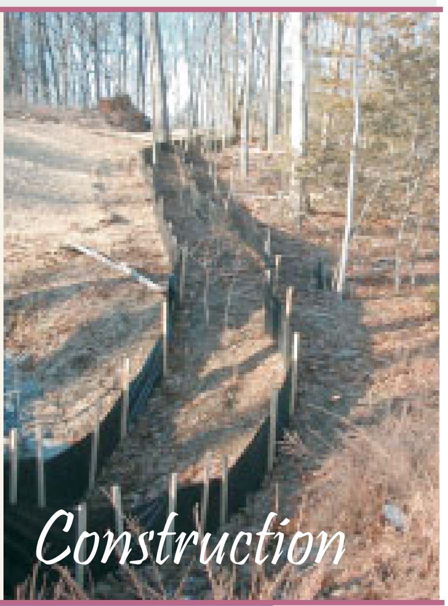
Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Construction

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.



Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

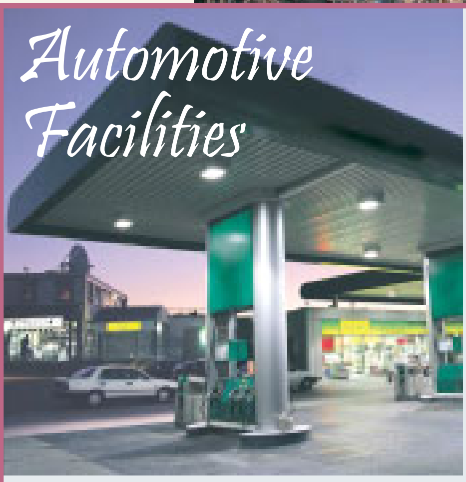
- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.

Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

Automotive Facilities



Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers

Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

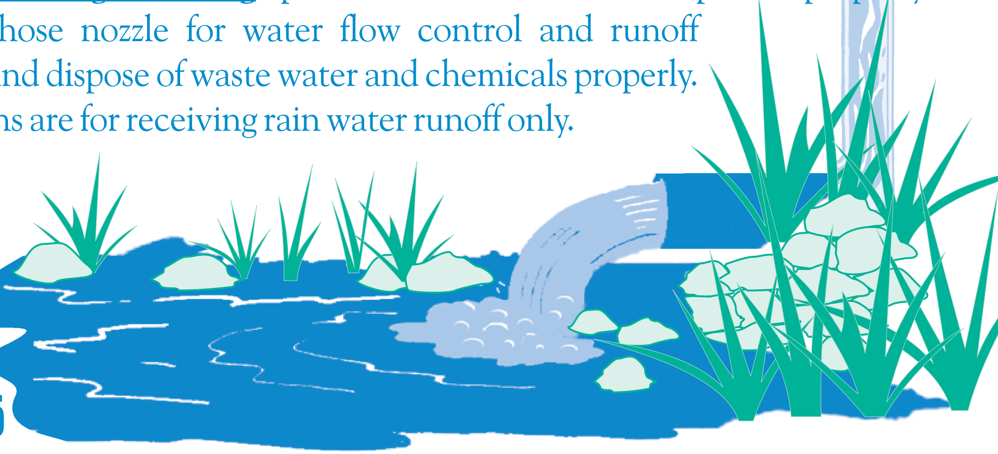
Do you know where street flows actually go?

Storm drains are NOT connected to sanitary sewer systems and treatment plants!

The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water <u>away</u> from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.

...ONLY RAIN... DOWN THE STORM DRAIN

Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system <u>can</u> impact the delicate aquatic environment.

When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

Landscaping and garden maintenance activities can be major contributors to water pollution. Soils, yard wastes, over-watering and garden chemicals become part of the urban runoff mix that winds its way through streets, gutters and storm drains before entering lakes, rivers, streams, etc. Urban runoff pollution contaminates water and harms aquatic life!

In Riverside County, report illegal discharges into the storm drain, call
1-800-506-2555
"Only Rain Down the Storm Drain"

Important Links:

Riverside County Household Hazardous Waste Collection Information
1-800-304-2226 or www.rivcowm.org

Riverside County Backyard Composting Program
1-800-366-SAVE

Integrated Pest Management (IPM) Solutions
www.ipm.ucdavis.edu

California Master Gardener Programs
www.mastergardeners.org
www.camastergardeners.ucdavis.edu

California Native Plant Society
www.cnps.org

The Riverside County "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges Orange County's Storm Water Program for their contribution to this brochure.

...Only Rain Down ...the Storm Drain

What you should know for... Landscape and Gardening

Best Management tips for:

- Professionals
- Novices
- Landscapers
- Gardeners
- Cultivators

Tips for Landscape & Gardening

This brochure will help you to get the most of your lawn and gardening efforts and keep our waterways clean. Clean waterways provide recreation, establish thriving fish habitats, secure safe sanctuaries for wildlife, and add beauty to our communities. NEVER allow gardening products or waste water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers and pesticides applied to the landscape.

- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

- Consider recycling your green waste and adding "nature's own fertilizer" to your lawn or garden.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.
- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains or sewers. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting.
- Try natural long-term common sense solutions first. Integrated Pest Management (IPM) can provide landscaping guidance and solutions, such as:
  - ◆ **Physical Controls** - Try hand picking, barriers, traps or caulking holes to control weeds and pests.
  - ◆ **Biological Controls** - Use predatory insects to control harmful pests.
  - ◆ **Chemical Controls** - Check out www.ipm.ucdavis.edu before using chemicals. Remember, all chemicals should be used cautiously and in moderation.
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Waste Collection Center to be recycled.
- *Dumping toxics into the street, gutter or storm drain is illegal!*

www.bewaterwise.com Great water conservation tips and drought tolerant garden designs.

www.ourwaterourworld.com Learn how to safely manage home and garden pests.

Additional information can also be found on the back of this brochure.

Saltwater Pools

- Salt water pools, although different from regular pools, are in fact, sanitized using chlorine. A salt-chlorine generator separates the chlorine and sodium molecules in salt and reintroduces them into the pool water. The same harmful effects of chlorine still apply.
- A salt water pool is still maintained with chemicals such as Muriatic acid, soda ash and sodium carbonate to help keep a proper pH, total Alkalinity, Calcium Hardness and Stabilizer levels.

- It may be illegal to discharge salt water to land. The salt may kill plants and the build-up of salt in soil puts animals, plants, and groundwater at risk. Consult your city representatives to determine local requirements regarding salt water drainage.

NEVER put unused chemicals into the trash, onto the ground or down a storm drain.

IMPORTANT: The discharge of pollutants into the street, gutter, storm drain system or waterways - without a permit or waiver - is strictly prohibited by local ordinances, state and federal law. Violations may result in monetary fines and enforcement actions.

Helpful telephone numbers and links

RIVERSIDE COUNTY WATER AGENCIES:

City of Banning	(951) 922-3130
City of Beaumont/Cherry Valley	(951) 845-9581
City of Blythe	(760) 922-6161
City of Coachella	(760) 398-3502
City of Corona	(951) 736-2263
City of Hemet	(951) 765-3710
City of Norco	(951) 270 5607
City of Riverside Public Works	(951) 351-6140
City of San Jacinto	(951) 654-4041
Coachella Valley Water District	(760) 398-2651
Desert Water Agency (Palm Springs)	(760) 323-4971
Eastern Municipal Water District	(951) 928-3777
Elsinore Valley Municipal Water District	(951) 674 3146
Elsinore Water District	(951) 674-2168
Farm Mutual Water Company	(951) 244-4198
Idyllwild Water District	(951) 659-2143
Indio Water Authority	(760) 391-4129
Jurupa Community Services District	(951) 685-7434
Lee Lake Water	(951) 658-3241
Mission Springs Water	(760) 329-6448
Rancho California Water District	(951) 296-6900
Ripley, CSA #62	(760) 922-4951
Riverside Co. Service Area #51	(760) 227-3203
Rubidoux Community Services District	(951) 684-7580
Valley Sanitary District	(760) 347-2356
Western Municipal Water District	(951) 789-5000
Yucaipa Valley Water District	(909) 797-5117

CALL 1-800-506-2555 to:

- Report clogged storm drains or illegal storm drain disposal from residential, industrial, construction and commercial sites into public streets, storm drains and/or water bodies.
- Find out about our various storm drain pollution prevention materials.
- Locate the dates and times of Household Hazardous Waste (HHW) Collection Events.
- Request adult, neighborhood, or classroom presentations.
- Locate other County environmental services.
- Receive grasscycling information and composting workshop information.

Or visit our
Riverside County Flood Control and Water Conservation District
website at: www.rcflood.org

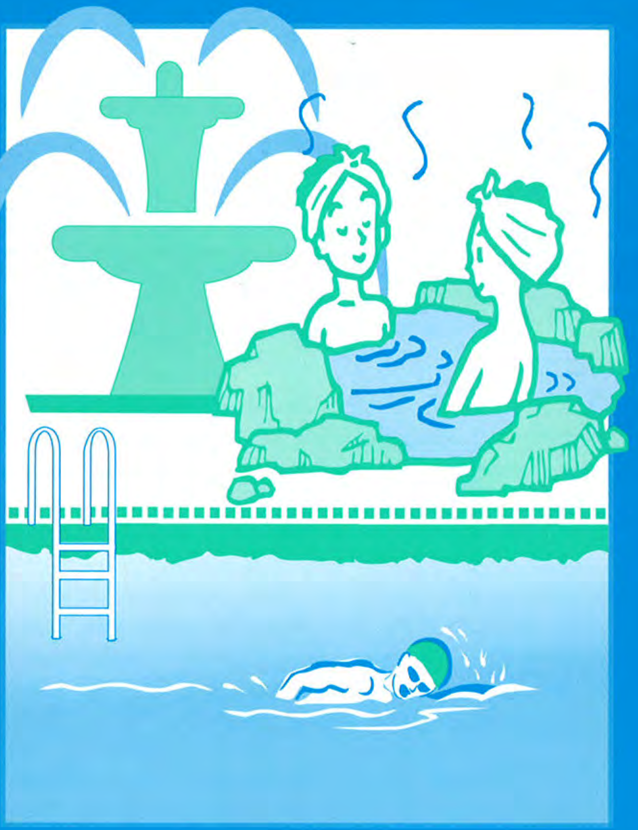
Other links to additional storm drain pollution information:

- County of Riverside Environmental Health: www.rivcoeh.org
- State Water Resources Control Board: www.waterboards.ca.gov
- California Stormwater Quality Association: www.casqa.org
- United States Environmental Protection Agency (EPA): www.epa.gov/compliance/assistance (compliance assistance information)

ONLY RAIN ... DOWN THE STORM DRAIN

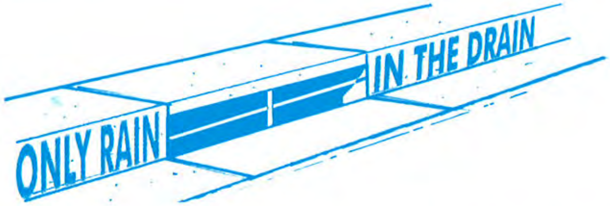
Riverside County's, "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges the Bay Area Stormwater Management Agencies Association and the Cleaning Equipment Trade Association for information provided in this brochure.

Guidelines for Maintaining your...



Swimming Pool, Jacuzzi and Garden Fountain

Where does the water go?



Pool, Jacuzzi and Fountain wastewater and rain water runoff (also called stormwater) that reach streets can enter the storm drain and be conveyed directly into local streams, rivers and lakes.

A storm drain's purpose is to prevent flooding by carrying rain water away from developed areas. Storm drains are not connected to sanitary sewers systems and treatment plants!

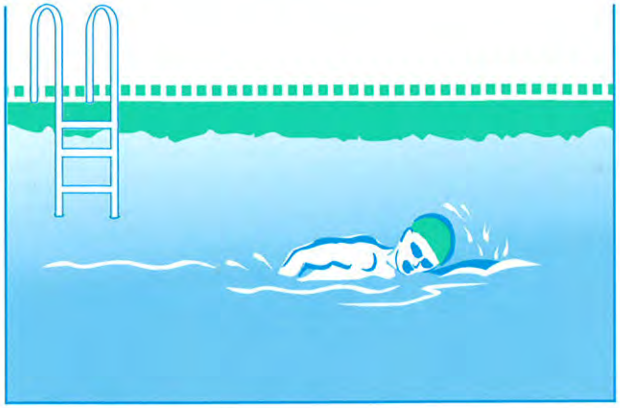
Wastewater, from residential swimming pools, Jacuzzis, fishponds and fountains, often contains chemicals used for sanitizing or cleansing purposes. Toxic chemicals (such as chlorine or copper-based algaecides) may pollute the environment when discharged into a storm drain system.

The Cities and County of Riverside have adopted ordinances that prohibit the discharge of wastewater to the street and storm drain system.

Discharge Regulations

Regulatory requirements for discharging wastewater from your pool may differ from city to city. Chlorinated water should not be discharged into the street, storm drain or surface waters. Check with your water agency to see if disposal to the sanitary sewer line is allowed for pool discharges (see reverse for Riverside County sewer agencies).

If allowed, a hose can be run from the pool Jacuzzi, or fountain to the private sewer cleanout, washing machine drain or a sink or bathtub.



If you cannot discharge to the sewer, you may drain your fountain, pool, or jacuzzi to your landscaping by following these guidelines:

First, reduce or eliminate solids (e.g. debris, leaves or dirt) in the pool water and allow the chemicals in the pool water to dissipate before draining the pool (this could take up to 7 days, verify using a home pool test kit).

Second, slowly drain to a landscaped area away from buildings or structures. Control the flow to prevent soil erosion; it may take more than one day to empty. Do not allow sediment to enter the street, gutter or storm drain.

Maintenance & Chemicals

Cleaning Filters

Filter rinse water and backwash must be discharged to the sanitary sewer, on-site septic tank and drain field system (if properly designed and adequately sized), or a seepage pit. Alternatively, rinse water or backwash may be diverted to landscaped or dirt areas. Filter media and other non-hazardous solids should be picked up and disposed of in the trash.

Algaecides

Avoid using copper-based algaecides unless absolutely necessary. Control algae with chlorine, organic polymers or other alternatives to copper-based pool chemicals. Copper is a heavy metal that can be toxic to aquatic life when you drain your pool.

Chemical Storage and Handling

- Use only the amount indicated on product labels
- Store chlorine and other chemicals in a covered area to prevent runoff. Keep out of reach of children and pets.
- Chlorine kits, available at retail swimming pool equipment and supply stores, should be used to monitor the chlorine and pH levels before draining your pool.
- Chlorine and other pool chemicals should never be allowed to flow into the gutter or storm drain system.

Take unwanted chemicals to a Household Hazardous Waste (HHW) Collection Event. There's no cost for taking HHW items to collection events – it's FREE! Call **1-800-506-2555** for a schedule of HHW events in your community.

IRRIGATION RUNOFF

STORMWATER FACT SHEET

RIVERSIDE COUNTY
WATERSHED PROTECTION

Report Irrigation Runoff or Stormwater Pollution:
800.506.2555

OVERWATERING

Overwatering causes irrigation runoff that may contain pollutants such as pesticides, herbicides, fertilizers, pet waste, yard waste, and sediments which can be hazardous to residents and harmful to our environment. Runoff can also serve as a transport mechanism for other pollutants already on the ground or in the curb gutter. Irrigation runoff entering the storm drain system is an illicit discharge.

BEST PRACTICES

Urban runoff begins when yards and landscaped areas are over-irrigated. Irrigation systems require regular maintenance and visual inspection of the system should be performed to prevent over-spray, leaks, and other problems that result in runoff to storm drains, curbs and gutters.

You can **prevent pollution** by conserving water on your property. Water during cooler times of the day (before 10am and after 6pm).

- Adjust sprinklers to stop overspray and runoff.
- Make needed repairs immediately.
- Use drip irrigation, soaker hoses, or micro-spray systems.
- Use an irrigation timer to pre-set watering times.
- Use a control nozzle or similar mechanism when watering by hand.
- Switch to a water-wise landscape - native plants need less fertilizers, herbicides, pesticides and water.

PROTECT OUR WATERSHED

Many people think that when water flows into a storm drain it is treated, but the storm drain system and the sanitary sewer system are not connected. Everything that enters storm drains flows untreated directly into our creeks, rivers, lakes, beaches and ultimately the ocean. Storm water often contains pollutants, including chemicals, trash, and automobile fluids, all of which pollute our watershed and harm fish and wildlife.

Whether at home or work, you can help reduce pollution and improve water quality by using the above Best Management Practices (BMP's) as part of your daily clean up and maintenance routine.

For Information:

To report illegal dumping or a clogged storm drain
1-800-506-2555

Hazardous Materials Disposal,
Recycling/Disposal Vendors call:
951-486-3200 or 1-800-506-2555

County Code Enforcement Offices
(unincorporated area)

Lake Elsinore/Mead Valley	951-245-3186
Jurupa Valley	951-275-8739
Moreno Valley/Banning	951-485-5840
Murrieta So. County	951-600-6140
Thousand Palms District	760-343-4150

Environmental Crimes
1-800-304-6100

Spill Response Agency
1-800-304-2226 or 951-358-5172

Recycling and Hazardous Waste Disposal
1-800-366-SAVE

For pollution prevention brochures or to obtain information on other County Environmental Services, call 1-800-506-2555

Popular links:
www.rcflood.org
www.cabmphandbooks.com
www.cfpub.epa.gov/npdes

ONLY RAIN DOWN THE
STORM DRAIN
POLLUTION PREVENTION
PROGRAM
1-800-506-2555

Riverside County's "Only Rain Down the Storm Drain" Pollution Prevention Program members include:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
City of Riverside
Corona
Coachella
Coachella Valley Water District
Desert Hot Springs
Hemet
Indian Wells
Indio
Lake Elsinore
La Quinta
Menifee
Murrieta
Moreno Valley
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside County
San Jacinto
Temecula
Wildomar

Stormwater Pollution

What you should know for...

Automotive Maintenance and Car Care

Best Management Practices (BMPS) for:

- Auto Body Shops
- Auto Repair Shops
- Car Dealerships
- Gas Stations
- Fleet Service Operations

Stormwater Pollution...What You Should Know

Riverside County has three major river systems, or watersheds, that are important to our communities and the environment. Improper automotive maintenance, storage and washing activities can cause pollution that endangers the health of these rivers.

Pollutants that can collect on the ground from automotive repair, storage and washing areas such as antifreeze, oil, grease, gas, lubricants, soaps and dirt can be washed into the street by rain, over-irrigation or wash water runoff. Once these pollutants are in the streets they can be carried to these rivers by the storm drain system. Unlike the sewer system, the storm drain system carries water (and pollution) to our rivers without treatment. Pollution from storm drains is a form of storm water pollution.

A common storm water pollution problem associated with automotive shops and businesses is the activity of hosing down service bays without proper capture of runoff water, illegal dumping of fluids to the street or storm drain inlets and not properly storing hazardous materials. Examples of pollutants that can be mobilized by these activities include oil and grease from cars, copper and asbestos from worn break linings, zinc from tires and toxics from spilled fluids.

The Cities and County of Riverside have adopted ordinances, in accordance with state and federal law, which prohibit the discharge of pollutants into the storm drain system or local lakes, rivers or streams. This brochure provides common practices that can prevent storm water pollution and keep your shop in compliance with the law.

Best Management Practices for Auto Body & Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations

Changing Automotive Fluids

- Locate storm drains on or near your property. Do not allow material to flow to these drains.
- Collect, and separately recycle motor oil, antifreeze, transmission fluid and gear oil. Combining waste fluid prevents recycling.
- Drain brake fluid and other non-recyclables into a proper container and handle as a hazardous waste.
- Use a recyclable radiator flushing fluid and discard safely.

Only rain is allowed down the storm drain! Don't be an offender!! Violations of local ordinances are prosecuted to the fullest extent of the law.

Identify specific activities with the potential to cause spills or release pollutants such as oil, grease, fuel, etc. Post signs and train employees on how to prevent and clean up spills during activities.

YOU can prevent Stormwater Pollution following these practices...

Working on Transmissions, Engines and Miscellaneous Repairs

- Keep a drip pan or a wide low-rimmed container under vehicles to catch fluids whenever you unclip hoses, unscrew filters, or change parts, to contain unexpected leaks.
- Drain all fluids from wrecked vehicles into proper containers before disassembly or repair.
- Store batteries indoors, on an open rack.
- Return used batteries to a battery vendor.
- Contain cracked batteries to prevent hazardous spills.
- Catch metal filings in an enclosed unit or on a tarpaulin.
- Sweep filing areas to prevent washing metals into floor drains.

Cleaning Parts

- Clean parts in a self-contained unit, solvent sink, or parts washer to prevent solvents and grease from entering a storm drain.

Fueling Vehicles

- Clean-up minor spills with a dry absorbent, rather than allowing them to evaporate.
- Use a damp cloth and a damp mop to keep the area clean rather than a hose or a wet mop.

Keeping your shop or work area pollutant clean and environmentally safe

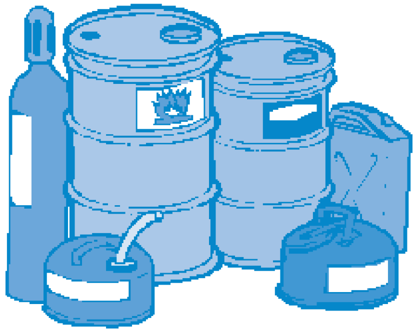
- Never hose down your work area, as pollutants could be washed into the storm drain.
- Sweep or vacuum the shop floor frequently.
- Routinely check equipment. Wipe up spills and repair leaks.
- Use large pans or an inflatable portable berm under wrecked cars.
- Avoid spills by emptying and wiping drip pans, when they are half-full.
- Keep dry absorbent materials and/or a wet/dry vacuum cleaner on hand for mid-sized spills.
- Train your employees to be familiar with hazardous spill response plans and emergency procedures.
- Immediately report hazardous material spills that have entered the street or storm drain to OES and local authorities.

Outdoor Parking and Auto Maintenance

- Use covered or controlled areas to prevent offsite spills.
- Sweep-up trash and dirt from outdoor parking and maintenance areas. Do not hose down areas. All non-stormwater discharges to the street of storm drain are prohibited.

Storing and Disposing of Waste

- Store recyclable and non-recyclable waste separately.
- Place liquid waste (hazardous or otherwise) in proper containers with secondary containment.
- Cover outdoor storage areas to prevent contact with rain water.
- Collect used parts for delivery to a scrap metal dealer.



Washing vehicles and steam cleaning equipment

- For car washing, minimize wash water used and use designated areas. Never discharge wash water to the street, gutters or storm drain.
- Be sure to keep waste water from engine parts cleaning or steam cleaning from being discharged to the street, gutter or storm drain.
- Wash vehicles and steam clean with environmentally friendly soaps and polishes.

Selecting and Controlling Inventory

- Purchase recyclable or non-toxic materials.
- Select "closed-loop" suppliers and purchase supplies in bulk.

Appendix C

BMP OPERATION & MAINTENANCE AND TRAINING LOGS

BMP OPERATION & MAINTENANCE LOG

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

TRAINING / EDUCATIONAL LOG

Date of Training/Educational Activity: ___________________________________

Name of Person Performing Activity (Printed): ___________________________________

Signature: ___________________________________

Topic of Training/Educational Activity: ___________________________________

____

Name of Participant	Signature of Participant

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

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

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

APPENDIX D

CITY OF LA QUINTA
WATER QUALITY MANAGEMENT PLAN (WQMP) VERIFICATION SURVEY

Project Name/Site Address: ______________________________

Responsible Party : ______________________________

Contact Phone: ______________ Contact Email: ______________

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

   ☐ **Yes** ☐ **No** Name of Landscape/Maintenance Contractor: ______________________

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

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

   ☐ **Yes** ☐ **No** Date of Last Inspection/Maintenance: ______________________

   Maintenance conducted by: ______________________________

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

   ☐ **Yes** ☐ **No** If yes, how was the problem resolved?: ______________________

   ____

4. **What type of Integrated Pest Management (IPM) practices are used on site?**

   ____

5. **Are native and/or drought tolerant plants established and considered for any new landscaping?**

   ☐ **Yes** ☐ **No**

6. **Have the storm drain stencils been inspected annually for legibility prior to Oct. 1?**

   ☐ **Yes** ☐ **No** Total number of stencils on site: __________

   How many inlets required restenciling / date of restenciling? ___________ /_____________

7. **Have education materials been distributed to the residents/tenants/contractors within the past year?**

☐ **Yes** ☐ **No** Topic / Date of Distribution: ____________________ / ________________________

Method of Distribution: newsletter, billing insert, etc.: _________________________

8. **Is street sweeping conducted weekly?**

   ☐ **Yes** ☐ **No** **Contractor:** ____

9. **Are trash areas in common area inspected daily?**

   ☐ **Yes** ☐ **No**

10. **Have any vector concerns been observed (standing water, mosquito larvae, etc.). if yes, please contact Orange County Vector Control District at www.ocvcd.org.**

    ☐ **Yes** ☐ **No**

11. **Have the treatment BMPs been inspected and maintained per Manufacturer instructions? (attach invoices and inspection/maintenance forms).**

    ☐ **Yes** ☐ **No**

12. **Have there been any issues with operation and maintenance of the treatment BMPs units?**

    ____

I certify that the above information is correct and that the BMPs for this project have been implemented and operated and maintained in accordance with the Operation and Maintenance (O&M) Plan on site and on file at the City.

____
Print Name of Responsible Party

____
Signature (required) Date

This form must be completed and submitted to the City by September 30 each year.

Appendix E

Soils Report

NMG
Geotechnical, Inc.

August 27, 2021

Project No. 18186-01

To: Hofmann Management Company
c/o TRG Land Design
898 Production Place
Newport Beach, California 92663

Attention: Mr. Mark Rogers

Subject: Preliminary Geotechnical Evaluation and Planning Study, Proposed Residential Development at Travertine, City of La Quinta, California

In accordance with your authorization, NMG Geotechnical, Inc. (NMG) has performed a preliminary geotechnical evaluation and planning study for the proposed Travertine mixed-use development in the city of La Quinta, California. We have reviewed the grading plan prepared by ProActive Engineering Consultants, received by NMG on May 20, 2019, in light of the geotechnical conditions at the site in order to provide geotechnical recommendations for the proposed grading and development. This report will also be used for preparation of the project Environmental Impact Report (EIR).

Prior subsurface investigations have been performed at and adjacent to the site by various consultants (Appendix A). In addition, NMG conducted geophysical surveys at three locations, performed geologic mapping of the site, and completed an infiltration study for the two proposed water quality basins in the eastern portion of the site. The infiltration study included drilling of seven hollow-stem- auger borings to depths of 20 to 40 feet, percolation testing in five of the borings, laboratory testing, and evaluation of design infiltration rates. The collected data was compiled and are the basis for our findings, conclusions, and recommendations presented in this report. The 200-scale grading plan was used as the base map to present boring and test pit locations and geologic mapping for the site (Preliminary Geotechnical Map: Plates 1 and 2). The 200-scale grading and topographic maps and test pit data were also utilized to prepare an Approximate Rock Distribution Map (Plate 3).

This report presents our findings and provides preliminary remedial grading and foundation design recommendations for the proposed development concept. Based on our findings, we conclude that the proposed development is feasible provided it is designed, graded and constructed in accordance with the preliminary geotechnical recommendations in this report. Additional geotechnical exploration, review, and analysis may need to be performed during the future design phases and as rough grading plans become available. The recommendations provided herein will then be confirmed and/or updated as necessary based on our findings.

If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

NMG GEOTECHNICAL, INC.

Anthony Zepeda, CEG 2681
Project Geologist

Shahrooz "Bob" Karimi, RCE 54250
Principal Engineer

Terri Wright

Terri Wright, CEG 1342
Principal Geologist

TW/AZ/SBK/grd

Distribution: (1) Addressee (E-Mail)

TABLE OF CONTENTS

1.0 INTRODUCTION....1

1.1 Purpose and Scope of Work....1
1.2 Site Location and Description....2
1.3 Proposed Conceptual Development and Grading....3
1.4 Site History and Prior Investigations/Grading....3
1.5 Field Exploration....5
1.6 Laboratory Testing....5

2.0 GEOTECHNICAL FINDINGS....7

2.1 Geologic Setting and Soil Mapping....7
2.2 Earth Units....7
2.3 Laboratory Testing and Soil Properties....9
2.4 Groundwater and Surface Water/Flood Potential....10
2.5 Regional Faulting and Seismicity....11
2.6 Slope Stability and Mass Movements....12
2.7 Settlement....12
2.8 Regional Subsidence....13
2.9 Erosion Potential and Scour Protection....13
2.10 Rippability and Oversize Rocks....13
2.11 Infiltration Testing....14
2.12 Earthwork Bulking/Shrinking and Subsidence....15

3.0 CONCLUSION AND PRELIMINARY RECOMMENDATIONS....16

3.1 General Conclusion and Recommendation....16
3.2 Earthwork and Grading Specifications....16
3.3 Remedial Grading and Overexcavation....16
3.4 Rippability....17
3.5 Oversize Rock Crushing....17
3.6 Placement of Oversize Material....17
3.7 Slope Stabilization....18
3.8 Groundwater Conditions....19
3.9 Settlement....19
3.10 Foundation Design....19
3.11 Storm Water Infiltration Feasibility....20
3.12 Trench Excavations and Backfill....20
3.13 Lateral Earth Pressures....20
3.14 Preliminary Pavement Design....21
3.15 Structural Setbacks....22
3.16 Seismic Design Guidelines....22
3.17 Subdrains....23
3.18 Expansion Potential....23
3.19 Cement Type and Corrosivity....23
3.20 Exterior Concrete....23
3.21 Slope Maintenance and Protection....25
3.22 Surface Drainage....25

3.23 Additional Geotechnical Investigation and Plan Reviews 25
3.24 Geotechnical Observation and Testing During Grading and Construction....25

4.0 LIMITATIONS 27

Appendices

Appendix A – References and Definitions
Appendix B – Boring and Test Pit Logs
Appendix C – Laboratory Test Results
Appendix D – Seismic Parameters
Appendix E – Geophysical Study
Appendix F – Infiltration Testing Data
Appendix G – General Earthwork and Grading Specifications

Figures and Plates

Figure 1 – Site Location Map – Rear of Text
Figure 2 – USDA Soil Map – Rear of Text
Figure 3 – Regional Geology Map (Dibblee, 2008) – Rear of Text
Figure 4 – Regional Geology Map (CGS, 2012) – Rear of Text
Figure 5 – Regional Fault Map – Rear of Text
Figure 6 – Seismic Hazards Map – Rear of Text
Figure 7 – Retaining Wall Drainage Detail – Rear of Text

Plates 1 and 2 – Preliminary Geotechnical Map – In Pocket
Plate 3 – Approximate Rock Distribution Map – In Pocket

1.0 INTRODUCTION

1.1 Purpose and Scope of Work

NMG Geotechnical, Inc. (NMG) has prepared this report of geotechnical evaluation and planning-level study for the proposed Travertine mixed-use development in the city of La Quinta, California. We have reviewed the proposed grading and development in light of the geotechnical conditions at the site in order to provide preliminary geotechnical recommendations for the proposed grading and development. This report will also serve as the technical Appendix G for the EIR.

We have reviewed the grading plan prepared by ProActive Engineering, received by NMG on May 20, 2019. The grading plan was used as the base map for our Preliminary Geotechnical Map (Plates 1 and 2) to present the geologic mapping and locations of geotechnical borings, percolation test borings, seismic lines, and test pits at the site. The 200-scale grading and topographic maps and test pit data were also utilized to prepare an Approximate Rock Distribution Map (Plate 3).

Our scope of work was as follows:

- Acquisition, review and compilation of available geologic/geotechnical reports and maps for the subject site and surrounding area. A reference list and definitions of terms used in this report are included in Appendix A.
- The 200-scale Preliminary Geotechnical Map (Plates 1 and 2) provides a compilation of the boring and test pit locations at and adjacent to the site from this and previous geotechnical studies. Boring and test pit logs by NMG and others are included in Appendix B.
- Review of historic aerial photographs dating back to the late 1940s and historic topographic maps dating back to the early 1900s. A list of reviewed photographs is included in Appendix A.
- Geologic mapping of alluvial fans and exposures of bedrock in the mountains and hills adjacent to the proposed development. Geologic field mapping was performed on May 9 and 10, 2019. The geologic mapping is presented on the Preliminary Geotechnical Map (Plates 1 and 2).
- A geophysical study was performed on May 9, 2019 to evaluate the rippability potential of the onsite materials at the anticipated locations of the deepest cuts. The approximate locations of the seismic lines are provided on the Preliminary Geotechnical Map (Plates 1 and 2). The complete geophysical refraction study is included in Appendix E.
- An infiltration study was performed August 9 through 12, 2021, that included drilling and sampling of seven hollow-stem-auger borings at the two proposed water quality basins in the eastern portion of the site. Percolation testing was performed in five of the borings in general conformance with the Riverside County Design Handbook for Low Impact Development Best Management Practices. The boring logs are included in Appendix B. The percolation test data are presented in Appendix F.
- An Approximate Rock Distribution Map (Plate 3) was prepared based on the percentages of boulders (oversize) recorded in the test pits to show the amount of oversize that may be generated during grading.

- Laboratory testing by NMG included moisture density, grain size and collapse testing. We also reviewed laboratory test results by others, including grain size distribution, consolidation, maximum density, optimum moisture content, permeability, expansion index, and corrosion potential. Laboratory test results by NMG and others are included in Appendix C, the in-situ moisture and density test results are included on the boring logs in Appendix B.

- Evaluation of faulting and seismicity in accordance with the 2019 California Building Code (CBC) and the current standard of practice. Seismic design parameters are included in Section 3.16 and the data in Appendix D.

- Geotechnical evaluation and analysis of the compiled data with respect to the proposed development. Geologic analysis included preparation of the geotechnical map and review of prior data compiled for this report. Geotechnical analysis included evaluation of rippability, rock (oversize) quantification, groundwater, settlement, slope stability, infiltration rate calculation, and development of preliminary grading recommendations. This task also included review of the preliminary grading plan in light of the geotechnical conditions. Geotechnical grading recommendations are included in Sections 3.2 to 3.7, and the General Earthwork and Grading Specifications are provided in Appendix G.

- Preparation of this report with our findings, conclusions, and preliminary recommendations for the subject development.

1.2 Site Location and Description

The approximately 855-acre site is located in the southern most portion of the City of La Quinta. The property is accessed from the east, via a gate and dirt road over the levee from the western end of 62nd Avenue (Plate 2). The site consists of east-facing mountain-front alluvial fan, sloping gently at approximately 3 to 6 percent toward the east. Existing elevations vary from a high of 270 feet above mean sea level (msl) in the west, to a low of 30 feet above msl in the east near 62nd Avenue. Locally, where 62nd Avenue and Madison Avenue are proposed to cross the existing levee, elevations at the toes of the levee are below sea level (-10 feet msl). The highest elevation within the boundary of the grading is 455 feet msl in the southwest corner where two water tanks are proposed.

Site drainage sheet flows over the land surface toward existing washes and ultimately drains to the east. These flows historically made their way into the Whitewater River located 7 miles to the east of the site; however, a levee was constructed with infiltration ponds (Thomas E. Levy Groundwater Replenishment Facility) west of the levee. Surface flows are now impounded and infiltrate into the Coachella Valley groundwater basin.

An abandoned vineyard is present within the central portion of the site. Miscellaneous remnants of this operation are still present, consisting of trellises, root balls, irrigation-related pipelines and well pads, and scattered rock piles likely generated during grading of the vineyard. The remainder of the site is essentially in its native condition, with sparse vegetation and abundant cobbles and boulders at the surface.

There were limited utilities noted during our site reconnaissance, including overhead electric and remnants of water/irrigation, which previously supplied water for the vineyard. A water line is present along 62nd Avenue, crossing the existing levee, which supplies water to the Thomas E. Levy Groundwater Replenishment Facility east of the project area.

1.3 Proposed Conceptual Development and Grading

The proposed project covers an area of approximately 855 acres and will be comprised of a variety of land uses. Residential land uses will range from low to medium density (1.5 to 8.5 dwelling units per acre) and total up to 1,200 dwelling units of varying product types. A resort/spa facility is planned in the northern portion of the community to serve residents, tourists and recreational visitors. The facility features a 45,000 square foot boutique hotel with a 175-seat restaurant, 97,500 square feet of lodging to allow 100 villas, and an 8,700 square foot spa and wellness center.

A 4-hole golf practice facility with a clubhouse is planned in the southeast portion of the site and will include a driving range, tracking bays, putting course, pro-shop, restaurant and bar, banquet and restaurant facility to be shared with wedding garden facilities. Bike lanes, pedestrian walkways, and a Travertine community trail system is proposed throughout the community. Recreational open space uses include picnic tables, barbeques, tot lot playground, two community parks and staging facilities for the regional interpretive trail.

Proposed grading will consist of design cuts and fills up to 40 and 60 feet thick, respectively. The preliminary grading plan shows cut and fill slopes within the interior of the project at 3H:1V (horizontal to vertical) inclinations or flatter, up to 80 feet high. The perimeter slopes of the project are at inclinations of 2H:1V or flatter, up to 30 feet high. There will be perimeter flood protection along the western and southern boundaries, that consists of a raised edge condition (2H:1V slope) with armored lining to protect against scour and erosion.

There will be two paved public access roads and a paved emergency access road. Both 62nd Avenue and Madison Street extensions will include grading adjacent to and over the existing flood control levee, from the east and north, respectively. Jefferson Street will also be extended to the north (Plate 1), to connect to the Coral Canyon portion of Jefferson Street, ultimately connecting to 58th Avenue. Madison Street will be the emergency access, to connect to 60 Avenue and used by CVWD for access to their facilities. 62nd Avenue will be the main entrance to the site and the existing approach on the eastern side of the levee will be lengthened to soften grade with embankments likely supported with retaining structures. Additionally, culvert/arch crossings are anticipated to support the roadway extensions on the west side of the levee at 62nd Avenue and the south side of the levee for Madison Street. The alignment of Jefferson Street will cross over the Guadalupe dike at the northwest corner of the project, and may also include culvert/arch crossings.

1.4 Site History and Prior Investigations/Grading

Based on historic aerial photographs dating back to the 1940s and historic topographic maps dating back to the early 1900s, the following site history can be detailed:

- The earliest topographic map reviewed was from 1904. The natural drainages and dry creeks appear roughly in the same location as today. The map indicates very little development of structures and roadways within the Coachella Valley area.

- In 1949, the site appears to be in its natural condition and predates the flood control levee (Dike No. 4) to the east. Visible lineaments representing the shoreline of ancient Lake Cahuilla are evident in the photographs. Other geomorphic features, such as the Martinez Landslide and varying-age alluvial fans and desert varnish/pavement are visible. The site remained in this condition through the 1950s.

- By 1977, the flood control levee and associated control/conveyance levees were constructed. No infiltration ponds were yet constructed. The remainder of the project area appears to be in its native condition.

- By 1998, a portion of the site was being utilized for agriculture (vineyard) and appears to generally be in the present-day condition.

- Between 2006 and 2009, the Thomas E. Levy groundwater replenishment infiltration ponds were graded on the western side of the flood control levee.

We have compiled and reviewed the data from numerous geotechnical studies performed at and near the site. A summary of the reports obtained and the investigations performed is presented below. A complete reference list is provided in Appendix A. The boring and test pit logs by others are included in Appendix B and the laboratory test results by others in Appendix C.

- Sladden Engineering (2001) performed a geotechnical evaluation of the existing levee (Dike No. 4 Flood Control Levee) adjacent to the development. The evaluation included excavation of 10 hollow-stem-auger borings to depths of 11.5 to 46.5 feet.

- URS Corporation (2002) performed a geotechnical investigation near the site for the proposed recharge facility. Their investigation included 12 hollow-stem borings to depths of 26.5 to 28 feet, 8 test pits to depths of 11 to 15 feet, installation of two groundwater wells and geotechnical laboratory testing.

- Sladden Engineering (2005a) performed a geotechnical exploration for adjacent development immediately north of the subject site ("Coral Canyon" Development). This exploration included drilling of 12 hollow-stem-auger borings to depths of 8.0 to 30.5 feet.

- Earth Systems Southwest (2007b) performed a geotechnical exploration for the proposed extension of Madison Street. This study included excavation of four hollow-stem-auger borings, laboratory testing, and preparation of the report.

- Earth Systems Southwest (2007c) performed infiltration testing for storm water facilities proposed for the Travertine project. This study included excavation of seven hollow-stem-auger borings, in-situ infiltration testing, collection of surface samples, laboratory testing, and preparation of a report summarizing their findings.

- Earth Systems Southwest (2007d) later prepared a geotechnical engineering report for the Travertine project, which included a field exploration consisting of excavation of 49 test pits ranging in depth from 7 to 26 feet below existing grade, sample collection, and laboratory testing. This report includes the bulk of the data utilized during our review and development of the preliminary geotechnical recommendations provided herein.

1.5 Field Exploration

Our field exploration started with two days of site reconnaissance and geologic mapping performed on May 9 and 10, 2019. The geologic mapping is shown on the Preliminary Geotechnical Map (Plates 1 and 2) utilizing the existing topography and rough grading plan as the base map. The map represents a compilation of the regional geologic mapping, along with aerial photograph interpretation and site-specific mapping.

A seismic refraction survey was performed onsite within areas of the deepest planned cuts in order to review rippability and the potential presence of buried granitic rock. The survey consisted of three seismic lines ranging from 350 to 470 feet long with geophone spacing ranging from 7.5 to 10 feet apart. The locations of the seismic lines are shown on the Preliminary Geotechnical Map (Plates 1 and 2) and the complete seismic refraction survey report is included in Appendix E.

Additional field exploration was performed on August 9 and 10, 2021 in the southeast portion of the site, where two water quality basins are proposed near 62nd Avenue. This work included drilling, logging, and sampling of seven 8-inch-diameter hollow-stem borings (H-1, H-2, P-1 through P-5) to depths between 20 and 40 feet below ground surface with a truck-mounted drill rig. Samples were taken using the Standard Penetration Test (SPT) (1.38-inch inside-diameter) and modified California split-barrel ring sampler (2.5-inch inside-diameter). The samplers were driven into the soil with a 140-pound automatic safety hammer, free-falling 30 inches on the truck-mounted rig. The drive samples were also used to obtain a measure of resistance of the soil to penetration (recorded as blows-per-foot on our geotechnical boring log). Representative bulk samples of onsite soil were collected from the drill cuttings and SPT samples. Relatively undisturbed samples were also collected using the modified California split barrel ring sampler. The borings were backfilled with cuttings and tamped for compaction. The approximate locations of these and prior borings are shown on the Geotechnical Map (Plates 1 and 2). The boring logs are included in Appendix B.

Percolation testing was performed in five borings (P-1 through P-5) on August 10 and 12, 2021 in general conformance with the Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development (2014). This method was approved by the city for use on the Travertine site prior to the work being performed. Two-inch-diameter slotted PVC pipe and granular sand (No. 3) backfill (annular space) was installed within the borings to prevent caving of the native sandy soils during testing. A 4,000-gallon heavy-duty water truck was used to supply water during testing. Percolation test results are discussed in Section 2.11 and presented in Appendix F.

1.6 Laboratory Testing

Due to the dry clean sandy nature of the alluvial soils at the site, undisturbed samples were difficult to collect. Therefore, the majority of laboratory testing was performed on selected bulk and disturbed soil samples. The testing performed included:

- Moisture content and dry density as possible;
- Grain size; and
- Collapse tests.

Laboratory tests were conducted in general conformance with applicable ASTM standards. Laboratory test results by NMG and others are presented in Appendix C. In-situ moisture and dry density results are included on the geotechnical boring logs (Appendix B).

2.0 GEOTECHNICAL FINDINGS

2.1 Geologic Setting and Soil Mapping

The site is situated on substantial alluvial fan deposits at the base of the Santa Rosa Mountains, located within the Peninsular Range geomorphic province of southern California. The project area lies along the west side of Coachella Valley, approximately 14 miles northwest of the Salton Sea. The site is situated west of ancient Lake Cahuilla that once inundated the Coachella Valley. Bedrock is exposed along the northern perimeter and southwest corner of the site and consists of Mesozoic-age plutonic (granitic) rocks. Bedrock units present in the adjacent Santa Rosa Mountains to the west include both Mesozoic-age granitic rock and Pre-Cenozoic-age granitic and metamorphic rocks. Surficial deposits include numerous generations of Quaternary-age alluvial fan deposits.

Soil mapping by the U.S. Department of Agriculture (USDA, 2020) only covers portions of the project area. We have used the existing available data and modified/extended the soil mapping to cover the project area based on the soil types presented in the USDA mapping and our field mapping. Figure 2 presents the combined soils mapping. The granitic bedrock outcrops and elevated older alluvial fan deposits largely composed of cobbles and boulders have been designated as Rock Outcrop and Rubble Land, respectively, in the USDA mapping. The lower-lying younger alluvial fans and active wash materials are also designated as the Carrizo stony sand and Carsitas gravelly sand. This material is generally granular and subject to erosion.

2.2 Earth Units

The site is generally underlain by young and old alluvial fan deposits. Locally along the project perimeter, granitic bedrock is mapped. Undocumented artificial fill associated with grading of flood control levees and the abandoned vineyard are present at the site. Mapped earth units within the development area are described below, in the order of oldest to youngest. The approximate limits of the earth units are shown on the Preliminary Geotechnical Map (Plates 1 and 2). The earth units were based on regional mapping by others (Figures 3 and 4; Dibblee, 2008 and CGS, 2012), and site-specific mapping by Earth Systems Southwest (2007d). NMG refined the units based on review of aerial photographs and field mapping.

Granitic Bedrock (gr): Exposed Mesozoic-age granitic bedrock is mapped within the adjacent mountains to the west-southwest and in the north-south trending ridgeline at the north end of the project area. The medium-grained, massive to foliated, granitic rock was found to be highly fractured and jointed near-surface with veins of feldspar and quartz. The Santa Rosa Mountains to the west expose granitic and metamorphic bedrock that are the source of the fan deposits that underlie the subject site.

Older Alluvial Fan Deposits (Qof) were predominately mapped along the central and southwestern portions of the project area within the elevated fans. This unit was assigned based on fan morphology, relative elevation, magnitude of channel incision, and strong desert pavement and varnish development (Christenson and Purcell, 1985). While many generations of older alluvial fans may be present across the project area, we have designated this unit to represent older fans outside of the active alluvial fan.

Based on test pits excavated and geotechnically logged by Earth Systems Southwest (2007d), TP-30 through TP-32 and TP-39 encountered this earth unit. The material was found to generally consist of light brown to white well-graded fine to coarse sands (SW) with trace to little gravel that were dry and medium dense. The percentage of larger rock (cobbles and boulders) was found to generally range from 20 to 30 percent with an abundance near-surface (80+ percent) at some locations, likely representing the desert pavement. Based on our review of the site-specific data, there is no distinct correlation between earth unit and presence/quantity of cobbles and boulders. This is likely more closely linked to mountain-front proximity. An Approximate Rock Distribution Map (Plate 3) was prepared to distinguish the limits and distribution of oversize material (boulders over 12 inches in the maximum diameter) based on the existing test pit logs and field descriptions.

Younger Alluvial Fan Deposits (Qyf) were mapped across the majority of the project area and is the most prevalent earth unit within the development area. The younger alluvial fans were generally found to have little to no desert pavement or varnish development, mild channel incision, and a braided channel drainage pattern. Based on our mapping, the fan deposits include rocks of both granitic and metamorphic composition that are very hard and not weathered. These rocks are primarily rounded to subangular, cobble to small boulder (12- to 24-inch) size over much of the site, and with boulders up to 2 to 4 feet in the fans to the west.

This unit was encountered in all exploratory trenches by Earth Systems Southwest, except TP-30 through TP-32 and TP-39. The material was found to generally consist of light brown to white well-graded fine to coarse sand (SW) with trace to some gravel, locally with trace to little fines (silts and clays). Additionally, some of the material was found to consist of fine to coarse sandy gravel (GW). The sands and gravels were dry to damp, medium dense to dense, and friable. The test pit logs indicate that the percentage of cobbles and boulders was found to generally range from 2 to 50 percent, with a number of locations as high as 60 to 80 percent. The amount and size of boulders generally decreased to the east, away from the mountains.

The younger alluvial fan deposits were found in our borings drilled in the eastern portion of the site near the future basins and the 62nd Avenue extension. Borings H-1 and H-2 were drilled to depths of 40 feet and encountered primarily gray to brownish-gray fine to coarse sands (SW, SP, SW-SM) with gravelly sand layers (SW/GW) that were between 5 and 10 feet thick. Continuous sampling performed to depths of 20 to 23 feet below the bottom of the basins did not encounter clayey or silty confining layers. Five borings P-1 through P-5 that were drilled to depths of 20 to 30 feet, also encountered similar younger alluvial fan deposits.

Undocumented Artificial Fills (Afu): There are several generations of artificial fill onsite, including undocumented fill associated with vineyard and flood control levee grading. No test pits or exploration was performed within vineyard artificial fill. The fill appears to be of relatively minor thickness and of similar composition to the alluvial fans. More significant grading appears to have been performed along the western and southern perimeters of the vineyard where the natural drainage courses were realigned. This portion of artificial fill appears to have a large concentration of cobbles and boulders, likely to protect the vineyard from scour and heavy flows during rain. Additional piles of undocumented artificial fills are present at the northwestern portion of the vineyard and appear to be composed largely of cobbles and boulders.

Other artificial fills exist along the eastern perimeters of the site (future 62nd Avenue extension), where flood control levees were constructed under the jurisdiction of the Bureau of Reclamation. The levee is constructed with sloping sides, approximately 2H:1V, and 30 to 35 feet above the adjacent natural elevations. A geotechnical study that included field exploration and borings was performed to evaluate the soil conditions within the levee and underlying native soils to determine the adequacy of the levee (Sladden, 2001). The soils were reportedly found to be an inconsistent mixture of brown silty sand (SM) and sandy silt (ML) with scattered gravel. The fill materials were found to be generally very firm, dense, dry to moist and adequate for levee support (Sladden, 2001). The report also indicates that the core was typically siltier than the soils exposed on the embankment. No report documenting the original construction of levee was available for our review.

2.3 Laboratory Testing and Soil Properties

Based on our limited exploration, the matrix materials within the younger alluvial fan deposits encountered in the borings predominantly consisted of clean sands with gravel and varying amount of silt. The majority of the driven samples during our exploration were disturbed due to the presence of gravels and the dry nature of the sandy soils. The in-place moisture contents varied between 0.3 and 7.3 percent. Dry densities were obtained in eleven of the 63 samples and the densities varied between 116.7 and 126.5 pcf. In addition, blow counts generally varied between 20 and 80 blows per foot.

Moisture contents and dry densities for the flood control levee fill ranged from 0.5 to 8.7 percent and 95 to 129 pcf, respectively (Sladden, 2001). Blow counts reportedly ranged from 26 to 100+ blows per foot.

Grain Size Distribution: Grain-size distribution tests were conducted by NMG and others on bulk and/or ring samples. These samples were classified as poorly or well-graded sands with fines contents (passing Sieve No. 200) of 13 percent or less with a Unified Soil Classification System (USCS) of SW, SP or SW-SM. Note that it is likely most cobbles and boulders were screened out during sample collection and preparation. The grain size analysis represents the matrix materials (clay, silt, sand, and gravel) and should be reviewed with the associated test pit log for a more complete representation of the earth units.

Grain-size distribution tests for the flood control levee fill were conducted on 69 bulk and/or ring samples. Sixty-six of these samples were classified as silty or clayey sands with fines contents in the range of 13 to 49 percent (USCS classification of SM or SC). Three of the samples were classified as sandy silt (USCS classification of ML) with fines contents in the range of 52 to 56 percent.

Maximum Density and Optimum Moisture Content: The results of the maximum dry density testing by others indicate that the near-surface soils at depths of 0 to 5 feet have maximum dry densities ranging from 115.5 to 131.0 pcf with optimum moisture contents ranging from 3 to 12 percent.

Maximum dry density testing of the flood control levee fill indicated that the near-surface soils at depths of 0 to 5 feet have maximum dry densities ranging from 131 to 134 pcf with optimum moisture contents ranging from 7 to 8 percent.

Consolidation/Collapse: NMG performed hydro-consolidation tests on two relatively undisturbed ring samples collected at depths of 20 to 30 feet. Hydro-consolidation potential of the samples was estimated under the vertical load of 3.2 ksf, which is near or above the existing overburden pressures of the samples. The estimated hydro-consolidation potential of the samples ranged from 1.4 to 1.6 percent, which is considered to be moderate.

The consolidation test results for the flood control levee fill indicated a collapse potential of less than 3.1 percent and swell potential of less than 0.1 percent upon addition of water at 0.575 and 0.72 kips per square foot (ksf) (Sladden, 2001). The report concluded that the higher collapse potential in the samples may have been attributed to the sample disturbance resulting from very high blow counts during collection. Consolidation testing of onsite materials was not performed during prior studies. The results of the consolidation tests are included in Appendix C.

Corrosivity: Laboratory testing of the soil samples indicated that the onsite soils and those of the flood control levee are considered to be corrosive to severely corrosive to ferrous metals. Soluble sulfate exposure of levee soils is classified as "S0" per Table 19.3.1.1 of ACI-318-14. (Sladden, 2001).

2.4 Groundwater and Surface Water/Flood Potential

Groundwater: The subject site lies within the East Whitewater River sub-basin of the Colorado River groundwater basin. Groundwater has not been encountered in borings or test pits excavated during any of the prior exploratory work. Based on our review of Coachella Valley Water District (CVWD) engineering report, groundwater is at great depth, approximate elevation of -75 feet below msl (CVWD, 2019). Ongoing replenishment has substantially increased the groundwater table over the past decade. Due to the location and elevation of the existing replenishment facility immediately east of the project area, we do not expect groundwater elevations to rise within 50 feet of the planned development.

There are several known water wells onsite within the Thomas E. Levy Groundwater Replenishment Facility. These well locations and groundwater levels were obtained from CVWD and are shown on Plates 1 and 2. Based on data from CVWD, the groundwater in the wells near 62nd Avenue extension varied from 84 to 124.5 feet in depth (or elevations of -75 to -80 feet below msl) on December 16, 2019. The groundwater levels in wells near Madison Avenue were approximately 60 feet deep (or elevation of -80 feet below msl) on December 18, 2019.

Surface Water and Flood Potential: Currently, the U.S. Federal Emergency Management Agency (FEMA) mapping does not cover the project area west of Dike No. 4. We understand that the flooding potential and associated hazards are being reviewed by the project hydrologist and that the development elevations will be situated above anticipated flood elevations, and appropriate scour and erosion protection will provided on the project perimeter slopes.

2.5 Regional Faulting and Seismicity

Faulting: A bedrock fault is mapped within the project area in the northern portion of the site extending toward the south and buried under the alluvial fan (Rogers, 1965 and Earth Systems Southwest, 2007d). This fault was also shown on the Technical Background Report of the Safety Element of the La Quinta 2035 General Plan (Earth Consultants International, 2010) as an inactive fault. There are no faults mapped at the site by other published maps (Dibblee, 2008 and CGS, 2012). The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (CGS, 2018) or within an active or potentially active fault zone defined by Riverside County (2021).

There are several regionally active faults that could produce an earthquake that results in strong ground shaking at the site. The closest seismically active faults are the San Andreas Fault located 9.8 miles to the northeast, and the San Jacinto Fault located 14.8 miles southwest, as shown on Figure 5. The other regionally active, more distant faults that could produce ground shaking at the site include, but are not limited to, the Elsinore Fault and Brawley Seismic Zone.

Seismicity: Properties in southern California are subject to seismic hazards of varying degrees, depending upon the proximity, degree of activity, and capability of nearby faults. These hazards can be primary (i.e., directly related to the energy release of an earthquake such as surface rupture and ground shaking) or secondary (i.e., related to the effect of earthquake energy on the physical world, which can cause phenomena such as liquefaction and ground lurching). Since there are no active faults at the site, the potential for primary ground rupture is considered very low. The primary seismic hazard for this site is ground shaking due to a future earthquake on one of the major regional active faults listed above.

Using the USGS computer program (USGS, 2020) and the site coordinates of 33.60143 degrees north latitude and -116.26159 degrees west longitude, the controlling fault for the site is the San Andreas Fault, with the maximum moment magnitude of 7.7 M_W.

Based on the 2019 CBC and underlying site soil conditions, the site may be classified as Site Class D.

Secondary Seismic Hazards: Both the City of La Quinta Technical Background Report to the Safety Element of the 2035 General Plan (Earth Consultants International, 2010) and Riverside County (2021) provide mapping of potential secondary seismic hazards, such as liquefaction susceptibility and earthquake-induced slope instability. Zones of potentially liquefiable soil, as defined by the County of Riverside, are included on Figure 6 and indicate low to very low liquefaction susceptibility. Based on the depth to groundwater summarized in Section 2.4, the liquefaction potential at the site is considered very low. Mass movements and slope stability are discussed in detail in Section 2.6.

The potential for other secondary seismic hazards, such as tsunami and seiche, are considered very low as the site is located away from bodies of water and at elevation greater than 50 feet above msl.

2.6 Slope Stability and Mass Movements

Permanent Structural Slopes: There are planned 3H:1V cut and fill slopes up to 80 feet high that will be cut from and/or underlain by alluvial fan materials. The proposed slopes are anticipated to be globally stable and likely surficially unstable or subject to erosion due to the lack of fines and cohesion in the native soils. Detailed slope stability analysis will need to be performed at the design-level study. (See further discussions in Section 3.7.)

Temporary Slopes: Temporary excavations may expose varying earth materials, including both compacted and undocumented fills, and alluvial fan deposits. Temporary slopes in alluvial fans are anticipated to be subject to failure due to the sandy nature of the alluvium and lack of cohesion. A detailed slope stability analysis will need to be performed at the design-level study.

Mass Movements and Natural Slopes: The Martinez Rockslide is located south of the site. The rockslide spans over 4.5 miles in length and broke away from the mountainside at an elevation of 6,320 feet above msl, from the top of the Santa Rosa Mountains. It deposited and came to a stop onto the flatter desert floor. The toe area consists of a bouldery landslide material with a slope that is 200 to 300 feet above the adjacent alluvial fan. One study by Bock (1977) tentatively dated the rockslide as Holocene due to remnants of older alluvial fan material beneath the toe of the slide. It is hypothesized that the initiating force was a large seismic event located near Martinez Mountain. The development has been set back approximately 900 feet from the toe of the rockslide. Based on the setback distance and lack of potential energy and upslope materials, we do not anticipate the rockslide will have any impact to the project. However, due to the steep slope at the toe of the rockslide and presence of cobbles and boulders, rockfall hazard exists within the setback area.

The granitic bedrock ridge at the north end of the development was found to generally be fractured and jointed and has been mapped as a potential rockfall hazard (Earth Consultants International, 2010). In general, the plan set indicates 100-foot offset from this bedrock ridge.

Rockfall hazard review and/or analysis should be performed at a later date for both locations discussed above once plans are further developed to evaluate this hazard and provide mitigation recommendations (i.e., impact walls or berms/channels) if required.

2.7 Settlement

Based upon our review of the existing subsurface data and laboratory data, the near-surface soil at the site generally consists of weathered, low density and/or porous material and undocumented fill material. This unsuitable soil is prone to significant collapse and/or consolidation and has poor bearing properties. Below this zone, the native materials appear to be dense, as reported by the high blow counts on the boring logs from adjacent projects. The amount of potential settlement can vary significantly over the site due to variations in subsurface conditions and depths of planned cuts and fills. In conducting our preliminary settlement evaluation, we have assumed that remedial removals will be implemented to remove the undocumented fill materials and weathered alluvial fan deposits; that fill loading will be a maximum of 60 feet over existing ground; and structures will be of low-rise wood-framed construction (one to two stories).

We anticipate the total consolidation settlement at the completion of grading to be on the order of 1 to 1 ½ inches. The differential settlement is then expected to be on the order of ¾-inch over a 40-foot span.

2.8 Regional Subsidence

Regional land subsidence as a result of groundwater withdrawal in the Coachella Valley has been studied by the U.S. Geological Survey over the past 25 years (USGS, 2014). Since the 1900s, increasing agricultural, domestic, and municipal groundwater withdrawal has lowered the water table in Coachella Valley as much as 50 vertical feet, which in turn resulted in wide spread land subsidence. Water levels were measured between 1995 and 2010 and found that groundwater levels were the lowest recorded in 2010. The majority of this measured subsidence occurred in the central portions of the city of La Quinta, north of 60th Avenue, where up to 2 feet was recorded. Interferometric Synthetic Aperture Radar detection indicated that land-surface elevation changes within the project area ranged from 0 to approximately 1.3 inches. Additionally, the study has noted that groundwater levels within the La Quinta area have shown recovery coinciding with increased groundwater replenishment at the Thomas E. Levy Facility beginning in mid-2009. As CVWD continues to monitor and maintain groundwater replenishment and reduce reliance on groundwater resources through water-supply management, we anticipate that regional subsidence will continue to decline.

2.9 Erosion Potential and Scour Protection

The alluvial fan deposits onsite are sandy with generally less than 10 percent fines and are considered highly erodible when exposed to environmental elements without protection. Design cut and fill slopes will need to have surface protection and proper drainage devices. Please note that the design cut slopes are laid back to 3H:1V inclination or flatter to reduce the potential for slope instability and erosion. To reduce the erosion and surficial slumping potential of the graded slopes, permanent manufactured slopes should be protected from erosion by planting with appropriate ground cover or by placing suitable erosion protection (i.e., jute matting, polymer coating, etc.). These measures should be applied as soon as is practical.

The perimeter slopes are designed at 2H:1V and will require additional measures to reduce the erosion and scour potential in order to protect the slopes from flood waters. We understand that scour protection will be designed to depths on the order of 20 feet. Rip-rap or other surface protection will be provided on the slope face below the potential flood levels. These mitigation measures will be designed during future site-specific hydrological studies by others.

2.10 Rippability and Oversize Rocks

A seismic refraction study (Appendix E) was performed within the alluvial fan deposits at the locations of the deepest planned cuts, as shown on the Preliminary Geotechnical Maps (Plates 1 and 2). In general, the primary wave velocities recorded in the uppermost 20 feet of alluvial fan material ranged from 1,500 to 2,500 feet per second (fps) Below 20 feet, velocities were consistently higher, generally 2,500 to 3,500 fps to our total study depth of 80 feet. Additionally, test pits were previously performed across the site to total depths of up to 25 feet with a trackmounted Deere 370C excavator. This work encountered refusal in 6 of 49 total test pit excavations due to large boulders.

While the materials are generally considered rippable, considerable oversize rocks may be generated from the alluvial fan deposits. An Approximate Rock Distribution Map (Plate 3) was prepared to distinguish the limits and distribution of oversize material (boulders over 12 inches in the maximum diameter) that are anticipated to be encountered during grading in each of the cut or remedial removal areas. These percentages are based on the visual observations by Earth Systems Southwest (2007d) personnel while performing the excavator test pits onsite. Based on preliminary calculations, we anticipate that a significant amount of oversize rocks will need to be crushed to complete the proposed grading. With additional rock quality testing (hardness, durability, etc.), we anticipate that the crushed material should meet the Greenbook specifications for Crushed Aggregate Base (CAB). The rock may also be crushed to use as gravel or cobble sizes for use in erosion protection. It is unlikely the rock could be broken to use as rip-rap since the majority of the rock is smaller than the typical rip-rap material.

2.11 Infiltration Testing

There are two water quality basins planned at the site, a 2.5-acre basin north of 62nd Avenue and a 10-acre basin located south of 62nd Avenue. The basins have proposed finish grade elevations, which are 15 to 30 feet below existing grade. Two borings (H-1 and H-2) were drilled to 40 feet bgs, or approximately 20 to 23 feet below the bottom of the proposed basins. Samples below the bottom of the proposed basin elevation were taken continuously with alternating ring samples and SPTs in order to verify that there were no fine-grained confining layers within the effective depths of the basins, per City of La Quinta Engineering Bulletin #06-16.

Five additional borings (P-1 through P-5) were drilled to depths of 20 to 30 feet bgs (or 3 to 7 feet below the bottom of the future basins) for percolation testing. Two-inch diameter slotted PVC pipe and granular sand (No. 3) backfill (annular space) was installed within the borings to prevent caving of the native sandy soils during percolation testing.

The Boring Percolation Tests were performed in P-1 through P-5 on August 10 and 12, 2021 in general conformance with the Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development (2014). Per discussion with the City, they have allowed for preliminary testing and infiltration rate determination to be performed using the established County of Riverside methods.

Initial testing was performed to confirm the "sandy soil criteria," after the pre-soaking period. The final measurements at the end of testing were used to convert percolation rates to infiltration rates using the equations presented in the County design handbook. The field test data sheets that include percolation rates are provided in Appendix F.

The calculated infiltration rates are tabulated below and include rates with a factor-of-safety of 3, as required. The infiltration test results are representative of the location and depth the tests were performed. Due to the inherent variation of subsurface conditions, infiltration rates could vary substantially across the site.

Boring No.	***Tested Depth (ft.)***	***Infiltration Rate (in./hr.)***	***Infiltration Rate (in./hr.) with Factor of Safety***
P-1	21 to 23.5	18.0	6.0
P-2	19 to 23.5	26.7	8.9
P-3	18.5 to 20	26.6	8.9
P-4	21.5 to 24.5	43.7	14.6
P-5	26.5 to 29.5	19.3	6.4

2.12 Earthwork Bulking/Shrinking and Subsidence

The loss or gain of volume (shrink/bulk) of excavated natural materials and recompaction as fill varies according to earth material type and location. This volume change is represented as percent shrinkage (volume loss) and as percent bulking (volume gain) after recompaction of a unit volume of cut in this same material in its natural state. The onsite materials will have varying shrinkage or bulking characteristics. We anticipate that mass excavation and remedial removals will result in a 10 and 15 percent shrinkage, respectively. Note that the onsite materials have little to abundant cobbles and boulders. Crushing will be required to generate fill materials, as discussed in Section 2.10. Crushing rock may result in bulking on the order of 15 percent.

Ground subsidence at the site is estimated to be on the order of 0.2 foot.

3.0 CONCLUSION AND PRELIMINARY RECOMMENDATIONS

3.1 General Conclusion and Recommendation

Based on our study, the site is considered geotechnically suitable for the proposed residential development provided the preliminary geotechnical recommendations in this report are implemented during design, grading and construction. This report should also serve as the geotechnical appendix for the project EIR.

Geotechnical observation/testing and mapping during grading is essential to verify the anticipated conditions and evaluate the recommended remedial design measures. The recommendations in this report are considered minimum and may be superseded by more restrictive requirements of others. These preliminary recommendations will need to be confirmed and updated as necessary during the design phase and through additional geotechnical investigation, testing and analysis.

3.2 Earthwork and Grading Specifications

Grading and excavations should be performed in accordance with the City of La Quinta Code and regulations and the General Earthwork and Grading Specifications in Appendix G. Clearing and grubbing of the site should include removal of any pavement or concrete, turf, landscaping, miscellaneous trash and debris, and disposal of deleterious material offsite. After removals and/or overexcavation, the bottoms should be scarified and moisture-conditioned prior to placement of fill. Fill should be placed in nearly horizontal loose lifts less than 8 inches in thickness, moisture-conditioned and compacted to a minimum relative compaction of 90 percent (per ASTM D1557). Fills placed against ground sloping more than 5H:1V should be keyed and benched into competent material as the new fill is placed.

Onsite soil materials are generally considered suitable to be used as fill materials. As noted, the onsite materials have little to abundant cobbles and boulders. Crushing may be required to generate fill material, as discussed in Section 3.5.

The soil engineering properties of imported soil (if any) should be evaluated to determine if any of the recommendations provided herein will need modification.

3.3 Remedial Grading and Overexcavation

Remedial Removals: Unsuitable earth materials should be removed prior to placement of compacted fill. Unsuitable materials at the site include undocumented fills and weathered alluvial fan deposits. Removal depths in native soils across the site should extend 4 feet below existing grade. Locally, where thicker undocumented fills are located, remedial removals should extend deeper to remove the fill and unsuitable native soils. Removal bottoms should expose competent native material and should be reviewed and accepted by the geotechnical consultant prior to placement of fill.

Grading over the levee for the proposed 62nd Avenue extension should bench into competent existing fills on the sides with minimal removals on the top (1 to 2 feet). Grading on the levee fill should be performed under the direction of the Bureau of Reclamation representatives.

Overexcavation: The proposed grading is anticipated to expose cut and fill transitions at finish grade. Shallow fill areas and cut portions of lots should be overexcavated and replaced with compacted fill to provide a minimum of 4 feet of uniform fill cap over each lot. Streets should be overexcavated 2 feet below subgrade to provide uniform fill below the pavement section. Alternatively, streets may be overexcavated 2 feet below the deepest utility to reduce the amount of oversize materials encountered and facilitate utility excavation/installation.

3.4 Rippability

Based on the geophysical studies and prior excavation work performed onsite, the alluvial fan earth units are anticipated to be rippable/excavatable with conventional earthmoving equipment (i.e., scrapers, excavators and backhoes). Seismic refraction surveys indicate the primary wave velocities vary from 1,200 fps near-surface to 3,500 fps at depth. Excavation difficulty due to the abundancy of cobbles and boulders should be expected. The geophysical results are provided in Appendix E.

Buried hard granitic rock out-crops were not encountered at the location of the seismic surveys. However, small exposures of granitic bedrock may be encountered locally along the northern perimeter of the site, adjacent to the southernmost proposed tank site. This rock may not be rippable with conventional earth-moving equipment; requiring larger bulldozers, excavators and rock breaking equipment.

3.5 Oversize Rock Crushing

We anticipate there will be more oversize rocks generated during grading than can be placed in the onsite fills. The Approximate Rock Distribution Map (Plate 3) shows the approximate percentages of oversize rocks/boulders by area that will be generated from different areas at the site during mass excavation and remedial grading. Therefore, we anticipate that rock crushing may be needed during the grading operations. For crushing purposes, we anticipate that the planned operations should be to break the oversize boulders of 1 to 4 feet in maximum dimension down to make fill materials with the crushed product. We understand that larger boulders may need to be pre-broken, down to 2.5 to 3 feet in diameter prior to crushing. We anticipate the rocks could be crushed to make aggregate base materials or other rock products, but would need laboratory testing to confirm.

3.6 Placement of Oversize Material

Oversize rocks larger than 12 inches in the maximum diameter should not be placed in the upper 10 feet of design fills or within 2 feet below the deepest utility in the streets. Oversized rocks greater than 24 inches in the maximum diameter will need to be placed in windrows in the deeper fills. Rocks that have a maximum diameter greater than approximately 4 feet should either be broken with pneumatic hammers and/or crushers prior to placement in windrows, or they should be handled by special placement as individual rocks in deep fill areas. The Grading and Earthwork Specifications in Appendix G include a detail for placement of oversize rocks.

3.7 Slope Stabilization

General Slope Stability: As discussed previously, the proposed slopes, as shown on the preliminary grading plan, are anticipated to be grossly stable under static and pseudo-static loading conditions, provided the remedial removals recommended in this report are performed and the slopes are adequately compacted.

The onsite native materials consist of highly erodible, cohesionless materials that contain oversize material. In order to reduce the potential rockfall hazard, and to help with surficial stability, stabilization fills are recommended for cut slopes at the site. Preliminary sizing of stabilization fill keys are a minimum depth of 4 feet and 15 feet wide for slopes up to 40 feet high, with the width increasing to 20 feet for those greater than 40 feet in height.

During grading, slope excavations and any backcuts or keyway excavations should be mapped and evaluated by the geotechnical consultant to verify the anticipated conditions. If the conditions are different than anticipated, geotechnical analysis should be performed and the remedial grading measures modified as necessary. The excavations should be evaluated and accepted by the geotechnical consultant prior to placement of compacted fill.

The reworked onsite soils are anticipated to provide adequate strength for the gross stability of the proposed fill slopes at the proposed slope inclination of 2H:1V and flatter. A base fill key should be provided for these fill slopes. The depth of the key should be a minimum of 2 feet into competent material, at least 15 feet wide, and have a one-foot tilt back into the slope. Fill slopes are anticipated to be stable as designed provided they are constructed in accordance with the details provided in our General Grading and Earthwork Specifications (Appendix G). Fill slopes and stabilization fills should be overbuilt approximately 3 feet thick and trimmed back to the proposed slope face in order to provide a uniform compacted slope face. Slopes will be subject to surficial erosion and should be planted as soon as practical.

Temporary Slope Stability: Temporary slopes will be created as a result of the backcuts for recommended stabilization fill keys. The actual stability of the backcuts will depend on many factors, including the geologic conditions and the amount of time the excavation remains exposed. Excavations should not be left open for long periods of time and should be backfilled as soon as practical (i.e., backfilled prior to the weekend or holiday, if possible). Extra care and attention should be provided while grading next to adjacent properties.

The backcut should be "slope-boarded" on a routine basis so that the geotechnical consultant can map the slope carefully during excavation and help to notify the project team of critically unstable areas. This will also allow those working below the excavation to observe any potential failures.

Mass Movements and Natural Slopes: The development has been set back approximately 900 feet from the toe of the Martinez Rockslide. Based on the setback distance and lack of potential energy and upslope materials, we do not anticipate the rockslide to have any adverse impact on the project. However, due to the steep slope at the toe of the rockslide and presence of cobbles and boulders, a rockfall hazard exists within the setback area.

The granitic bedrock ridge at the north end of the development, was found to generally be fractured and jointed and has been mapped as a potential rockfall hazard (Earth Consultants International, 2010).

Rockfall hazard analysis should be performed at a later date for both locations discussed above once plans are further developed in order to evaluate this hazard and provide mitigation recommendations (i.e., impact walls or berms/channels) if required.

3.8 Groundwater Conditions

Based on review of the existing groundwater data, we anticipate groundwater to remain deep below the site, in excess of 50 feet. Groundwater is not anticipated to be encountered during grading or construction at the site.

3.9 Settlement

As discussed in Section 2.7, the total settlement as a result of fill placement in the areas underlain by native alluvial fan deposits, is estimated to be on the order of 1 to 1½ inches. The differential settlement is anticipated to be on the order of ¾-inch over a span of 40 feet.

The amount of anticipated settlement will also depend on the type of foundation(s) selected. Additional evaluation will need to be performed once the actual design grades, foundation type, foundation loads and layouts are known.

3.10 Foundation Design

The design of foundation and slabs is the purview of the project structural engineer. Following completion of grading operations, the onsite soils at the site are anticipated to have "very low" to "low" expansion potential.

An allowable bearing pressure of 1,800 psf may be assumed for foundations in compacted fill soils having a minimum depth of 12 inches below the lowest adjacent grade with a minimum width of 12 inches. The allowable bearing pressure may be increased for each additional foot of width and/or depth by 300 psf up to a maximum of 3,000 psf.

The allowable bearing pressure may be increased by one-third for wind and seismic loading. The allowable bearing pressure may also be applied to post-tensioned and mat slabs, if needed for design. The footings of freestanding structures (including walls and pilasters) should have a minimum embedment depth of 24 inches into approved soils.

For lateral resistance against sliding, a friction coefficient of 0.38 may be used at the soil-foundation interface. This value may be increase by one-third for wind and seismic loading.

For non-post-tensioned slabs-on-grade and foundations, in accordance with Wire Reinforcement Institute (WRI) method (per the 2019 California Building Code), an effective Plasticity Index of 15 is considered appropriate for the upper 15 feet of soil. For such slabs, we recommend a minimum embedment of 18 inches below the lowest adjacent grade for the perimeter footings.

The slabs should also be designed to satisfy the settlement criteria presented in Section 3.9 of these recommendations.

3.11 Storm Water Infiltration Feasibility

Based on our evaluation and analysis as described herein, we conclude that onsite storm water infiltration is geotechnically feasible. As discussed in Section 2.11, a minimum factor-of-safety of 3 has been applied to the results for preliminary design purposes. Per City of La Quinta Engineering Bulletin #06-16, the maximum allowable rate for retention basin design is two inches per hour. The infiltration rates obtained from testing exceed the maximum allowable rate dictated by the City; varying between 6.0 and 14.6 inches per hour. In addition, the two borings (H-1 and H-2) drilled with continuous sampling to a depth of 20 to 23 feet below the bottom of the proposed basins encountered sandy and gravelly alluvium without a confining layer.

Infiltration systems should be constructed per the recommendations outlined in the Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development (2014. Special care should be taken so as to limit disturbance to native soils utilized as the infiltration surface in a manner that may affect infiltration performance. Proper and routine maintenance should be provided for the infiltration systems.

3.12 Trench Excavations and Backfill

Excavations should conform to all applicable safety requirements. Trench excavations are anticipated to expose varying earth units, including fill and native alluvial fan deposits. Excavations should be considered Type C soils per Cal/OSHA regulations and should be excavated at 1.5H:1V or flatter, with no vertical excavation near the bottom. If the excavations cannot be made within the subject site, temporary shoring would be needed. The shoring would likely require shields or lagging for potential caving sands. Clean sands were encountered through the project, with caving conditions noted in some exploratory test pits.

Native soils should be suitable for use as trench backfill. The cobbly materials may be difficult to use without mixing with cleaner sands and/or screening the rock. Cobbles larger than 3 inches in size should not be placed within the pipe zone. Trenches, including interior utility lines, should be either backfilled with native soil and compacted to 90 percent relative compaction, or backfilled with clean sand (SE 30 or better), which can be densified with water jetting and flooding. Trenches excavated next to structures and foundations should also be properly backfilled and compacted to provide full lateral support and reduce settlement potential.

3.13 Lateral Earth Pressures

The recommended lateral earth pressures for the drained onsite materials are as follows:

Equivalent Fluid Pressure (psf/ft)		
Conditions	***Level***	***2:1 Sloping***
Active	35	50
At-Rest	55	--
Passive	400	230 sloping down

These parameters are based on a soil internal friction angle of 33 degrees and soil unit weight of 120 pcf. The above parameters do not apply for backfill that is highly expansive.

To design an unrestrained retaining wall, such as a cantilever wall, the active earth pressure may be used. For a restrained retaining wall, such as a vault, basement or at restrained wall corners, the at-rest pressure should be used. Passive pressure is used to compute lateral soils resistance developed against lateral structural movement. Passive pressure may be increased by one-third for wind and seismic loading. Future landscaping/planting and improvements adjacent to retaining walls should also be taken into account in the design of the retaining walls. Excessive soil disturbance, trenches (excavation and backfill), future landscaping adjacent to footings, and over-saturation can adversely impact retaining structures and result in reduced lateral resistance.

For sliding resistance, the friction coefficient of 0.40 may be used at the concrete and soil interface. This value may be increased by one-third for wind and seismic loading. The passive resistance is taken into account only if it is ensured that the soil against embedded structure will remain intact with time. The retaining walls will also need to be designed for additional lateral loads if other structures or walls are planned within a 1H:1V projection.

The seismic lateral earth pressure for walls retaining more than 6 feet of soil may be estimated to be an additional 15 pcf for active and at-rest conditions. The earthquake soil pressure has a triangular distribution and is added to the static pressures. For the active and at-rest conditions, the additional earthquake loading is zero at the top and maximum at the base. The seismic lateral earth pressure does not apply to walls retaining less than 6 feet of soil (2016 CBC Section 1803.5.12).

Retaining structures should be waterproofed and provided with suitable backdrain systems to reduce the potential hydrostatic pressure on the walls. Figure 7 presents alternatives for wall-backdrain systems. Specific drainage connections, outlets and avoiding open joints should be considered for the retaining wall design.

3.14 Preliminary Pavement Design

A preliminary pavement section based on assumed R-value of 40 and Traffic Index (TI) of 7 for the main drive areas and roadways and TI of 4 for residential streets and parking lots, consists of 4 inches of asphalt concrete over 7 inches of aggregate base and 3 inches of asphalt concrete over 4 inches of aggregate base, respectively. The final pavement section recommendations should be based on the anticipated Traffic Index (TI) of the roadways and the R-value of the subgrade soils. Pavement design and construction should be performed in accordance with the requirements of the City of La Quinta and the Greenbook.

3.15 Structural Setbacks

The footings of structures (including retaining walls) located above descending slopes should be setback from the slope face. The setback distance is measured from the outside edge of the footing bottom along a horizontal line to the face of the slope. The table below summarizes the minimum setback criteria for structures above descending slopes.

Structural Setback Requirements for Footings Above Descending Slopes

Slope Height [H] (feet)	Minimum Setback from Slope Face (feet)
Less than 10	5
10 to 20	½ * H
20 to 30	10
30 to 120	⅓ * H
More than 120	40

3.16 Seismic Design Guidelines

The following table summarizes the seismic design criteria for the subject site. The seismic design parameters are developed in accordance with ASCE 7-16 and 2019 CBC (Appendix D). Please note that considering the proposed structures and the anticipated structural periods, site-specific ground hazard analysis was not performed for the site. The seismic design coefficient, C_s, should be determined per the parameters provided below and using equation 12.8-2 of ASCE 7-16.

Selected Seismic Design Parameters from 2019 CBC/ASCE 7-16	*Seismic Design Values*	*Reference*
Latitude	33.60143 North	
Longitude	-116.26159 West	
Controlling Seismic Source	San Andreas Fault	USGS, 2020
Distance to Controlling Seismic Source	9.8 mi	USGS, 2020
Site Class per Table 20.3-1 of ASCE 7-16	D	
Spectral Acceleration for Short Periods (Ss)	1.5 g	SEA/OSHPD, 2020
Spectral Accelerations for 1-Second Periods (S1)	0.58 g	SEA/OSHPD, 2020
Site Coefficient F_a, Table 11.4-1 of ASCE 7-16	1.0	SEA/OSHPD, 2020
Site Coefficient F_v, Table 11.4-2 of ASCE 7-16	1.72	
Design Spectral Response Acceleration at Short Periods (S_{DS}) from Equation 11.4-3 of ASCE 7-16	1.0 g	SEA/OSHPD, 2020
Design Spectral Response Acceleration at 1-Second Period (S_{D1}) from Equation 11.4-4 of ASCE 7-16	0.67 g	
T_S, S_{D1}/ $S_{DS,}$ Section 11.4.6 of ASCE 7-16	0.67 sec	
T_L, Long-Period Transition Period	8 sec	SEA/OSHPD, 2020
Peak Ground Acceleration (PGA_M) Corrected for Site Class Effects from Equation 11.8-1 of ASCE 7-16	0.58 g	SEA/OSHPD, 2020
Seismic Design Category, Section 11.6 of ASCE 7-16	D	

3.17 Subdrains

Backdrains should be provided for stabilization fills at 30-foot-vertical intervals with outlets every 100 feet through the slope face. Backdrains should consist of 4-inch perforated Schedule 40 PVC pipe inserted into a minimum of 3 cubic feet per linear foot of ¾-inch gravel wrapped in geotextile filter fabric (Mirafi 140N or equivalent). Backdrain details are included in the General Earthwork and Grading Specifications (Appendix G). During grading, additional subdrains may be necessary for areas where seepage is encountered.

Proper surface drainage, such as a concrete V-ditch, should also be provided along the top of walls. Downdrains (outlets) for surface drainage should not be tied into the subdrain system for walls. (They should be outlet separately.)

Protection of Subdrain Outlets: The outlet pipe should be protected by installation of devices per exhibit labeled "Subdrain Outlet Marker Detail" in the Grading and Earthwork Specifications (Appendix G). This will allow the pipe outlets to be protected in the future during landscaping and make them easier to find, if necessary.

3.18 Expansion Potential

Based on the onsite soil properties, the expansion potential is anticipated to generally range from "Very Low" to "Low." Additional laboratory testing should be performed following completion of grading operations to determine the expansion potential of the near-surface soils.

3.19 Cement Type and Corrosivity

Based on prior laboratory testing on adjacent projects, the soluble sulfates exposure in the onsite soils are anticipated to be classified as "S0" to "S1" per Table 19.3.1.1 of ACI-318-14. Structural concrete elements in contact with soil include footings and building slabs-on-grade. Concrete mix for these elements may be preliminarily based on the "**S1**" soluble sulfate exposure class of Table 19.3.2.1 in ACI-318-14. Other American Concrete Institute (ACI) guidelines for structural concrete are recommended.

Also, the site soils are anticipated to be corrosive to very corrosive to ferrous metals and may also be deleterious to copper. Where metals will be in contact with onsite soils for a long period of time (such as buried iron or steel pipe), corrosion-control measures should be taken to prolong their life.

Additional laboratory testing should be performed following completion of grading operations to determine the corrosion potential of onsite soils and to provide recommendations for corrosion protection.

3.20 Exterior Concrete

Exterior concrete elements, such as curb and gutter, driveways, sidewalks and patios, are susceptible to lifting and cracking when constructed over expansive soil. Please also note that reducing concrete problems is often a function of proper slab design, concrete mix design, placement, and curing/finishing practices. Adherence to guidelines of the ACI is recommended.

Also, the amount of post-construction watering, or lack thereof, can have a very significant impact on the adjacent concrete flatwork.

For reducing the potential effects of expansive soils, we recommend a combination of presaturation of subgrade soils; reinforcement; moisture barriers/drains; and a sublayer of granular material. Though these types of measures may not completely eliminate adverse impacts, application of these measures can significantly reduce the impacts from post-construction expansion of soil. The degrees and combinations of these measures will depend upon the expansion potential of the subgrade soil, moisture migration potential, feasibility of the measures, and the economics of the measures versus the benefits. These factors should be weighed by the project owner determining the measures to be applied on a project-by-project basis, subject to the requirements of the local building/grading department.

The following table provides our recommendations for varying expansion characteristics of subgrade soils. Additional considerations are also provided after the table. We recommend that the "**Low**" category be preliminarily used during design of the project.

**TYPICAL RECOMMENDATIONS
FOR CONCRETE FLATWORK/HARDSCAPE**

	Expansion Potential (Index)				
Recommendations	*Very Low* *(< 20)*	***Low*** ***(20 – 50)***	*Medium* *(51 – 90)*	*High* *(91 – 130)*	*Very High* *(> 130)*
Slab Thickness (Min.): Nominal thickness except where noted.	4"	**4"**	4"	4"	4" Full
Subbase: Thickness of sand or gravel layer below concrete	N/A	**N/A**	Optional	2" – 4"	2" – 4"
Presaturation: Degree of optimum moisture content (opt.) and depth of saturation	Pre-wet Only	**1.1 x opt. to 6"**	1.2 x opt. to 12"	1.3 x opt. to 18"	1.4 x opt. to 24"
Joints: Maximum spacing of control joints. Joint should be ¼ of total thickness	10'	**10'**	8'	6'	6'
Reinforcement**:** Rebar or equivalent welded wire mesh placed near mid-height of slab	N/A	**N/A**	Optional (WWF 6 x 6 – W1.4xW1.4)	No. 3 rebar, 24" O.C. both ways or equivalent wire mesh	No. 3 rebar, 24" O.C. both ways
Restraint**:** Slip dowels across cold joints; between sidewalk and curb	N/A	**N/A**	Optional	Across cold joints	Across cold joints (and into curb)

The procedure and timing of presaturation should be carefully planned in advance of construction.

Design and maintenance of proper surface drainage is also very important. If the concrete will be subject to heavy loading from cars/trucks or other heavy objects, thicker slabs should be used. The above recommendations typically are not applied to curb and gutter.

3.21 Slope Maintenance and Protection

To reduce the erosion and surficial slumping potential of the graded slopes, permanent manufactured slopes should be protected from erosion by planting with appropriate ground cover or by placing suitable erosion protection (i.e., jute matting, polymer coating, etc.). These measures should be applied as soon as is practical. Proper drainage should be designed and maintained to collect surface waters and direct them away from slopes. A rodent-control program should be established and maintained as well, in order to reduce the potential for damage related to burrowing. In addition, the design and construction of improvements and landscaping should also provide appropriate drainage measures.

3.22 Surface Drainage

Surface drainage should be carefully taken into consideration during all grading, landscaping, and building construction. Positive surface drainage should be provided to direct surface water away from structures and slopes and toward the street or suitable drainage devices. Ponding of water adjacent to the structures or tops of slopes should not be allowed. Paved areas should be provided with adequate drainage devices, gradients, and curbing to reduce run-off flowing from paved areas onto adjacent unpaved areas.

3.23 Additional Geotechnical Investigation and Plan Reviews

Additional geotechnical evaluation and investigation are recommended during the design phase of work. This additional analysis and investigation would occur after entitlement, when grading and building plans are in progress or finalized, and before obtaining grading permits. NMG has solely relied upon the observations and laboratory testing of others, we recommend additional exploratory borings and test pits to verify the findings of others. Additionally, percolation testing conforming with current city/county standards may need to be performed.

Also, additional borings will be needed along the proposed extension of 62nd Avenue in order to evaluate the underlying native soils within the vicinity of the proposed improvements.

NMG should also review the project plans during the design phase, including but not limited to, rough and precise grading, foundation, retaining walls (if any), and street and utility plans.

Geotechnical review reports will be prepared for these plan reviews, which will be submitted to the City for review and approval (if required).

3.24 Geotechnical Observation and Testing During Grading and Construction

Geotechnical observation and testing should be performed by the geotechnical consultant during the following phases of grading and construction:

- During site preparation and clearing;

- During earthwork operations, including remedial removals and pad overexcavation;
- During all fill placement;
- During temporary excavations and slope stabilization measures;
- During installation of subdrains;
- Upon completion of any excavation for buildings or retaining walls, prior to pouring concrete;
- During slab and pavement subgrade preparation, prior to pouring of concrete;
- During and after installation of subdrains for retaining walls;
- During placement of backfill for utility trenches and retaining walls; and
- When any unusual soil conditions are encountered.

4.0 LIMITATIONS

This report has been prepared for the exclusive use of our client, Hofmann Management Company, within the specific scope of services requested by our client for the planning study discussed in this report. This report or its contents should not be used or relied upon for other projects or purposes or by other parties without the written consent of NMG. Our methodology for this study is based on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, express or implied is given.

The findings, conclusions, and recommendations are professional opinions based on interpretations and inferences made from geologic and engineering data from specific locations and depths, observed or collected at a given time. By nature, geologic conditions can be very different in between points, and can also change over time. Our conclusions and recommendations are subject to verification and/or modification with more exploration and/or during grading and construction when more subsurface conditions are exposed.

NMG's expertise and scope of services did not include assessment of potential subsurface environmental contaminants or environmental health hazards.

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Esri, HERE, Garmin, (c) OpenStreetMap contributors

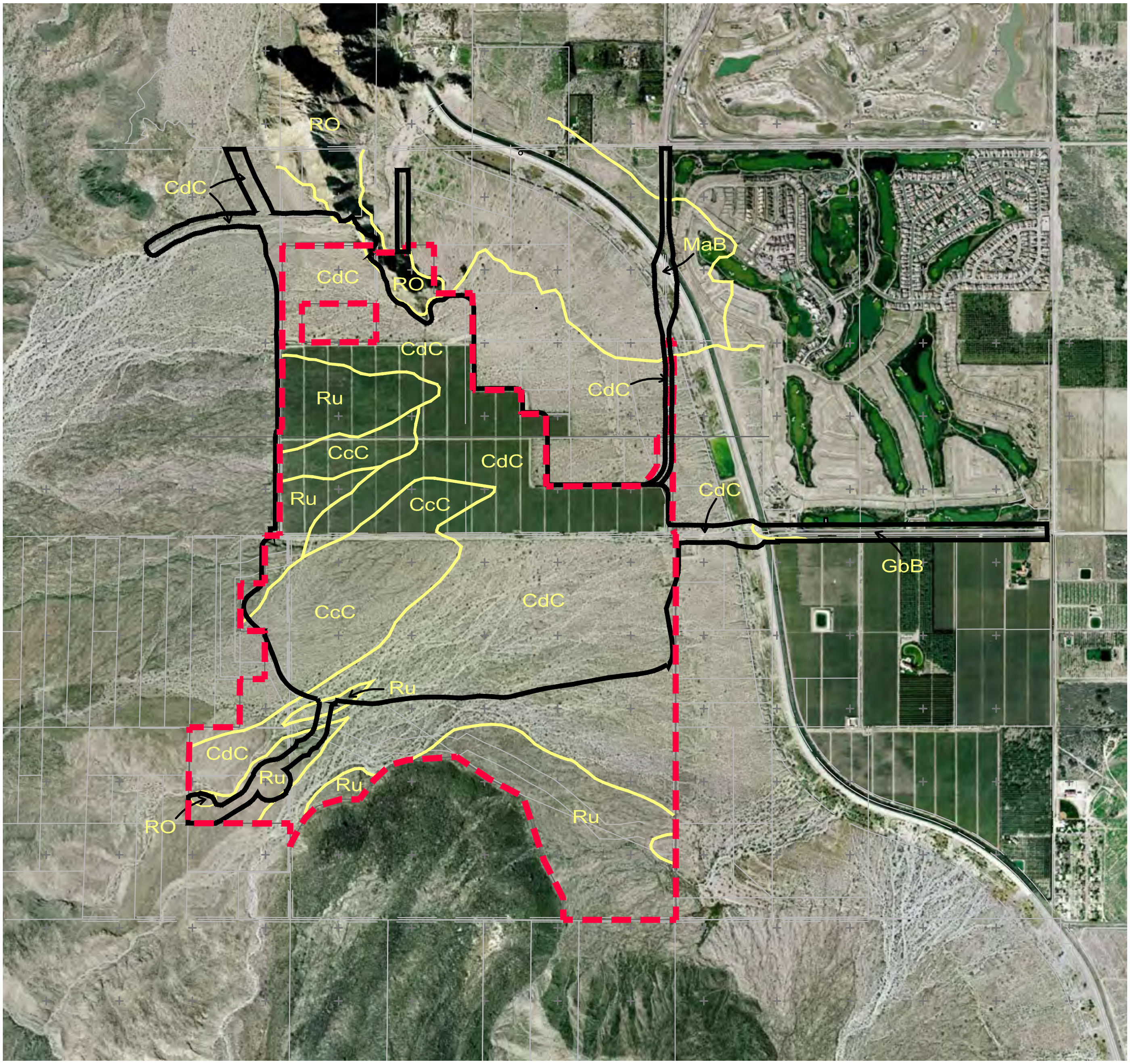
SITE LOCATION MAP

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
RIVERSIDE COUNTY, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann/Travertine
Date: 8/27/2021 Figure 1

NMG

P:\2018\18186-01 TRG LaQuinta Travertine\Drafting\GIS\SiteLocation18186-01.mxd



LEGEND

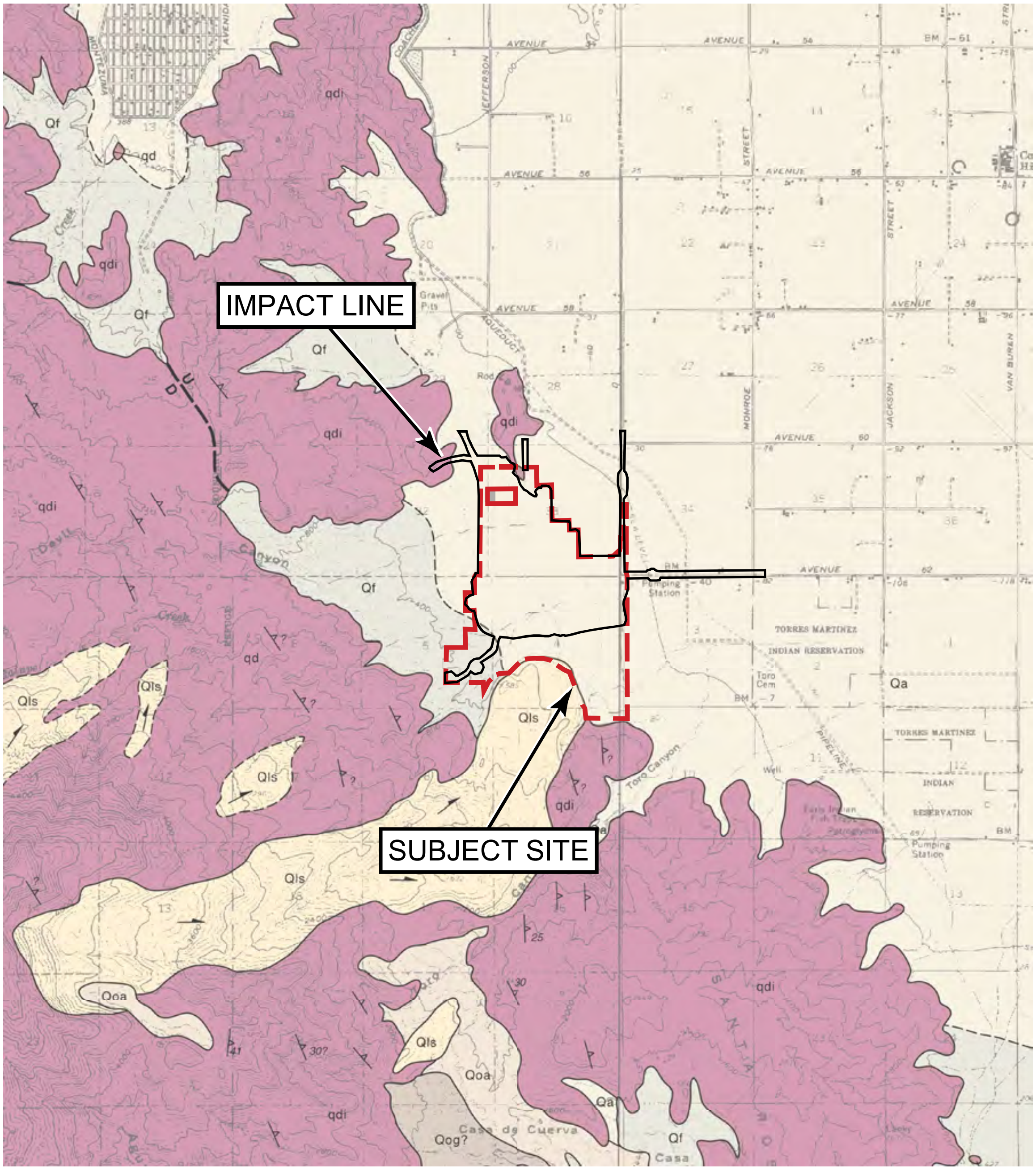
CcC	CARRIZO STONY SAND, 2-9% SLOPES
CdC	CARSITAS GRAVELLY SAND, 0-9% SLOPE
GbB	GILMAN FINE SANDY LOAM
MaB	MYOMA FINE SAND
RO	ROCK OUTCROP
Ru	RUBBLE LAND

—	SOIL SURVEY INFORMATION FROM NATURAL RESOURCES CONSERVATION SERVICE
—	IMPACT LINE
- - -	LIMIT LINE

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
COUNTY OF RIVERSIDE, CALIFORNIA

Project No.: 18186-01
Project Name: Jofmann / Travertine
Date: 8/27/21
Figure No. 2

NMG
Geotechnical, Inc.



LEGEND

LOCATIONS ARE APPROXIMATE

Qa	Alluvium	Qls	Landslide
Qf	Alluvial Fan	qdi	Quartz Diorite

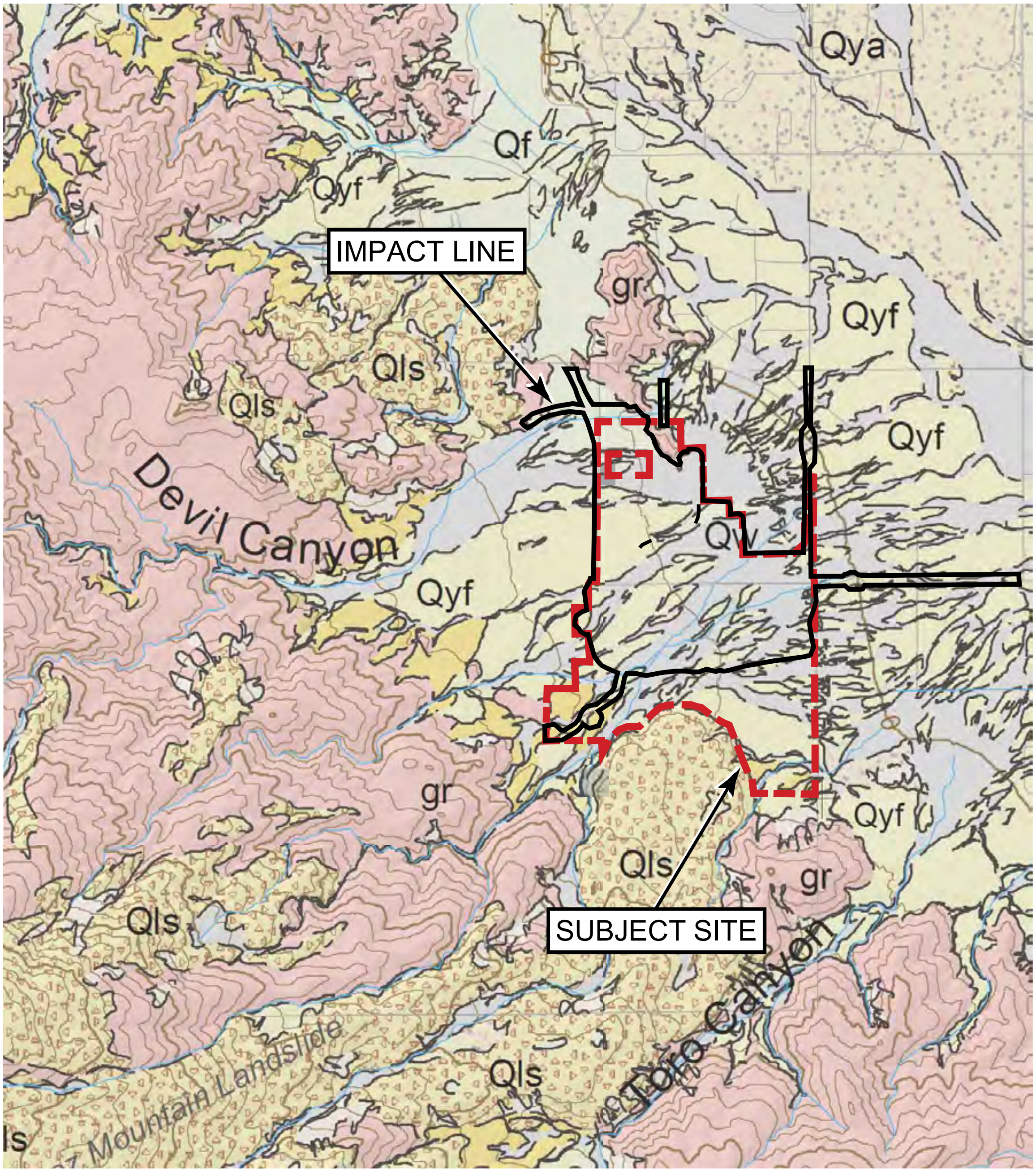
REGIONAL GEOLOGY MAP (DIBBLEE, 2008)

N

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
COUNTY OF RIVERSIDE, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann / Travertine
Date: 8/27/2021 Figure 3

NMG



LEGEND

LOCATIONS ARE APPROXIMATE

Qls	Landslide Deposits	Qyf	Young Alluvial Fan Deposits
Qw	Alluvial Wash Deposits	gr	Granitic and other Intrusive Crystalline Rocks of all ages

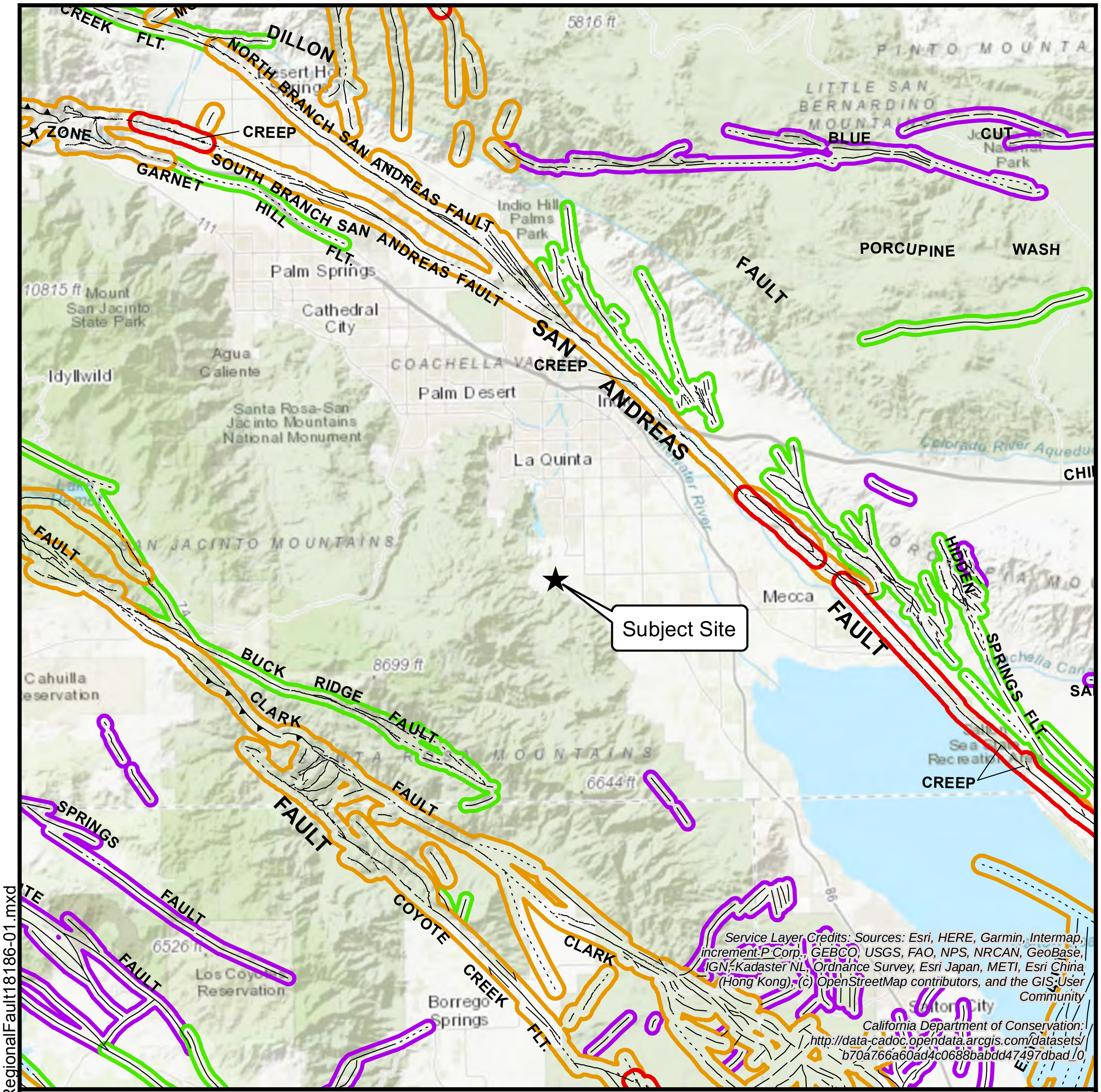
REGIONAL GEOLOGY MAP
(CGS, 2012)

N

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
COUNTY OF RIVERSIDE, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann / Travertine
Date: 8/27/2021 Figure 4

NMG



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

California Department of Conservation: http://data-cadoc.opendata.arcgis.com/datasets/b70a766a60ad4c0688babdd47497dbad_0

Legend

Faults

—— Certain

— — Approximately Located

······ Concealed

Recency of Movement

🟥 Historic

🟧 Holocene

🟩 Late Quaternary

🟪 Quaternary

0 4 8 Miles

1 inch = 8 miles

N

REGIONAL FAULT MAP

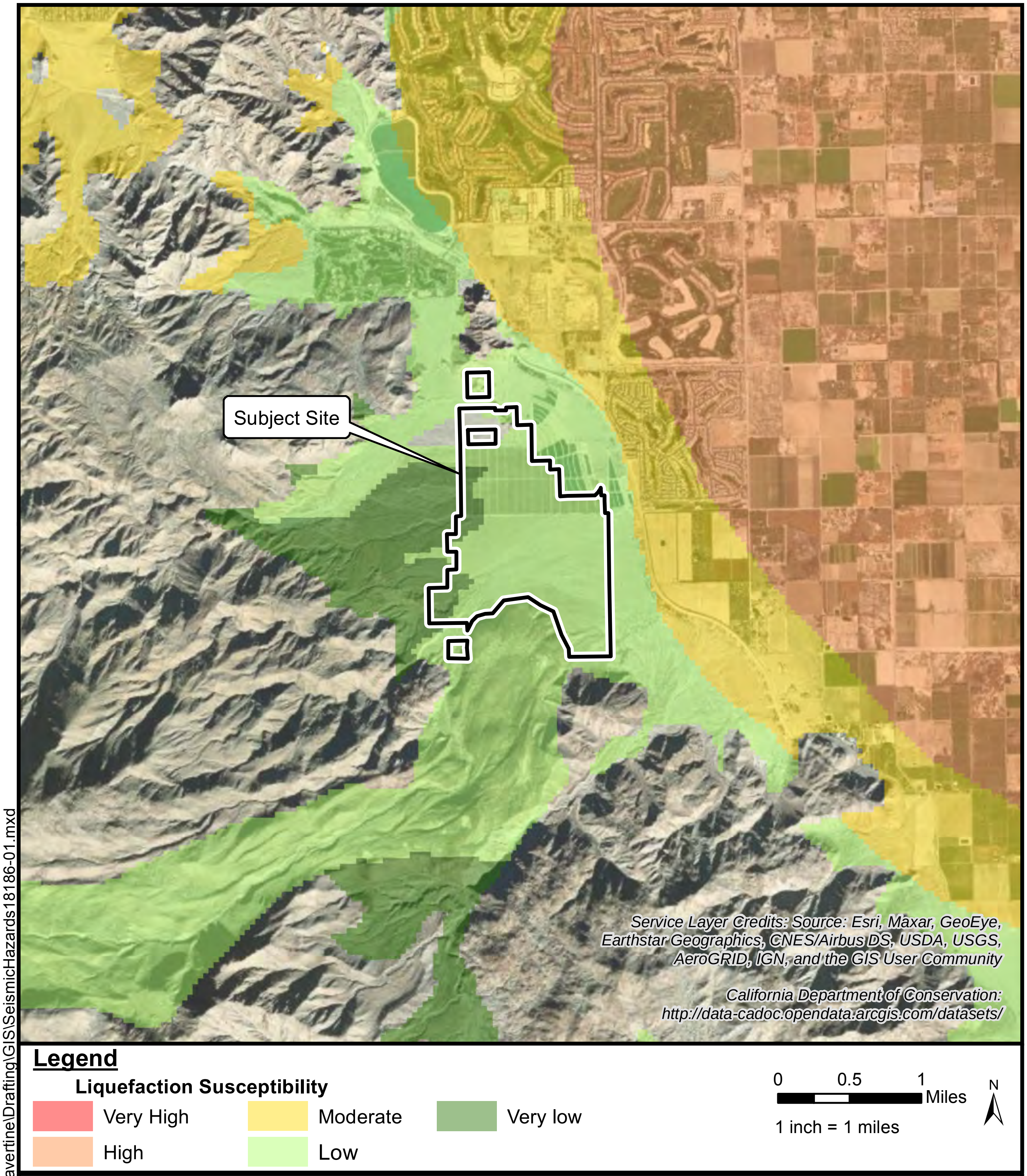
Base: California Geological Survey, Fault Activity Map of California, 2010

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
RIVERSIDE COUNTY, CALIFORNIA

Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann/Travertine
Date: 8/27/2021 Figure 5

NMG

P:\2018\18186-01 TRG LaQuinta Travertine\Drafting\GIS\RegionalFault18186-01.mxd



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

California Department of Conservation: http://data-cadoc.opendata.arcgis.com/datasets/

SEISMIC HAZARD ZONES MAP

Base: Riverside County General Plan

TRAVERTINE RESIDENTIAL DEVELOPMENT
CITY OF LA QUINTA
RIVERSIDE COUNTY, CALIFORNIA

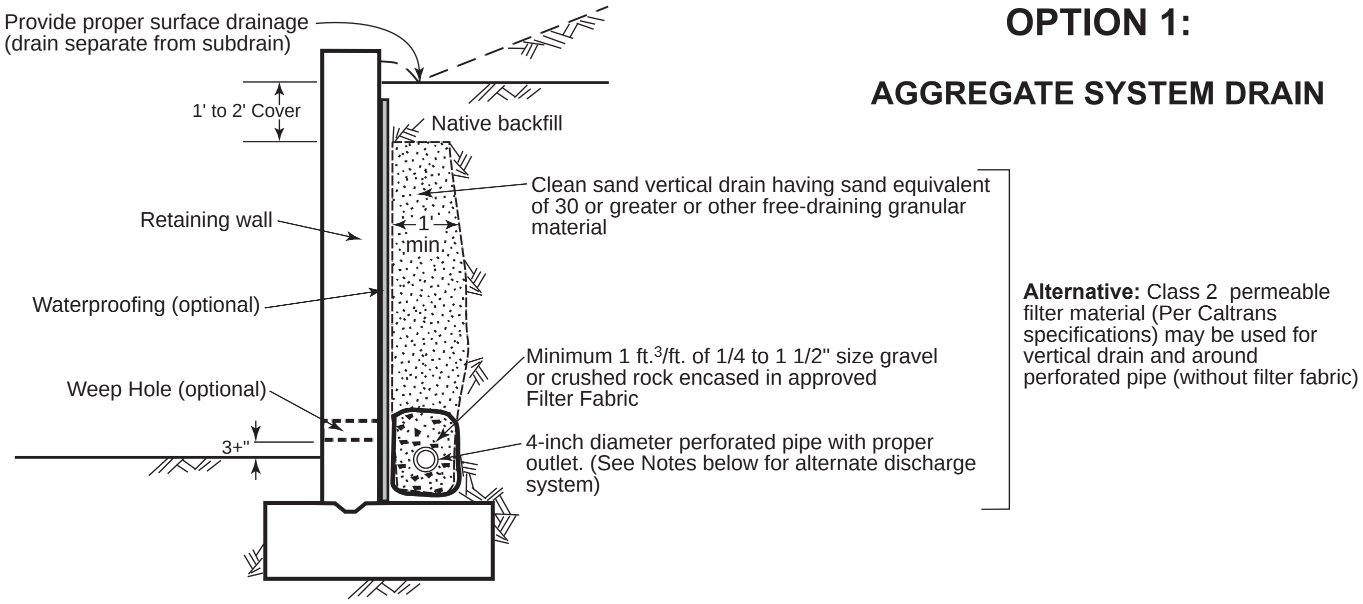
Project Number: 18186-01 By: TW/SBK
Project Name: Hofmann/Travertine
Date: 8/27/2021 Figure 6

NMG

P:\2018\18186-01 TRG LaQuinta Travertine\Drafting\GIS\SeismicHazards18186-01.mxd

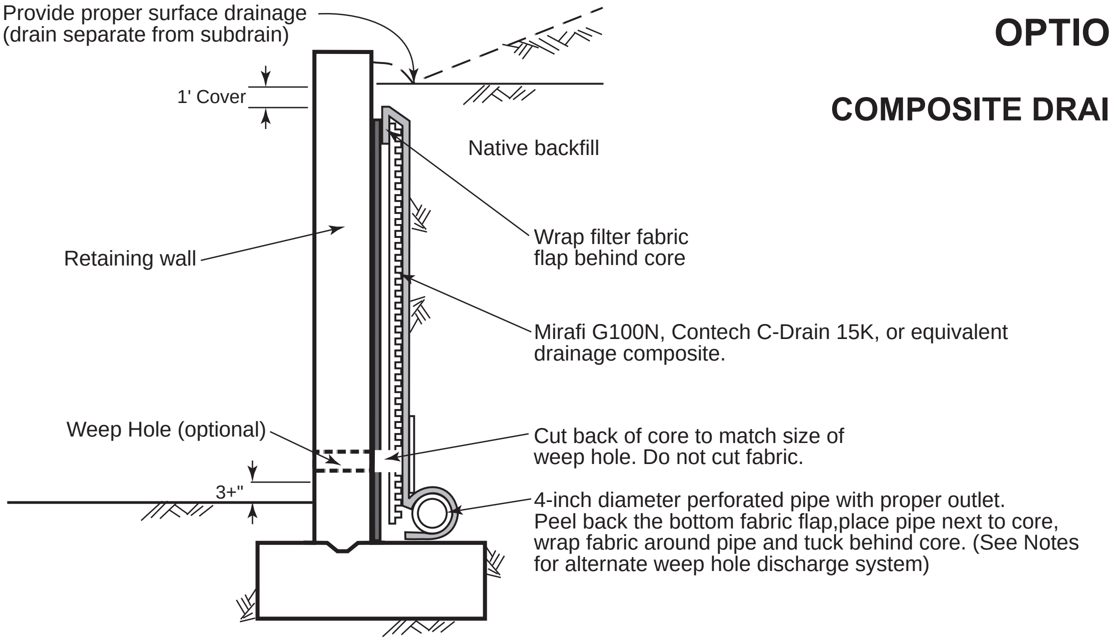
OPTION 1:

AGGREGATE SYSTEM DRAIN



OPTION 2:

COMPOSITE DRAINAGE SYSTEM



NOTES:

1. PIPE TYPE SHOULD BE PVC OR ABS, SCHEDULE 40 OR SDR35 SATISFYING THE REQUIREMENTS OF ASTM TEST STANDARD D1527, D1785, D2751 , OR D3034.
2. FILTER FABRIC SHALL BE APPROVED PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL.
3. DRAIN PIPE SHOULD HAVE A GRADIENT OF 1 PERCENT MINIMUM.
4. WATERPROOFING MEMBRANE MAY BE REQUIRED FOR A SPECIFIC RETAINING WALL (SUCH AS A STUCCO OR BASEMENT WALL).
5. WEEP HOLES MAY BE PROVIDED FOR LOW RETAINING WALLS (LESS THAN 3 FEET IN HEIGHT) IN LIEU OF A VERTICAL DRAIN AND PIPE AND WHERE POTENTIAL WATER FROM BEHIND THE RETAINING WALL WILL NOT CREATE A NUISANCE WATER CONDITION. IF EXPOSURE IS NOT PERMITTED, A PROPER SUBDRAIN OUTLET SYSTEM SHOULD BE PROVIDED.
6. IF EXPOSURE IS PERMITTED, WEEP HOLES SHOULD BE 2-INCH MINIMUM DIAMETER AND PROVIDED AT 25-FOOT MAXIMUM SPACING ALONG WALL. WEEP HOLES SHOULD BE LOCATED 3+ INCHES ABOVE FINISHED GRADE.
7. SCREENING SUCH AS WITH A FILTER FABRIC SHOULD BE PROVIDED FOR WEEP HOLES/OPEN JOINTS TO PREVENT EARTH MATERIALS FROM ENTERING THE HOLES/JOINTS.
8. OPEN VERTICAL MASONRY JOINTS (I.E., OMIT MORTAR FROM JOINTS OF FIRST COURSE ABOVE FINISHED GRADE) AT 32-INCH MAXIMUM INTERVALS MAY BE SUBSTITUTED FOR WEEP HOLES.
9 THE GEOTECHNICAL CONSULTANT MAY PROVIDE ADDITIONAL RECOMMENDATIONS FOR RETAINING WALLS DESIGNED FOR SELECT SAND BACKFILL.

RETAINING WALL DRAINAGE DETAIL

NMG
Geotechnical, Inc.

FIGURE 7

APPENDIX A

APPENDIX A

REFERENCES

Bock, C.G., 1977, Martinez Mountain Rock Avalanche, Geological Society of America – Reviews in Engineering Geology, Volume III.

California Division of Mines and Geology, 1965, Geologic Map of Southern California, Santa Ana Sheet, Compilation by Rogers, T.H.

California Geological Survey, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, Originally Adopted March 13, 1997, Revised and Re-adopted September 11, 2008.

California Geological Survey, 2010, Fault Activity Map of California and Adjacent Areas (Scale 1: 750,000), Geologic Data Map No. 6, Compiled and Interpreted by Charles W. Jennings and William A. Bryant.

California Geological Survey, 2012, Preliminary Geologic Map of Quaternary Surficial Deposits in Southern California, Palm Springs 30'X60' Quadrangle, Special Report 217, Plate 24, by Lancaster, J.T., Hayhurst, C.A., and Bedrossian, T.L.

California Geological Survey (CGS), 2018, Earthquake Fault Zones, A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California, Special Publication 42, Revised 2018.

Christenson, G.E., and Purcell, C., 1985, Correlation and age of Quaternary alluvial-fan sequences, Basin and Range Province, Southwestern United States, Geological Society of America Special Paper 203.

City of La Quinta, 2004, Ordinance No. 406, Chapter 8.80 (Grading) to M.C., Adopted May 4, 2004.

City of La Quinta, 2006, Engineering Bulletin #06-16, Hydrology and Hydraulic Report Criteria for Storm Drain Systems, Revised Effective Data of October 3, 2020.

City of La Quinta, 2013, City of La Quinta 2035 General Plan, Adopted February 19, 2013.

Coachella Valley Water District, 2012, Coachella Valley Water Management Plan Update, Final Report, Dated January 2012.

Coachella Valley Water District, 2018, Engineer's Report on Water Supply and Replenishment Assessment, 2018-2019, dated April 2018.

Coachella Valley Water District, 2019, Engineer's Report on Water Supply and Replenishment Assessment, 2019-2020, dated April 2019.

Construction Testing and Engineering, Inc., 2007, Geotechnical Assessment, Two Existing Drainage Basins, Avenue 62, West of Monroe, Riverside County, California, Job No. 40-2251, dated July 23, 2007.

Dibblee, T.W, 2008, Geologic Map of the Palm Desert & Coachella 15 Minute Quadrangles, Dibblee Geology Center Map #DF-373, March 2008.

APPENDIX A

REFERENCES (CONTINUED)

Earth Consultants International, 2010, Technical Background Report to the Safety Element of the La Quinta 2035 General Plan Update, Seismic Hazards, Geologic Hazards, Flooding Hazards, Dated June 2010, Revised September 7, 2010.

Earth Systems Southwest, 2007a, Suitability of Borrow Site Soils for Fill of Proposed Madison and Jefferson Streets, Travertine Project, Between Avenues 60 and 64 West of Proposed Madison and Jefferson Streets, La Quinta, California, File No.: 11112-01, 07-05-764R, dated May 14, 2007, revised May 25, 2007.

Earth Systems Southwest, 2007b, Geotechnical Engineering Report, Travertine Project, Proposed Madison Street Extension, La Quinta, California, File No.: 11112-02 07-06-706, dated September 12, 2007.

Earth Systems Southwest, 2007c, Report of Infiltration Testing for Stormwater Retention, Proposed Travertine Project, Between Avenues 60 and 64, West of Madison Street, La Quinta, California, File No.: 11112-04, 07-09-773, dated September 24, 2007.

Earth Systems Southwest, 2007d, Geotechnical Engineering Report, Proposed Travertine Project, Between Avenues 60 and 64, West of Madison Street, La Quinta, Riverside County, California, File No.: 11112-04, 07-11-804, dated November 21, 2007.

Leighton and Associates, Inc., 2011, Geotechnical Evaluation Report, Soughing Pond Embankments, Thomas E. Levey Groundwater Replenishment Facility, 80800± 62nd Avenue, La Quinta, California, Project No. 602953-001, dated January 10, 2011.

MTG$_L$ Geotechnical Engineering Services, 2011, Siltation Investigation, Thomas E. Levy Groundwater Recharge Facility, Avenue 62 & Monroe Street, La Quinta, California, Project No. 1681-A36, dated June 3 and 11, 2011.

Riverside County Flood Control and Water Conservation District, 2014, Whitewater River Region, Stormwater Quality Best Management Practice Design Handbook for Low Impact Development, dated Jun 2014.

Riverside County, 2021, Riverside County Information Technology (RCIT), Riverside County GIS, Fault and Liquefaction Potential Maps, 2019, website address: https://gis1.countyofriverside.us/Html5Viewer/index.html?viewer=MMC_Public; Date Accessed: August 19, 2021.

Rogers, T.H., 1965, Geologic Map of California, Santa Ana Sheet.

Sladden Engineering, 2001, Geotechnical Investigation, CVWD Dike No. 4 Flood Control Levee, Avenue 60 to Avenue 65 – Dike No. 4, West of the Trilogy at La Quinta, La Quinta Area of Riverside County, California, Project No.: 544-1211, 01-10-507, dated October 11, 2001.

Sladden Engineering, 2002, Infiltration Testing for Stormwater Retention, CVWD Dike No. 4 Flood Control Levee, West of Trilogy at La Quinta Project Site, La Quinta Area of Riverside County, California, Project No.: 544-1211, 02-03-168, dated March 14, 2002.

APPENDIX A

REFERENCES (CONTINUED)

Sladden Engineering, 2005a, Geotechnical Investigation, Residential Subdivision – Green Property, SWC Quarry Ranch Road and Jefferson Street, Project No.: 544-4769, 05-01-075, dated January 26, 2005.

Sladden Engineering, 2005b, Geotechnical Addendum, Proposed Madison Street Extension, Madison Street South of Avenue 60, La Quinta, California, Project No.: 544-5301, 05-04-401, dated April 12, 2005.

Sladden Engineering, 2006, 176 Lot Residential Subdivision – Coral Canyon, SWC Quarry Ranch Road and Jefferson Street, La Quinta, California, Project No. 544-4769, dated May 12, 2006.

Sladden Engineering, 2007, Response to City of La Quinta Review Comments, Coral Canyon – TTM 33444, SWC Quarry Ranch Road and Jefferson Street, La Quinta, California, Project No. 544-4769, dated November 29, 2007.

Sladden Engineering, Supplemental Field Investigation and Percolation Testing, Coral Canyon Tract 33444, SWC Quarry Ranch Road and Jefferson Street, La Quinta, California, Project No. 544-4769, dated November 30, 2007.

Sladden Engineering, 2008, Response to City of La Quinta Review Comments, Coral Canyon, TTM 33444, SWC Quarry Ranch Road and Jefferson Street, La Quinta, California, Project No. 544-4769, dated May 6, 2008.

Sladden Engineering, 2011, Geotechnical Update Report for Proposed Jefferson Street Extension Project, South of Avenue 58, Adjacent to Tentative Tract 33444, La Quinta, Project No. 544-4769, dated November 17, 2011.

Stantec Consulting, Inc., 2009, Coachella Valley Water District Dike No. 4 Groundwater Recharge Facility – Basins, Record Drawing Plan Set, 37 Sheets, dated October 1, 2009.

Structural Engineers Association/Office of Statewide Health Planning and Development, 2020, U.S. Seismic Design Maps, web site address: https://seismicmaps.org/ ; Date Accessed: January 7, 2020.

URS Corporation, 2002, Draft Report, Geotechnical Investigation Proposed Dike No. 4 Recharge Facility, Riverside County, California, File: 0643.5212, dated January 15, 2002.

U.S. Department of Agriculture, 2020, Web Soil Survey, web site address: https://websoilsurvey.nrcs.usda.gov/app/ ; Date Accessed: January 7, 2020.

U.S. Federal Emergency Management Agency, 2017, Flood Insurance Rate Map, Riverside County, California and Incorporated Areas, Panel 2900 of 3805, Map Number 06065C2900H, Revised April 19, 2017.

U.S. Federal Emergency Management Agency, 2018, Flood Insurance Rate Map, Riverside County, California and Incorporated Areas, Panel 2925 of 3805, Map Number 06065C2925H, Revised March 6, 2018.

APPENDIX A

REFERENCES (CONTINUED)

U.S. Geological Survey, 2014, Land Subsidence, Groundwater Levels, and Geology in the Coachella Valley, California, 1993-2010, Scientific Investigations Report 2014-5075.

U.S. Geological Survey, 2020, Unified Hazard Tool, NSHM 2014 Dynamic Deaggregation Program; web site address: https://earthquake.usgs.gov/hazards/interactive/; Date Accessed: January 7, 2020.

AERIAL PHOTOGRAPHS REVEIWED

Date	*Flight*	*Photos*	*Scale*	*Source*
2/15/49	AXM-1F	20, 21, 22	1"=1,667'	Continental Aerial
9/20/53	AXM-3K	146, 147		UCSB
11/10/59	AXM-10W	170, 171		UCSB
2/15/77	RIV 8	6, 7, 8		Continental Aerial
8/5/98	C-122-48	7, 8, 9	1"=2,000'	Continental Aerial
8/5/98	C-122-49	57, 58, 59, 60	1"=2,000'	Continental Aerial
5/28/02	NAPP 12478	116		UCSB

APPENDIX A

DEFINITIONS

Active (Fault): A fault that is likely to have another earthquake sometime in the future. Faults are commonly considered active if they have moved one or more times in the last 11,700 years.

Alluvial Fan: A conical, depositional landform found along mountain fronts of arid and semiarid regions.

Artificial Fill: Earth material used to fill in a depression or hole, create mounds or otherwise man-made fills to change natural grades.

Backcut: An inclined temporary excavation associated with the construction of a stabilization fill key. A backcut typically begins at the top of a natural and/or design slope and extends down to the toe of slope, terminating at the back of design keyway.

Bedrock: Relatively hard, solid rock that commonly underlies soft rock, sediment, or soil. May also be exposed at the earth's surface, known as an outcrop.

Blow Count: Number of blows by a 140-pound hammer, free-falling a distance of 30 inches, required to drive a sampler 12 inches into the ground. Also, a measure of soil resistance to penetration.

Boring: A circular excavation utilizing revolving tooling.

Boulder: A rock or rock fragment with size greater than 12 inches (considered oversize material for use in this report).

Braided Channel: A stream/channel consisting of numerous intertwining channels.

Cenozoic: A time span on the geologic time scale beginning about 66 million years ago, following the Mesozoic era.

Cobble: A rock or rock fragment with size larger than 2.5 inches and up to boulder size.

Desert Pavement: A layer of coarse pebbles and cobbles created by the removal of finer material through wind erosion.

Desert Varnish: An orange to black coating found on rock surfaces exposed to the sun in arid environments. The varnish collects on the exposed surface rocks over time and indicates relatively older alluvial deposits.

Erosion: The processes of weathering and transport of sediment. The process of abrasion or wearing away by wind, water, or other natural agents.

Expansion Potential: A measure to define the severity of risk of soil or sedimentary rock movement to foundation/slab due to shrink or swell. Expansive soils typically swell when wet or shrink when dry.

Fault: A fracture or discontinuity within blocks of the earth's crust on which displacement or movement on either side has occurred relative to one another.

Fault-Rupture Hazard Zone: A regulatory zone surrounding the surface traces of active faults. Wherever an active fault exists that has potential for surface rupture, a structure for human occupancy cannot be placed over the fault and must be set back a minimum distance from the fault.

Front Cut: An inclined temporary excavation associated with the construction of a stabilization fill key. A front cut typically begins near the toe of the design slope and extends down to the front of the design key. Similar to a backcut but occurs on the toe side of a slope.

fps: Feet per second is a unit/measurement of both speed and velocity.

Geomorphology: The study of the character and origin of landforms, such as mountains, valleys, etc., on the surface of the earth.

Geophysical Survey: Surveys using various earth sensing instrumentation to collect data below the earth's surface.

Granitic Bedrock: Crystalline bedrock that largely consists of light-colored silicates (quartz) and feldspars; an intrusive igneous rock.

Groundwater Basin: An area or region underlain by permeable earth materials capable of furnishing a supply of groundwater to wells.

Hollow-Stem Auger: An auger-type drill rig typically used during geotechnical explorations and groundwater monitoring well construction. Auger flights consist of a hollow stem that acts as a temporary casing, allowing for collection of samples through the stem or for setting a groundwater monitoring device.

Hydraulic Conductivity: A factor relating to groundwater flow; it is a coefficient that takes into account the permeability of soil and viscosity of a fluid (water).

Inactive (Fault): California Geological Survey (CGS) indicates that a fault may be presumed seismically inactive (or pre-Holocene) if it does not break Holocene-age formations. CGS also suggests a fault that lacks evidence for surface displacement within Holocene time (the past 11,700 years) should not necessarily be considered inactive.

Infiltration Rate: Calculated rate from the percolation test results, usually in accordance with an agency's technical guidance document.

ksf: Kips per square foot is a unit/measurement of pressure. A kip is a unit of force (1,000-pound force) used by engineers to measure loads.

Liquefaction: A process by which saturated sediments (i.e., alluvium, alluvial fan) temporarily lose strength and act as a fluid. This effect can be caused by earthquake shaking in saturated, unconsolidated, sandy alluvium.

Mass Movement: Also called mass wasting, is the downslope movement of rock or soil under the direct influence of gravity.

Mesozoic: A time span on the geologic time scale – from between approximately 252 to 66 million years ago.

Metamorphic (rock): Rock formed by the alteration of preexisting rock deep within the earth (remaining in solid state) by heat, pressure, and/or chemically active fluids.

Moment Magnitude (Mw): Magnitude characterizes the relative size of an earthquake based on measurement of the maximum motion recorded by a seismograph. This measures earthquake magnitude based on the total energy released by an earthquake. The Moment Magnitude scale, based on the concept of seismic moment, is uniformly applicable to all sizes of earthquakes but is more difficult to compute than other types.

Overexcavation: Soil or bedrock excavated below finish-grade elevations in design cut areas.

Percolation Testing: A field test used to determine the soil-water absorption rate to assist in the design of septic drain field or stormwater infiltration devices. Testing involves measurement of known water volume dissipation over time.

pcf: Pounds per cubic foot is a measurement of the density of materials.

Primary Ground Rupture: Offset of the ground surface associated with a main/major fault when earthquake rupture occurs along the fault.

Primary Wave (P-wave): The fastest seismic wave in the earth, which travel by compression and expansion ("push-pull") of the medium.

Quaternary: The latest period of geologic time up to and including the present. The Quaternary includes the Pleistocene and Holocene Epochs, and ranges from approximately 2.58 million years ago to the present.

Refraction (Geophysics): A geophysical survey that uses seismographs and geophones on the ground surface to record seismic waves through layers of rock/soil in order to characterize the subsurface geology.

Remedial Removal: Grading necessary to remove and/or mitigate unsuitable soils prior to placement of compacted fill and/or construction of foundations or structures.

Rockslide: The rapid slide of a mass of rock downslope along planes of weakness.

Seiche: The sloshing of a closed body of water (i.e., lakes, ponds, reservoirs) from earthquake shaking.

Seismic Line: A series of geophones on the ground surface used to collect geophysical data.

Slope Stability Analysis: The mathematical measure of the relative factor-of-safety against both global and surficial failure of slope material. Global failure involves either rotational or translational failure along planes/surfaces of weakness. Surficial failure includes the outer surface of the slope soil (generally 3 to 4 feet measured perpendicular to slope face) that may be affected by erosion, weathering, and gravity.

Stabilization Fill Key/Keyway: A design excavation into competent material at the toe of slope, in which compacted fill is placed to resist lateral pressure and replace slope materials with uniform compacted fill.

Subsidence: Down-warping or settlement of an area of the earth's surface. Regional subsidence can occur due to oil and/or groundwater withdrawal.

Test Pit/Trench: A mechanical excavation (backhoe, excavator) used to conduct subsurface geotechnical exploration. Typically consists of an open-pit or trench used for geologic/geotechnical evaluation and sample collection.

Tsunami: A great sea wave produced especially by a submarine earth movement, earthquake, or volcanic eruption.

USCS: Unified Soil Classification System is a system used in engineering and geology to describe the texture and grain-size of soil and is represented by a two-letter symbol (i.e. CL, ML, SC, etc.).

APPENDIX B

BORING LOGS BY

NMG

Date(s) Drilled	**8/9/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**10"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H-1

Sheet 1 of 2

Total Depth Drilled (ft)	**40.0**
Approximate Ground Surface Elevation (ft)	**45.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SW-SM	**Young Alluvial Fan Deposits (Qyf)**			
40	5		D-1	30			@ 5': Gray fine to coarse SAND with silt, damp, medium dense, highly friable, trace fine gravel.	1.3	119.1	B-1 @ 5-10'
			B-1							
	10		D-2	40			@ 10': Gray fine to coarse SAND with silt, damp, medium dense, highly friable, trace fine gravel, some gravel in upper rings.	1.1		
30	15		D-3	41		SM	@ 15': Gray silty fine to coarse SAND, damp, dense, friable, slighly more silt than above.	1.7	115.3	
	20		D-4	45			@ 20': Gray silty fine to coarse SAND, damp, dense, friable.	1.3	116.4	
			SPT-1	32			@ 21.5': Brownish gray silty fine to coarse SAND, damp, dense, rock in tip.	1.4		GS
			D-5	40		SW-SM	@ 23': Gray fine to coarse SAND with silt, damp, very dense, friable, trace to few fine to coarse gravel.	0.9		
							@ 24.5': Grayish brown fine to coarse SAND with silt, damp, dense, friable.	1.9		
20	25									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
20	25		SPT-2	21		SW-SM				
			D-6	30			@ 26': Gray fine to coarse SAND with silt, damp, medium dense, friable, trace rootlets, trace to few fine to coarse gravel.	2.5		
			SPT-3	15			@ 27.5': Gray fine to coarse SAND with silt, damp, dense, friable.	1.1		
	30		D-7	50			@ 29': Gray fine to coarse SAND with silt, damp, dense, rootlets concentrated in silty lenses, trace to few fine to coarse gravel.	2.1	123.9	
			SPT-4	32			@ 30.5': Gray fine to coarse SAND with silt, damp, dense, friable.	1.8		GS
			D-8	70			@ 32': Gray fine to coarse SAND with silt, damp, dense, friable.	1.4		
			SPT-5	22			@ 33.5': Gray fine to coarse SAND with silt, damp, dense, friable.	2.0		
10	35		D-9	57			@ 35': Gray fine to coarse SAND with silt, damp, dense, friable, trace to few fine to coarse gravel.	1.8		GS
			SPT-6	32			@ 36.5': Gray fine to coarse SAND with silt, damp, dense, friable, trace gravel.	1.6		
			D-10 SB-1	85			@ 38': Gray fine to coarse SAND with silt, damp, dense, highly friable, trace to few fine to coarse gravel. No ring sample recovery.	1.2		SB-1 @ 38'-39'
	40						Notes: Total Depth: 40 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
0	45									
	50									
-10	55									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA

PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	**8/10/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**10"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H-2

Sheet 1 of 2

Total Depth Drilled (ft)	**40.0**
Approximate Ground Surface Elevation (ft)	**50.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
50	0					SW/GM	**Young Alluvial Fan Deposits (Qyf)**			
	5	■	D-1	24			@ 5': Gray fine to coarse SAND/GRAVEL, damp, medium dense, highly friable.	0.5		
							@ 7.5': Driller noted gravel.			
40	10	■	D-2	43		SW	@ 10': Gray fine to coarse SAND, damp, dense, highly friable.	0.5		
		▨	B-1							
	15	■	D-3	40			@ 15': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
		■	D-4	50			@ 17': Gray fine to coarse SAND, damp, dense, highly friable.	0.6		
		◩	SPT-1	24			@ 18.5': Gray fine to coarse SAND, damp, dense, highly friable, trace to few gravel.	0.6		
30	20	■	D-5	43			@ 20': Gray fine to coarse SAND, damp, dense, highly friable, some lenses of cleaner sand.	0.7		GS
		◩	SPT-2	31			@ 21.5': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
		■	D-6	60			@ 23': Gray fine to coarse SAND, damp, dense, highly friable, trace to few gravel.	1.0		
		◩					@ 24.5': Gray fine to coarse SAND, damp, dense, highly friable, trace gravel.	0.8		
	25									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		SPT-3	48		SW				
			D-7	82/9"			@ 26': Gray fine to coarse SAND, damp, dense, highly friable, trace gravel, rock in tip.	0.9		
							@ 27': No Recovery, rock.			
			SPT-4	50/1"						
			D-8	89			@ 29': Gray fine to coarse SAND, damp, very dense, highly friable.	0.5		GS
20	30									
			SPT-5	28			@ 30.5': Gray fine to coarse SAND, damp, very dense, highly friable.	0.8		
			D-9	70			@ 32': Gray fine to coarse SAND, damp, very dense, some fine gravel, highly friable.	0.8	117.5	CN
			SPT-6	27			@ 33.5': Gray fine SAND, damp, dense, friable, more silt than above.	0.8		
	35									
			D-10	58			@ 35': Gray fine to coarse SAND, damp, very dense, trace to few gravel.	1.0		
			SPT-7	28			@ 36.5': Gray fine to coarse SAND, damp, very dense, friable, trace fine gravel.	0.8		
			D-11	55			@ 38': Gray fine to coarse SAND, damp, very dense, friable, trace fine gravel.	1.0		
10	40									
							Notes: Total Depth: 40 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	45									
0	50									
	55									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA

PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	**8/9/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-1

Sheet 1 of 1

Total Depth Drilled (ft)	**23.0**
Approximate Ground Surface Elevation (ft)	**45.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SW	Surface: Access Road. **Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
40	5	■	D-1	42			@ 5': Gray fine to coarse SAND, damp, dense, friable, trace to few gravel.	1.2	120.5	
	10	■	D-2	26		SW-SM	@ 10': Gray fine to coarse SAND with silt, damp, medium dense, friable.	3.8	112.5	
30	15	■	D-3	36			@ 15': Gray fine to coarse SAND with silt, damp, dense, friable, trace gravel, upper rings have olive brown silty sand.	7.3	112.3	GS
	20	■	D-4	50/6"			@ 20': No ring sample recovery.			
		■	D-5	64			@ 21.5': Olive gray fine to coarse SAND with silt, damp, very dense, interlayered silt lenses.	3.7	118.3	CN
20	25						Notes: Total Depth: 23 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/10/21.			
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Date(s) Drilled	**8/9/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-2

Sheet 1 of 1

Total Depth Drilled (ft)	**24.0**
Approximate Ground Surface Elevation (ft)	**43.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SP	Surface: Access Road. **Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
40										
	5	■	D-1	56			@ 5': Gray fine to coarse SAND, damp, very dense, highly friable, trace to few fine to coarse gravel.	1.1		
	10	■	D-2	46			@ 10': No ring sample recovery.			
30										
	15	■	D-3	31			@ 15': Gray fine to coarse SAND, damp, medium dense, highly friable, trace to few fine to coarse gravel.	1.6		
	20	■	D-4	46			@ 20': Gray fine to coarse SAND, damp, dense, highly friable, trace to few fine to coarse gravel.	1.4	120.6	
20		■	D-5	77			@ 22.5': Gray fine to coarse SAND, damp, medium dense, highly friable, some fine to coarse subangular gravel.	1.9		GS
	25						Notes: Total Depth: 24 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/10/21.			
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	**8/10/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-3

Sheet 1 of 1

Total Depth Drilled (ft)	**20.0**
Approximate Ground Surface Elevation (ft)	**46.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SW	**Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
40	5	▮	D-1	18			@ 5': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.8		
	10	▮	D-2	20			@ 10': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	1.1		
		▮	D-3	45			@ 13.5': Gray fine to coarse SAND, damp, dense, friable, trace fine gravel.	0.8		
30	15	▮	D-4	44			@ 15': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.9		
		▮	D-5	37			@ 16.5': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.7		GS
		▮	D-6	31			@ 18.5': Gray fine to coarse SAND, damp, medium dense, friable, trace fine gravel.	0.7		
	20						Notes: Total Depth: 20 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed in Bottom 10 Feet. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/12/21.			
20	25									
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Date(s) Drilled	**8/10/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-4

Sheet 1 of 1

Total Depth Drilled (ft)	**25.0**
Approximate Ground Surface Elevation (ft)	**55.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SW	**Young Alluvial Fan Deposits (Qyf)**			B-1 @ 0-5'
50	5	■	D-1	29			@ 5': Gray fine to coarse SAND, damp, medium dense, highly friable.	0.8		
	10	■	D-2	28			@ 10': Gray fine to coarse SAND, damp, medium dense, highly friable.	0.8		
40	15	■	D-3	48		SW-GW	@ 15': Gray fine to coarse SAND/GRAVEL, damp, medium dense, highly friable.	1.0		
	20	■	D-4	39			@ 20': No ring sample recovery.			
		■	D-5	46		SW	@ 22': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
		■	D-6	44			@ 23.5': Gray fine to coarse SAND, damp, dense, highly friable.	0.7		
30	25						Notes: Total Depth: 25 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/12/21.			
	30									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Report: HOLLOW STEM; Project: 18186-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 8/30/21

Date(s) Drilled	**8/10/21**	Logged By	**ZKH**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME75 Hollow Stem**	Hammer Data	**140 lbs. @ 30 inch drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-5

Sheet 1 of 2

Total Depth Drilled (ft)	**30.0**
Approximate Ground Surface Elevation (ft)	**60.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot						
60	0					SW	**Young Alluvial Fan Deposits (Qyf)**			
	5	■	D-1	27			@ 5': Gray fine to coarse SAND, damp, medium dense, highly friable, trace fine gravel.	0.7		
		▨	B-1							
50	10	■	D-2	50/6"		SW/GW	@ 10': Gray fine to coarse SAND/GRAVEL, damp, very dense, highly friable.	0.7		
							@ 10'-15': Driller noted gravel.			
	15	■	D-3	45			@ 15': No ring sample recovery.			
40	20	■	D-4	80		SW	@ 20': Gray fine to coarse SAND, damp, very dense, highly friable, trace fine gravel.	0.5		
	25									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot						
	25	■	D-5	55		SW	@ 25': Gray fine to coarse SAND, damp, very dense, friable.	0.3	120.7	
		■	D-6	51			@ 27': Gray fine to coarse SAND, damp, very dense, friable.	0.7		GS
		■	D-7	72			@ 28.5': Gray fine to coarse SAND, damp, very dense, friable.	0.6		
30	30						Notes: Total Depth: 30 Feet. No Groundwater Encountered. 2-inch Diameter Slotted Well Pipe Installed in Bottom 10 Feet. Annular Space Backfilled with #3 Sand. Percolation Testing Conducted on 8/12/21.			
	35									
20	40									
	45									
10	50									
	55									

LOG OF BORING

Hofmann / La Quinta - Travertine
La Quinta, CA

PROJECT NO. 18186-01

NMG

BORING AND TEST PIT LOGS

BY OTHERS

BORINGS BY

SLADDEN (2001)

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 **Boring No. 1** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Sandy Silt: Brown, very sandy	ML				
5		■	50-5"	" "	"	105	3.6	---	52% passing #200
10		☒	50-5"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	---	2.6	---	32% passing #200
15		■	50-5"	" "	"	114	3.6	87	34% passing #200
20		■	37/50-3"	Sandy Silt: Brown, clayey with coarse grained sand	ML	113	8.7	---	56% passing #200
25		■	18/50-5"	" "	"	95	7.5	---	56% passing #200 Native
30		■	50-6"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	109	5.3	---	31% passing #200
35		■	38/50-5"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	108	4.2	---	28% passing #200
40		■	18/50-6"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	111	7.0	85	35% passing #200
45				■ Recovered Sample ☒ Disturbed Sample					Total Depth = 41.5' No Bedrock No Groundwater
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 **Boring No. 2** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained	SM				
5		■	50-6"	" "	"	111	1.5	---	22% passing #200
10		■	50-4"	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	118	4.7	90	35% passing #200
15		■	26/50-6"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	112	3.0	---	25% passing #200
20		■	30/50-6"	" "	"	117	2.6	87	18% passing #200
25		■	29/35/50	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	113	3.1	---	32% passing #200
30		■	21/25/50	" "	"	111	3.6	---	28% passing #200
35		■	29/50-5"	Silty Sand: Brown, fine to medium grained, slightly clayey	SM	111	3.1	---	20% passing #200
40		■	22/25/30	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	112	5.2	---	35% passing #200
				■ Recovered Sample					Total Depth = 41.5' No Bedrock No Groundwater
45									
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-24-01 **Boring No. 3** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained	SM				
5		■	31/50-5"	" "	"	122	3.6	---	24% passing #200
10		■	36/50-5"	" "	"	129	3.1	96	17% passing #200
15		■	20/50-5"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	125	5.8	---	32% passing #200
20		■	22/40/43	" "	"	120	4.2	---	24% passing #200
25		◫	14/21/28	" "	"	---	4.7	---	31% passing #200
30		■	7/19/32	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	117	4.2	---	23% passing #200
35		◫	15/25/30	" "	"	---	5.3	---	38% passing #200
40		■	12/20/22	Silty Sand: Brown, fine to coarse grained	SM	110	1.5	82	15% passing #200
45				■ Recovered Sample ◫ Standard Penetration Sample					Boulder Refusal @ 43' No Bedrock No Groundwater
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 | **Boring No. 4** | Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained, slightly clayey	SM				
5		■	18/50-6"	" "	"	117	3.6	---	26% passing #200
10		◫	12/20/25	" "	"	---	4.2	---	28% passing #200
15		■	24/50-6"	Silty Sand: Brown, fine to coarse grained, clayey	SM	112	5.8	---	26% passing #200
20		◫	24/31/40	" "	"	---	4.2	---	22% passing #200
25		■	50-6"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	118	2.6	88	15% passing #200
30		◫	12/14/24	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	---	4.2	---	31% passing #200
35		■	10/10/30	" "	"	120	4.7	92	35% passing #200
40		◫	13/15/15	" "	"	---	5.8	---	37% passing #200
45		☒	26/36/50	Sand: Brown, slightly silty, fine to coarse grained with gravel	SP/SM	---	1.5	---	15% passing #200
50				■ Recovered Sample ◫ Standard Penetration Sample ☒ Disturbed Sample					Total Depth = 46.5' No Bedrock No Groundwater
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-23-01 | Boring No. 5 | Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained, slightly clayey	SM				
5		◫	13/16/25	" "	"	---	4.2	---	28% passing #200 Scattered gravel
10		■	24/50-5"	Silty Sand: Brown, fine to coarse grained, clayey	SM	123	4.7	---	24% passing #200
15		◫	18/23/33	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	---	4.2	---	18% passing #200 Scattered gravel
20		■	23/31/50	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	118	7.5	---	27% passing #200 Trace gravel
25		◫	12/19/31	" "	"	---	5.3	---	29% passing #200 Trace gravel
30		■	26/50-6"	" "	"	116	6.4	---	29% passing #200 Trace gravel
35		◫	13/13/13	" "	"	---	4.2	---	30% passing #200
40		■	20/27/30	Silty Sand: Brown, fine to coarse grained, clayey	SM	112	4.2	---	23% passing #200
45				■ Recovered Sample ◫ Standard Penetration Sample					Total Depth = 41.5' No Bedrock No Groundwater
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-24-01 | Boring No. 6 | Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0				Silty Sand: Brown, fine to coarse grained, slightly clayey	SM				
5		■	41/50-5"	" "	"	122	3.0	---	28% passing #200
10		◫	25/28/36	Silty Sand: Brown, fine to coarse grained, clayey	SM	---	0.5	---	26% passing #200
15		■	50/50-4"	Silty Sand: Brown, fine to coarse grained, slightly clayey	SM	129	4.5	---	27% passing #200
20		◫	25/28/28	Silty Sand: Brown, very silty, fine to coarse grained, clayey	SM	---	2.5	---	36% passing #200
25		■	43/50-5"	" "	"	112	5.0	---	40% passing #200
30		◫	12/15/21	Clayey Sand: Reddish brown, fine to coarse grained, silty	SC	---	7.0	---	45% passing #200
35		■	30/30/40	" "	"	129	8.0	---	49% passing #200
40		◫	14/18/25	" "	"	---	8.1	---	33% passing #200
45		■	25/30/33	Silty Sand: Brown, fine to coarse grained	SM	118	5.2	---	20% passing #200
50									Total Depth = 46.5' No Bedrock No Groundwater
55									

■ Recovered Sample

◫ Standard Penetration Sample

Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

Trilogy at La Quinta - Flood Control Levee
La Quinta Area / Riverside County, California

Date: 8-24-01 **Boring No. 10** Job No.: 544-1211

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0	▨			Silty Sand: Brown, fine to coarse grained	SM				
5	▨	☒	21/22/30	" "	"	---	0.5	---	13% passing #200
10	▨	▮	31/50-5"	" "	"	---	0.5	---	13% passing #200
				☒ Disturbed Sample ▮ Standard Penetration Sample					Total Depth = 11.5' No Bedrock No Groundwater
15									
20									
25									
30									
35									
40									
45									
50									
55									Note: The stratification lines represent the approximate boundaries between the soil types; the transitions may be gradual.

BORING AND TRENCH LOGS BY

URS CORPORATION

(2002)

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Key to Log of Boring

Sheet 1 of 1

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
		Type	Number	Sampling Resistance					
1	2	3	4	5	6	7	8	9	10

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL) or site datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number. "NR" indicates no sample recovery.

5 **Sampling Resistance:** Number of blows to advance driven sampler 12 inches beyond first 6-inch (seating) interval, or distance noted, using a 140-lb hammer with a 30-inch drop.

6 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

7 **Material Description:** Description of material encountered; may include relative density/consistency, moisture, color, particle size; texture, weathering, and strength of formation material.

8 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of specimen.

9 **Dry Unit Weight:** Dry weight per unit volume of soil sample measured in laboratory, expressed in pounds per cubic foot (pcf).

10 **Remarks and Other Tests:** Comments and observations regarding drilling or sampling made by driller or field personnel. Other field and laboratory test results, using the following abbreviations:

COMP	Compaction test by modified effort
LL	Liquid Limit from Atterberg Limits test
NP	Non-plastic result for Atterberg Limits test
PI	Plasticity Index from Atterberg Limits test
SA	Sieve analysis, percent passing #200 sieve
SE	Sand equivalent test, average sand equivalent
WA	Wash sieve, percent passing #200 sieve

TYPICAL MATERIAL GRAPHIC SYMBOLS

░ Poorly graded SAND (SP)
▒ Well-graded SAND (SW)
▥ SAND with SILT (SP-SM)
▥ SILT (ML)
▧ SILTY CLAY (CL-ML)
▦ SILTY SAND (SM)
▨ Lean CLAY (CL)
▨ Fat CLAY (CH)
▩ CLAYEY SAND (SC)
● GRAVEL (GP/GW)
● SILTY GRAVEL (GM)
▩ CLAYEY GRAVEL (GC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

■ Modified California (2.5-inch OD)
▧ Standard Penetration Test (SPT) split spoon
▩ Bulk sample
◪ California (3-inch OD)
▯ Shelby Tube
☒ Grab sample

OTHER GRAPHIC SYMBOLS

▽ First water encountered at time of drilling and sampling (ATD)
▼ Static water level measured in borehole at specified time after drilling
▾— Change in material properties within a lithologic stratum
--- Inferred contact between soil strata or gradational lithologic change

GENERAL NOTES

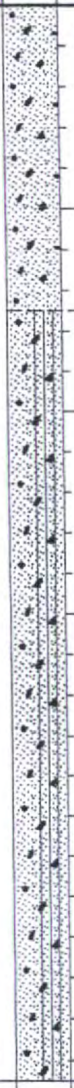
1. Elevations for borings are estimated from topographic maps provided by The Keith Companies.
2. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
3. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-1

Sheet 1 of 1

Date(s) Drilled	**11/18/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**26.5 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**20 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		



Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resistance, blows / foot	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
20	0				Medium dense, damp, gray, poorly graded SAND with GRAVEL (SP), trace silt; near-surface cobbles and boulders up to 12 inches			
		▨	1	16				SA: 4.9%<#200
15	5	■	2	26		1.5		SE=79
					Dense, damp to moist, gray, poorly graded SAND with SILT and GRAVEL (SP-SM)			
10	10	▨	3	44		1.8		WA: 10%<#200 Gravel up to 1 inch in sample.
5	15	■	4	56	Becomes dry to damp; decrease in silt content			
0	20	▨	5	44				
-5	25	■	6	36	Becomes medium dense			
					Bottom of boring at 26.5 feet			
-10	30							

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-2

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	36 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0	░				Dense, dry, gray, poorly graded SAND (SP), few gravel, trace silt			
35		░	SK-1				0.4		SA: 4.3%<#200 COMP
		▨	1	34			0.4		
30	5	■	2 [NR]	28		Medium dense, dry, gray, poorly graded SAND with SILT (SP-SM)			No sample recovery.
		▨	3	39		Becomes dense	0.6		WA: 6.7%<#200
25	10	■	4	44					Poor recovery.
						Dense, dry, gray, well-graded SAND with SILT (SW-SM), few gravel			
20	15	▨	5	32					SA: 6.7%<#200
15	20	▨	6	23		Becomes medium dense			
10	25	▨	7	50		Becomes dense			
						Bottom of boring at 26.5 feet			
	30								

URS

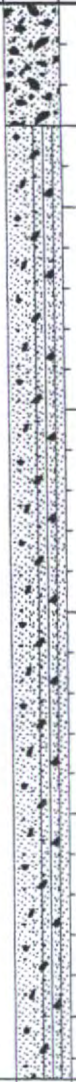
Figure A-3

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-3

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	20 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		



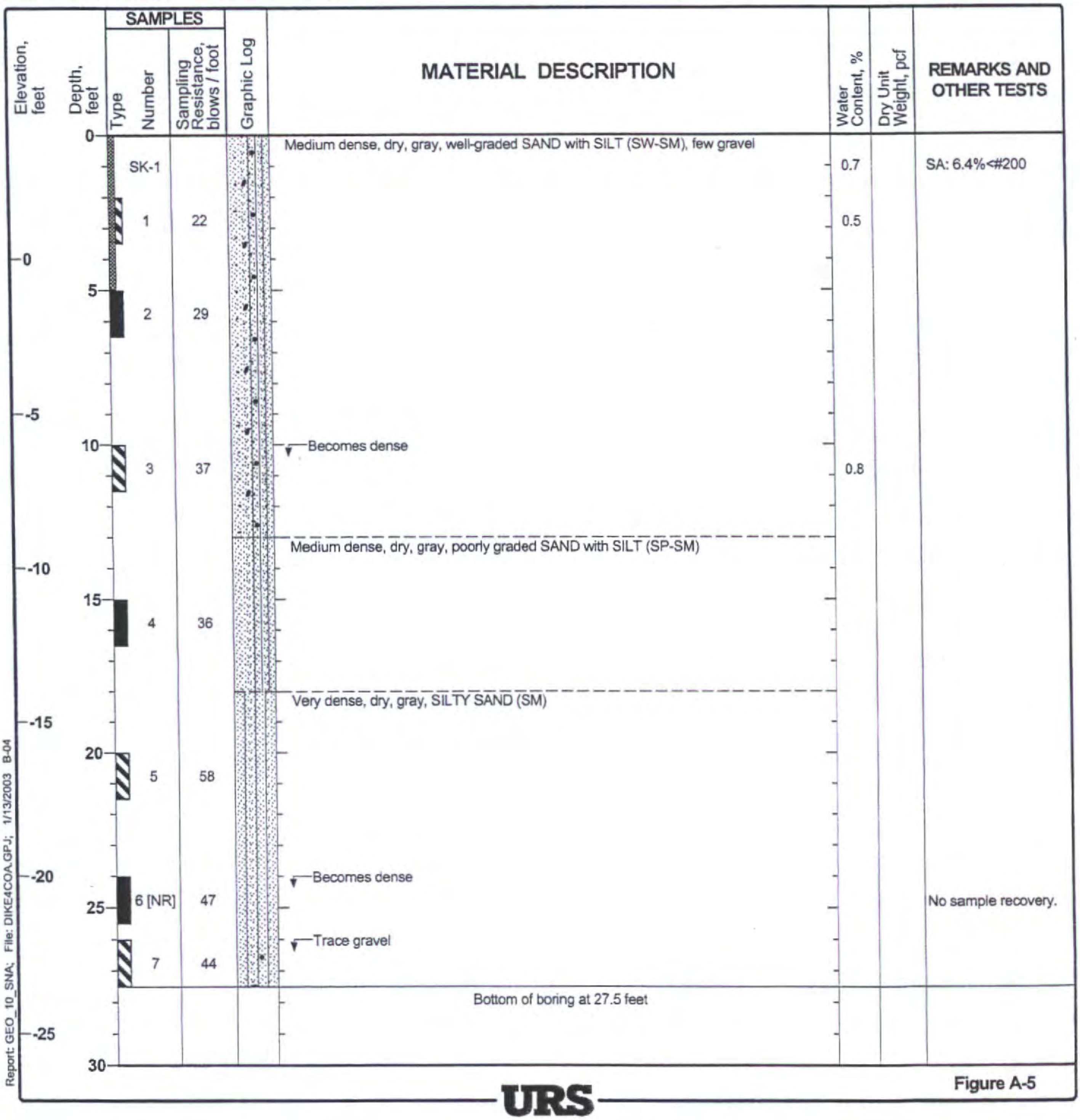
Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
20	0					Medium dense, dry, gray, well-graded SAND with GRAVEL (SW), trace silt			
		░	SK-1				0.6		SA: 4.5%<#200
		▨	1	19		Medium dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)	0.5		WA: 8.7%<#200
15	5	■	2	34					Gravel up to 1 inch in sample.
10	10					Becomes dense			
		▨	3	38			0.6		
5	15	■	4 [NR]	50/5"					Hammer bouncing on gravel; no recovery.
						Becomes very dense			
		▨	5	62					
0	20	■	6 [NR]	50					No sample recovery.
-5	25	▨	7	62					
						Bottom of boring at 26.5 feet			
-10	30								

Project:	**Dike No. 4 Recharge Facility**
Project Location:	**Coachella, California**
Project Number:	**29864604.00001**

Log of Boring B-4

Sheet 1 of 1

Date(s) Drilled	**11/18/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**27.5 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**4 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT, bulk**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		



Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0	░	SK-1			Medium dense, dry, gray, well-graded SAND with SILT (SW-SM), few gravel	0.7		SA: 6.4%<#200
		▨	1	22			0.5		
0									
	5	■	2	29					
-5									
	10	▨	3	37		Becomes dense	0.8		
						Medium dense, dry, gray, poorly graded SAND with SILT (SP-SM)			
-10									
	15	■	4	36					
						Very dense, dry, gray, SILTY SAND (SM)			
-15									
	20	▨	5	58					
-20						Becomes dense			
	25	■	6 [NR]	47					No sample recovery.
						Trace gravel			
		▨	7	44					
						Bottom of boring at 27.5 feet			
-25									
	30								

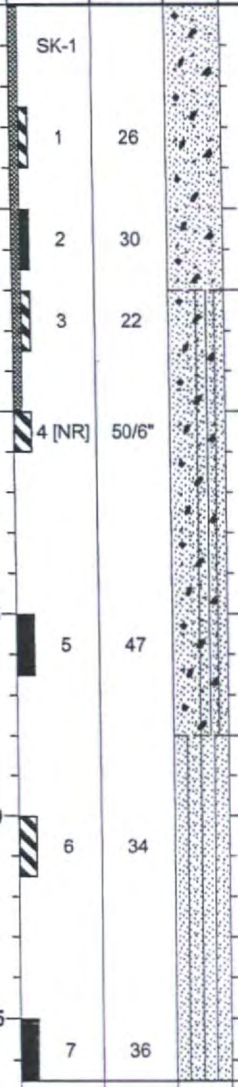
Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-04

Project:	**Dike No. 4 Recharge Facility**
Project Location:	**Coachella, California**
Project Number:	**29864604.00001**

Log of Boring B-5

Sheet 1 of 1

Date(s) Drilled	**11/18/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**26.5 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**14 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT, bulk**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		



Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0					Medium dense, dry, gray, well-graded SAND with GRAVEL (SW), trace silt			
			SK-1				0.4		SA: 4.6%<#200
									Auger grinding on a rock.
			1	26			0.3		
10									
	5		2	30					
						Medium dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)			
			3	22			0.5		WA: 6.3%<#200
5									
	10		4 [NR]	50/6"		Becomes very dense			No sample recovery.
0									
	15		5	47		Becomes dense			
						Dense, dry, gray, SILTY SAND (SM)			
-5									
	20		6	34					
-10									
	25		7	36		Becomes medium dense			
						Bottom of boring at 26.5 feet			
-15									
	30								

URS

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-6

Sheet 1 of 1

Date(s) Drilled	11/18/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	6 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
		Type	Number	Sampling Resistance, blows / foot					
	0					Medium dense, dry, gray, well-graded SAND with SILT (SW-SM), trace gravel			
5			SK-1						
		▨	1	21			0.5		SA: 10%<#200
	5					Becomes dense			
0		■	2	40			0.5		SE=75
	10					Becomes medium dense			
-5		▨	3	28					
	15					Becomes dense			
-10		■	4	40					
						Very dense, dry, gray, SILTY SAND (SM)			
	20								
-15		▨	5	62					WA: 29%<#200
	25					Becomes dense			
-20		■	6	43					
						Bottom of boring at 26.5 feet			
	30								

Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-06

URS

Figure A-7

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-7

Sheet 1 of 1

Date(s) Drilled	11/19/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	26.5 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	12 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0					Medium dense, dry, gray, poorly graded SAND (SP), few gravel, trace silt			
			SK-1				0.4		SA: 3.5%<#200
10									
			1	28					Poor recovery.
	5		2	20			1.2		
5									
	10		3	24			0.8		
0									
	15		4	40		Becomes dense			
-5									
						Dense, dry, gray, SILTY SAND (SM)			
	20		5	38					WA: 31%<#200
-10									
	25		6	42					
						Bottom of boring at 26.5 feet			
-15									
	30								

Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-07

URS

Figure A-8

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-8

Sheet 1 of 1

Date(s) Drilled	11/19/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	28.0 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	66 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
	0					Medium dense, dry, gray, SILTY SAND (SM), few gravel			
65									
		▨	1	23			0.9		2-inch rock fragment in sampler shoe.
60	5	■	2	25					Gravel up to 1/2 inch in sample.
55	10	▨	3	27			0.1		
						Dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)			
50	15	■	4	42					SA: 7.9%<#200
45	20	▨	5	43					
						Becomes medium dense			
40	25	■	6 [NR]	28					No sample recovery.
						Becomes dense			
		▨	7	32					WA: 9.8%<#200
						Bottom of boring at 28.0 feet			
	30								

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-9

Sheet 1 of 1

Date(s) Drilled	**11/19/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**28.0 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**85 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
85	0					Medium dense, dry, gray, poorly graded SAND with SILT and GRAVEL (SP-SM)			
		▨	1	23			0.5		WA: 5.8%<#200
80	5	■	2 [NR]	14		Medium dense, dry, gray, SILTY SAND (SM)			No sample recovery.
		▨	3	20			1.0		WA: 12%<#200
75	10	▨	4	21					SE=69
70	15					Becomes dense			
		■	5 [NR]	40					No sample recovery.
						Becomes medium dense			
		▨	6	26			0.9		
						Dense, dry, gray, poorly graded SAND with SILT (SP-SM)			
65	20	▨	7	37					WA: 7.0%<#200
60	25	■	8	46					
						Becomes medium dense			
		▨	9	26					
						Bottom of boring at 28.0 feet			
55	30								

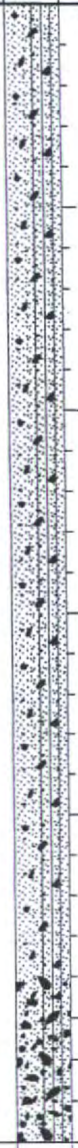
Figure A-10

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-10

Sheet 1 of 1

Date(s) Drilled	**11/19/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**28.0 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**50 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**Modified California, SPT, bulk**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resistance, blows / foot	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
50	0					Medium dense, dry, gray, well-graded SAND with SILT and GRAVEL (SW-SM)			
			SK-1				0.5		SA: 6.4%<#200
			1	10			0.4		
45	5		2	50/5"					Auger grinding on a rock.
40	10					Becomes dense			
			3	35			0.9		
35	15		4 [NR]	50/6"		Becomes very dense			No sample recovery.
			5 [NR]	66					No sample recovery.
30	20								
			6 [NR]	50					No sample recovery.
			7	61			0.7		WA: 9.3%<#200
						Becomes dense; increase in gravel content, clasts up to 1 inch			
25	25								
			8 [NR]	44					No sample recovery.
			9	35					
						Bottom of boring at 28.0 feet			
20	30								

URS

Figure A-11

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-11

Sheet 1 of 1

Date(s) Drilled	11/19/02	Logged By	V. Glisic	Checked By	B. Gookin
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch-OD auger bit	Total Depth of Borehole	28.0 feet
Drill Rig Type	Mobile B-61	Drilling Contractor	Cal Pac Drilling	Approximate Surface Elevation	8 feet MSL
Groundwater Level(s)	Not encountered	Sampling Method(s)	Modified California, SPT, bulk	Hammer Data	140 lbs, 30-inch drop
Borehole Backfill	Drill cuttings	Location	Refer to site plan		

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
		Type	Number	Sampling Resistance, blows / foot					
	0					Medium dense, dry, gray, poorly graded SAND (SP), few gravel, trace silt			
			SK-1				0.8		SA: 4.6%<#200
5									
			1	16			0.7		
									Auger grinding on a rock.
	5								
			2 [NR]	26					No sample recovery.
			3	28			0.7		
0									
	10								
			4	22					
-5									
	15								
			5	27					
-10						Dense, dry, gray, poorly graded SAND with SILT (SP-SM)			
	20								
			6	42			0.5		
-15									
	25								
			7	40					
			8	40					WA: 11%<#200
-20						Bottom of boring at 28.0 feet			
	30								

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Boring B-12

Sheet 1 of 1

Date(s) Drilled	**11/19/02**	Logged By	**V. Glisic**	Checked By	**B. Gookin**
Drilling Method	**Hollow-Stem Auger**	Drill Bit Size/Type	**8-inch-OD auger bit**	Total Depth of Borehole	**26.5 feet**
Drill Rig Type	**Mobile B-61**	Drilling Contractor	**Cal Pac Drilling**	Approximate Surface Elevation	**13 feet MSL**
Groundwater Level(s)	**Not encountered**	Sampling Method(s)	**SPT, bulk**	Hammer Data	**140 lbs, 30-inch drop**
Borehole Backfill	**Drill cuttings**	Location	**Refer to site plan**		

Elevation, feet	Depth, feet	SAMPLES			Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
		Type	Number	Sampling Resistance, blows / foot					
	0					Medium dense, dry, gray, well-graded SAND (SW), few gravel, trace silt			
			SK-1				0.5		SA: 3.8%<#200
10			1	28			0.5		
	5		2	34		Becomes dense	0.4		
5									
	10		3	22		Becomes medium dense			SE=69
0						Dense, dry, gray, SILTY SAND (SM)			
	15		4	32					WA: 18%<#200
-5									
	20		5	27		Becomes medium dense	1.0		
-10									
	25		6	41		Becomes dense			
						Bottom of boring at 26.5 feet			
-15									
	30								

Report: GEO_10_SNA; File: DIKE4COA.GPJ; 1/13/2003 B-12

URS

Figure A-13

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Key to Log of Test Pit

Elevation feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL).

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number.

5 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

6 **Material Description:** Description of material encountered; may include color, moisture, grain size, and density/consistency.

7 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of the designated specimen.

8 **Remarks and Other Tests:** Comments and observations regarding excavation or sampling made by driller or field personnel. Field and laboratory test results (other than water content), using abbreviations explained below.

TYPICAL MATERIAL GRAPHIC SYMBOLS

- ░ Poorly graded SAND (SP)
- ░ Well-graded SAND (SW)
- ░ SAND with SILT (SP-SM)
- ▥ SILT (ML)
- ▥ Elastic SILT (MH)
- ▥ SILTY SAND (SM)
- ▨ Lean CLAY (CL)
- ▨ Fat CLAY (CH)
- ▨ CLAYEY SAND (SC)
- ● GRAVEL (GP/GW)
- ● SILTY GRAVEL (GM)
- ● CLAYEY GRAVEL (GC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- ▓ Bulk sample
- ☒ Grab sample

OTHER GRAPHIC SYMBOLS

- ∇ First water encountered at time of drilling and sampling (ATD)
- ⌐ Minor change in material properties within a lithologic stratum
- --- Inferred contact between soil strata or gradational lithologic change

GENERAL NOTES

1. Elevations for test pits are estimated from topographic maps provided by The Keith Companies.
2. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
3. Descriptions on these logs apply only at the specific test pit locations and at the time the pits were excavated. They are not warranted to be representative of subsurface conditions at other locations or times.

TYPICAL LABORATORY TEST ABBREVIATIONS

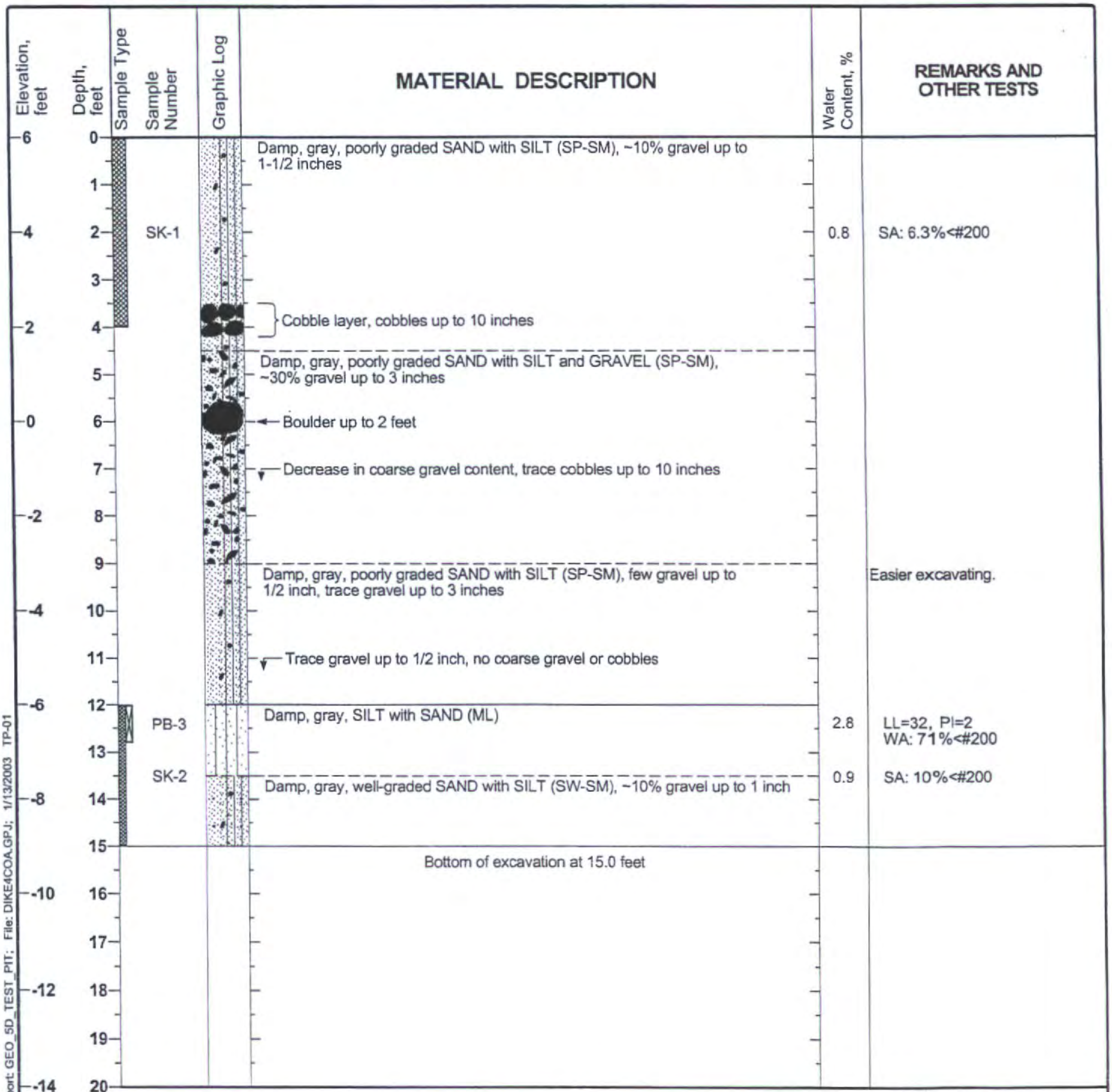
COMP	Compaction test by modified effort
LL	Liquid Limit from Atterberg Limits test
NP	Non-plastic result for Atterberg Limits test
PI	Plasticity Index from Atterberg Limits test
SA	Sieve analysis, percent passing #200 sieve
WA	Wash sieve, percent passing #200 sieve

Figure B-1

Project:	**Dike No. 4 Recharge Facility**
Project Location:	**Coachella, California**
Project Number:	**29864604.00001**

Log of Test Pit TP-1

Date(s) Excavated	**11/18/02**	Logged By	**V. Glisic**	Reviewed By	**B. Gookin**
Length of Excavation	**10 feet**	Width of Excavation	**4 feet**	Depth of Excavation	**15.0 feet**
Excavation Equipment	**John Deere 410 Backhoe**	Excavation Contractor	**Demo Unlimited**	Approximate Surface Elevation	**6 feet MSL**
Water Observations	**Not observed during excavation**			Approximate Pit Trend	**Not recorded**
Comments	**Refer to site plan for excavation location**				



Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
6	0				Damp, gray, poorly graded SAND with SILT (SP-SM), ~10% gravel up to 1-1/2 inches		
	1						
4	2		SK-1			0.8	SA: 6.3%<#200
	3						
2	4				Cobble layer, cobbles up to 10 inches		
	5				Damp, gray, poorly graded SAND with SILT and GRAVEL (SP-SM), ~30% gravel up to 3 inches		
0	6				Boulder up to 2 feet		
	7				Decrease in coarse gravel content, trace cobbles up to 10 inches		
-2	8						
	9				Damp, gray, poorly graded SAND with SILT (SP-SM), few gravel up to 1/2 inch, trace gravel up to 3 inches		Easier excavating.
-4	10						
	11				Trace gravel up to 1/2 inch, no coarse gravel or cobbles		
-6	12		PB-3		Damp, gray, SILT with SAND (ML)	2.8	LL=32, PI=2 WA: 71%<#200
	13		SK-2			0.9	SA: 10%<#200
-8	14				Damp, gray, well-graded SAND with SILT (SW-SM), ~10% gravel up to 1 inch		
	15				Bottom of excavation at 15.0 feet		
-10	16						
	17						
-12	18						
	19						
-14	20						

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-2

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	15.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	23 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

Elevation, feet	Depth, feet	Sample Type	Sample Number	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
	0	▨		Damp, gray, well-graded SAND with SILT (SW-SM), few gravel up to 3/4 inch		
22	1	▨				
	2	▨	SK-1		0.7	SA: 6.9%<#200 COMP
20	3	▨		Cobble layer, cobbles up to 7 inches		
	4	▨		← Boulder up to 2 feet		
18	5			← Boulder up to 2 feet		
	6			Damp, gray, well-graded SAND with SILT and GRAVEL (SW-SM), ~15% gravel up to 1/2 inch, few cobbles up to 10 inches		
16	7			Increase in cobble content, cobbles up to 5 inches, occasional boulder up to 2 feet		
	8					
14	9			Damp, gray, well-graded SAND with GRAVEL (SW), ~20% gravel up to 1-1/2 inches, few cobbles up to 5 inches, trace silt		
	10	▨				
12	11	▨				
	12	▨	SK-2		0.8	SA: 4.6%<#200
10	13	▨				
	14	▨				
8	15			Bottom of excavation at 15.0 feet		
	16					
6	17					
	18					
4	19					
	20					

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-3

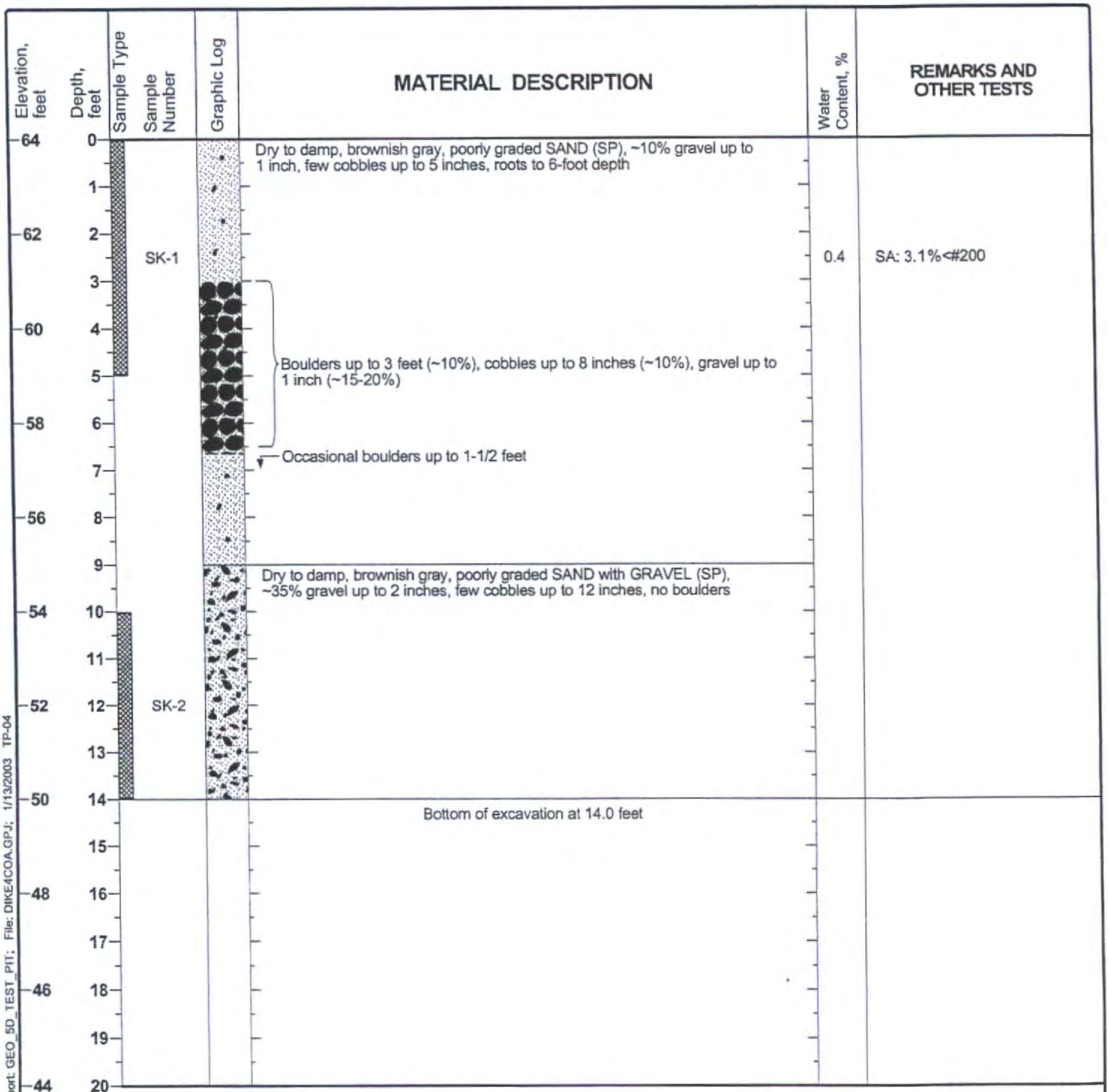
Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	14.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	47 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
	0				Damp, gray, poorly graded SAND (SP), ~10% gravel up to 1 inch, few cobbles up to 5 inches, trace silt		
46	1						
	2		SK-1			0.5	SA: 2.8%<#200 COMP
44	3						
	4						
42	5				Slight increase in cobble content		
	6				Damp, brownish gray, well-graded SAND with SILT and GRAVEL (SW-SM), ~15% gravel up to 3 inches		
40	7						
	8						
38	9						
	10				Damp, brownish gray, well-graded SAND with SILT (SW-SM), ~10% gravel up to 1 inch		
36	11						
	12		SK-2			1.2	SA: 7.3%<#200
34	13						
	14				Bottom of excavation at 14.0 feet		
32	15						
	16						
30	17						
	18						
28	19						
	20						

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-4

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	14.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	64 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				



Dry to damp, brownish gray, poorly graded SAND (SP), ~10% gravel up to 1 inch, few cobbles up to 5 inches, roots to 6-foot depth

Boulders up to 3 feet (~10%), cobbles up to 8 inches (~10%), gravel up to 1 inch (~15-20%)

Occasional boulders up to 1-1/2 feet

Dry to damp, brownish gray, poorly graded SAND with GRAVEL (SP), ~35% gravel up to 2 inches, few cobbles up to 12 inches, no boulders

Bottom of excavation at 14.0 feet

SA: 3.1%<#200

URS

Figure B-5

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-5

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	15.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	35 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

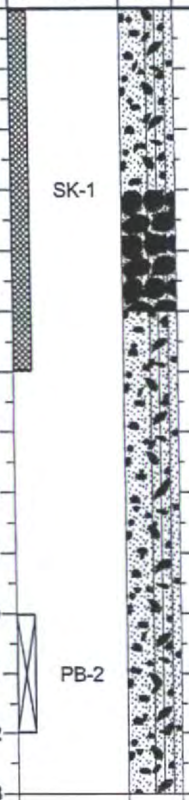
Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
	0				Dry to damp, gray, poorly graded SAND with GRAVEL (SP), ~20% gravel up to 2 inches, ~15% cobbles up to 6 inches, few cobbles up to 10 inches		
					Cobble layer, cobbles up to 10 inches		
		▨			Cobble layer, cobbles up to 8 inches		
					Decrease in gravel content (~15% up to 1-1/2 inches), decrease in cobble content and size (~10% up to 5 inches)		
			SK-1			0.7	SA: 4.1%<#200
					Increase in cobble content and size (~20% up to 6 inches, occasionally up to 12 inches)		
-20	15				Bottom of excavation at 15.0 feet		

Elevation scale: 34, 32, 30, 28, 26, 24, 22, 20, 18, 16
Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-6

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	13.0 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	18 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				



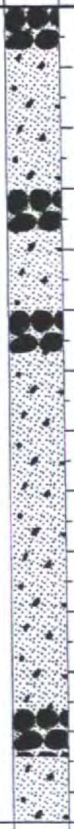
Elevation, feet	Depth, feet	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
18	0				Dry to damp, light brownish gray, poorly graded SAND with SILT and GRAVEL (SP-SM), ~15% gravel up to 1-1/2 inches, ~30% cobbles up to 7 inches, occasional boulders up to 1-1/2 feet		
	1						
16	2						
	3		SK-1			0.8	SA: 5.4%<#200 COMP
14	4				Cobble layer, most up to 8 inches, few up to 12 inches		
	5						
12	6						
	7				Sea shell fragments		
10	8						
	9				Increase in gravel content (~30% up to 1/2 inch), decrease in cobble content and size (~15% up to 5 inches)		
8	10						
	11		PB-2				
6	12						
	13				Bottom of excavation at 13.0 feet		
4	14						
	15						
2	16						
	17						
0	18						
	19						
-2	20						

Report: GEO_5D_TEST_PIT; File: DIKE4COA.GPJ; 1/13/2003 TP-06

Project: Dike No. 4 Recharge Facility
Project Location: Coachella, California
Project Number: 29864604.00001

Log of Test Pit TP-7

Date(s) Excavated	11/21/02	Logged By	V. Glisic	Reviewed By	B. Gookin
Length of Excavation	10 feet	Width of Excavation	4 feet	Depth of Excavation	13.5 feet
Excavation Equipment	John Deere 410 Backhoe	Excavation Contractor	Demo Unlimited	Approximate Surface Elevation	10 feet MSL
Water Observations	Not observed during excavation			Approximate Pit Trend	Not recorded
Comments	Refer to site plan for excavation location				

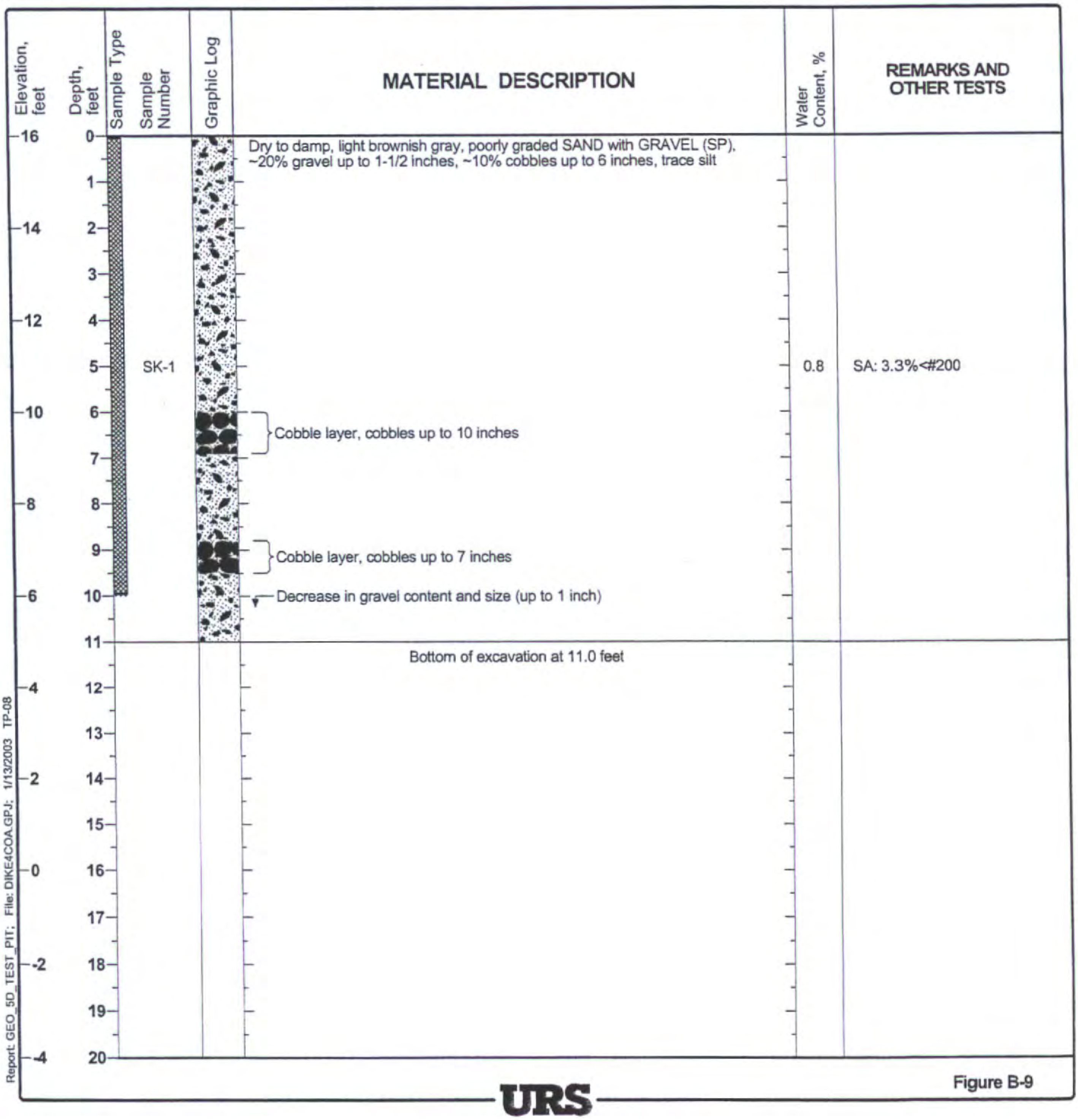


Elevation, feet	Depth, feet	Sample Type	Sample Number	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
10	0	▨		Dry to damp, gray to yellowish brown, poorly graded SAND (SP), ~10% gravel up to 1-1/2 inches, few cobbles up to 8 inches, roots to 5-foot depth		
	1	▨				
8	2	▨	SK-1		0.7	SA: 4.5%<#200
	3	▨		Cobble layer, ~10% cobbles up to 6 inches		
6	4	▨				
	5			Cobble layer, cobbles up to 5 inches, occasional boulders		
4	6					
	7			Becomes gray		
2	8					
	9			Increase in cobble content (~20% up to 8 inches), few boulders up to 2 feet		
0	10					
	11					
-2	12			Cobble layer, cobbles up to 10 inches, boulders up to 1-1/2 feet		
	13			Bottom of excavation at 13.5 feet		
-4	14					
	15					
-6	16					
	17					
-8	18					
	19					
-10	20					

Project:	**Dike No. 4 Recharge Facility**
Project Location:	**Coachella, California**
Project Number:	**29864604.00001**

Log of Test Pit TP-8

Date(s) Excavated	**11/21/02**	Logged By	**V. Glisic**	Reviewed By	**B. Gookin**
Length of Excavation	**10 feet**	Width of Excavation	**4 feet**	Depth of Excavation	**11.0 feet**
Excavation Equipment	**John Deere 410 Backhoe**	Excavation Contractor	**Demo Unlimited**	Approximate Surface Elevation	**16 feet MSL**
Water Observations	**Not observed during excavation**			Approximate Pit Trend	**Not recorded**
Comments	**Refer to site plan for excavation location**				



Depth, feet	MATERIAL DESCRIPTION	Water Content, %	REMARKS AND OTHER TESTS
0	Dry to damp, light brownish gray, poorly graded SAND with GRAVEL (SP), ~20% gravel up to 1-1/2 inches, ~10% cobbles up to 6 inches, trace silt		
5		0.8	SA: 3.3%<#200
6–7	Cobble layer, cobbles up to 10 inches		
9	Cobble layer, cobbles up to 7 inches		
10	Decrease in gravel content and size (up to 1 inch)		
11	Bottom of excavation at 11.0 feet		

LOGS BY

SLADDEN (2005a)

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 8** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0	░								Native Soil
5	░	▪	13/17/23	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	6	Brown in color
10	░	▪	15/20/29	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	5	Brown in color
	░								Refusal @ ~14 Feet
15									
20									
25									
30									
35									
40									
45									
50									

■ California Split-spoon Sample

☒ Unrecovered Sample

▪ Standard Penetration Test Sample

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Total Depth =~14'
Bedrock not encountered
Groundwater not encountered

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 9** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0									Native Soil
5		■	17/25/33	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	7	Brown in color
10		■	17/24/32	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	6	Brown in color
15		■	28/28/35	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	5	Brown in color
									Total Depth =~15.5' Bedrock not encountered Groundwater not encountered
20									
25									
30									
35									
40									
45									
50									

■ California Split-spoon Sample

☒ Unrecovered Sample

▨ Standard Penetration Test Sample

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 11** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0	▨								Native Soil
5	▨	■	5/47/28	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	7	Brown in color
10	▨	■	13/17/19	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		0	6	Brown in color
15	▨	■	50-5"	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	10	Brown in color
18	▨	■	33/44/50	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	10	Brown in color
20	▨								

▬ California Split-spoon Sample

☒ Unrecovered Sample

■ Standard Penetration Test Sample

Total Depth =~20'
Bedrock not encountered
Groundwater not encountered

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

176-Lot Green Property
SWC Quarry Ranch Road & Jefferson Street

Date: 12/3/2004 **Boring No. 12** **Job Number:** 544-4769

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0	▨								Native Soil
5	▨	▮	16/23/37	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	8	
10	▨	▮	50-5"	Sand: Fine to Coarse Grained and 1/8" to 1/4" Gravel with Rock Fragments	SP		1	9	Refusal @ ~11 Feet

■ California Split-spoon Sample

☒ Unrecovered Sample

▮ Standard Penetration Test Sample

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Total Depth = ~ 11'
Bedrock not encountered
Groundwater not encountered

BORING LOGS BY

CONSTRUCTION TESTING & ENGINEERING, INC.

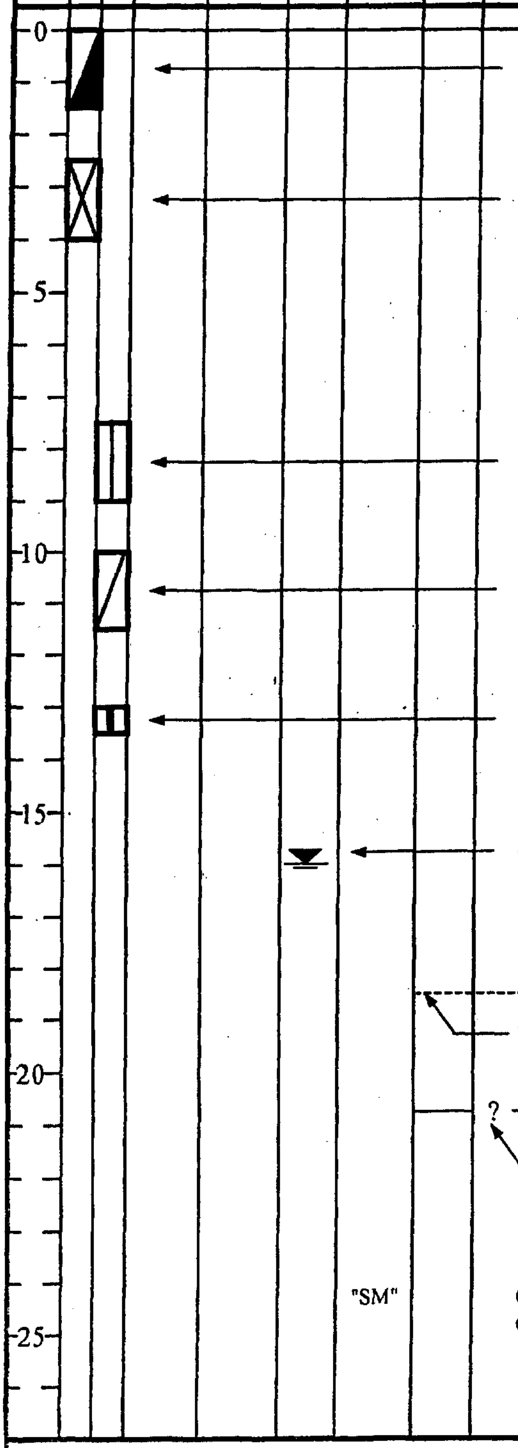
(2007)

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	DRILLER:	SHEET: of
CTE JOB NO:	DRILL METHOD:	DRILLING DATE:
LOGGED BY:	SAMPLE METHOD:	ELEVATION:

Depth (Feet)	Bulk Sample	Driven Type	Blows/Foot	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	BORING LEGEND DESCRIPTION	Laboratory Tests



Block or Chunk Sample

Bulk Sample

Standard Penetration Test

Modified Split-Barrel Drive Sampler (Cal Sampler)

Thin Walled Army Corp. of Engineers Sample

Groundwater Table

Soil Type or Classification Change

? —— ? —— ? —— ? —— ? —— ? —— ? –

Formation Change [(Approximate boundaries queried (?)]

Quotes are placed around classifications where the soils exist in situ as bedrock

FIGURE: BL2

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-1

Depth (Feet)	Bulk Sample	Driven Sample Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0		▨	13			SM	▥	Silty SAND - dry, gray, fine, traces of gravel.	GS (20.4% pass #200) HA
			14						
		▨	14						
			13						
		▨	9						
2.5			15						
		▨	10			SP-SM	░	Poorly-graded SAND with Silt - damp, light gray, medium to coarse, traces of gravel.	GS (7.6% pass #200) HA
			12						
		▨	6						
			4			ML	▥	at 57" - 3" lens of silt.	
5		▨	8			SP-SM	░	Poorly-graded SAND with Silt becomes moist, gray-brown, with occasional gravel.	
			14						
								Boring terminated at 6 ft. below surface.	
7.5									
10									
12.5									

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-2

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			2			SP-SM		Poorly-graded SAND with Silt - dry, light gray, fine to medium, traces of gravel.	GS (10.1% pass #200)
			2						
			2						
			2						
			2						GS (8.6% pass #200)
2.5			5						
			4			ML		SILT with little Sand and Clay - moist, light gray	GS (81.5% pass #200) HA
			7						
			4						
			5						
5			8						
			10			SP-SM		Poorly-graded SAND with Silt - damp, gray, medium to coarse, occasional gravel.	
								Boring terminated at 6 ft. below surface.	
7.5									
10									
12.5									

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT: CVWD Dike 4 Percolation Ponds
CTE JOB NO: 40-2251
LOGGED BY: R. Ellerbusch
DRILLER: 2R Drilling (CME Track Rig)
DRILL METHOD: 8" Hollow stem auger
SAMPLE METHOD: 140 lb/30" autohammer
SHEET: 1 of 1
DRILLING DATE: 6/25/2007
ELEVATION: basin floor

BORING: B-3

Depth (Feet)	Bulk Sample	Driven Sample Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			5			ML	▥	Sandy SILT - dry to damp, light gray, traces of gravel.	
			6				▥		GS (54.1% pass #200) HA
			8				▥		
			10				▥		GS (64.0% pass #200)
			8				▥	becomes moist at 2 ft.	
2.5			13				▥		
			12			SP-SM	░	Poorly-graded SAND with Silt and Gravel - damp, light gray, fine.	
			18				░		WA (5.0% pass #200)
			10				░		
			11			SW-SM	▓	Well graded SAND with Silt and Gravel - damp, dark gray-brown.	
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

Boring B-3

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-4

Depth (Feet)	Bulk Sample	Driven Sample Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			3			SM		Silty Sand - dry to damp, light gray, fine.	GS (29.4% pass #200) HA
			3						
			4						
			4						
			3					at 24" becomes medium to coarse with less fines, trace gravel.	GS (13.2% pass #200)
2.5			6			ML		at 30" - 3" lens of silt.	
			7			SW-SM		Well graded SAND with Silt and Gravel - damp, dark gray-brown.	
			13						
			6						GS (8.7% pass #200)
			4						
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

B-4

Boring B-4

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-5

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			5			SM		Silty SAND with Gravel - dry, light gray, fine.	GS (29.4% pass #200)
			5						
			8					becomes damp, decrease in gravel	GS (28.4% pass #200) HA
			8						
			10						
2.5			12						GS (14.8% pass #200)
			7			SP-SM		Poorly-graded SAND with Silt - damp, gray, coarse, occasional gravel.	
			9						
			14			SW-SM		Well graded SAND with Silt and Gravel - damp, dark gray-brown.	
			10						
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

Boring B-5

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-6

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			2			SM		Very Silty SAND - damp, light gray, traces of gravel.	GS (41.5% pass #200) HA
			3						
			4						
			4						
			5						
2.5			6						
			6			SP-SM		Poorly-graded SAND with Silt and Gravel - damp, gray, medium to coarse.	GS (6.1% pass #200)
			8						
			7			SW-SM		Well-graded SAND with Silt and Gravel - damp, dark gray-brown.	GS (4.6% pass #200)
			8						
5								Boring terminated at 5 ft. below surface.	
7.5									
10									
12.5									

Boring B-6

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-7

Depth (Feet)	Sample		Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
	Bulk	Driven Type							
0		▯	2			SM	▨	Silty SAND - damp to damp, gray, fine, occasional gravel.	GS (19.3% pass #200) HA
		▯	3				▨		
		▯	3				▨		GS (25.6% pass #200)
		▯	4				▨		
		▯	5				▨		
2.5		▯	5				▨		
		▯	4				▨	at 36" - becomes dark gray and medium grain with traces of gravel.	GS (33.6% pass #200)
		▯	9				▨		
		▯	6				▨		
		▯	6			SW-SM	▩	Well-graded SAND with Silt and Gravel - damp, dark gray-brown.	
5		▯	6				▩		
		▯	8				▩		
								Boring terminated at 6 ft. below surface.	
7.5									
10									
12.5									

Boring B-7

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

PROJECT:	CVWD Dike 4 Percolation Ponds	DRILLER:	2R Drilling (CME Track Rig)	SHEET:	1 of 1
CTE JOB NO:	40-2251	DRILL METHOD:	8" Hollow stem auger	DRILLING DATE:	6/25/2007
LOGGED BY:	R. Ellerbusch	SAMPLE METHOD:	140 lb/30" autohammer	ELEVATION:	basin floor

BORING: B-8

Depth (Feet)	Bulk Sample	Driven Type	Blows / 6 inch	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0			4			SM		Silty SAND - dry, light gray, very fine, traces of gravel.	
			5					becomes damp	GS (32.9% pass #200) HA
			6					increase in gravel	
			5						GS (24.0% pass #200)
			6						
2.5			6			SP-SM		Poorly-graded SAND with Silt - gray, damp, medium to coarse, occasional gravel	
			5						
			8						
			7						
			14			SW-SM		Well-graded SAND with Silt and Gravel - damp, dark gray-brown.	
5			12					at 58" - 1" silt lens	
			16						
								Boring terminated at 6 ft. below surface.	
7.5									
10									
12.5									

B-8

Boring B-8

BORINGS BY

EARTH SYSTEMS SOUTHWEST
(2007b)

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

12" 3" 3/4" 4 10 40 200

BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

305 76.2 19.1 4.76 2.00 0.42 0.074 0.002

SOIL GRAIN SIZE IN MILLIMETERS

RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	*N=0-4	RD=0-30	Easily push a 1/2-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a 1/2-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a 1/2-inch reinforcing rod with hammer
Dense	N=31-50	RD=70-90	Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer
Very Dense	N>50	RD=90-100	Drive a 1/2-inch reinforcing rod a few inches with hammer

*N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler, 140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	*N=0-1	*C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very Stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000	Dented slightly by a pencil point or thumbnail

MOISTURE DENSITY

Moisture Condition:	An observational term; dry, damp, moist, wet, saturated.
Moisture Content:	The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.
Dry Density:	The pounds of dry soil in a cubic foot.

MOISTURE CONDITION

Dry....................	Absence of moisture, dusty, dry to the touch
Damp................	Slight indication of moisture
Moist................	Color change with short period of air exposure (granular soil) Below optimum moisture content (cohesive soil)
Wet...................	High degree of saturation by visual and touch (granular soil) Above optimum moisture content (cohesive soil)
Saturated..........	Free surface water

RELATIVE PROPORTIONS

Trace............	minor amount (<5%)
with/some......	significant amount
modifier/and...	sufficient amount to influence material behavior (Typically >30%)

PLASTICITY

DESCRIPTION	FIELD TEST
Nonplastic	A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.
Low	The thread can barely be rolled.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit.
High	The thread can be rerolled several times after reaching the plastic limit.

LOG KEY SYMBOLS

▮	Bulk, Bag or Grab Sample
▯	Standard Penetration Split Spoon Sampler (2" outside diameter)
▮	Modified California Sampler (3" outside diameter)
▧	No Recovery

GROUNDWATER LEVEL

▼	Water Level (measured or after drilling)
▽	Water Level (during drilling)

Terms and Symbols used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 sieve size	GRAVEL AND GRAVELLY SOILS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS < 5% FINES	⁙	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			▚	GP	Poorly-graded gravels, gravel-sand mixtures. Little or no fines
		GRAVELS WITH FINES > 12% FINES	▦	GM	Silty gravels, gravel-sand-silt mixtures
			▩	GC	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS More than 50% of coarse fraction passing No. 4 sieve	CLEAN SAND (Little or no fines) < 5%	░	SW	Well-graded sands, gravelly sands, little or no fines
			▒	SP	Poorly-graded sands, gravelly sands, little or no fines
		SAND WITH FINES (appreciable amount of fines) > 12%	▥	SM	Silty sands, sand-silt mixtures
			▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more of material is smaller than No. 200 sieve size	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	ML	Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▥	OL	Organic silts and organic silty clays of low plasticity
		LIQUID LIMIT GREATER THAN 50	▮	MH	Inorganic silty, micaceous, or diatomaceous fine sand or silty soils
			▧	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			▩	PT	Peat, humus, swamp soils with high organic contents
VARIOUS SOILS AND MAN MADE MATERIALS			▦		Fill Materials
MAN MADE MATERIALS			■		Asphalt and concrete

Soil Classification System

Earth Systems
Southwest

Earth Systems
Southwest
79811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-1
Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend Blow Count	Dry Density
0					░	SP-SM			SAND WITH SILT: pale yellowish brown to white, medium dense, dry, fine to coarse grained		
	■	□		4,5,5	░					●	
5		□		4,5,5	░				trace fine to coarse gravels	●	
10		□		6,7,7	░					●	
15									Total Depth 11.5 feet No Groundwater Encountered Cobbles and boulders encountered throughout		
20											

Earth Systems
Southwest

79811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-2
Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

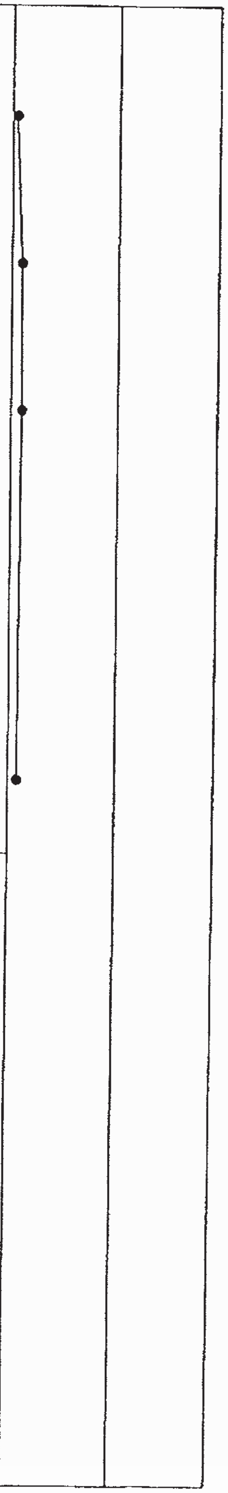
Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk SPT MOD Calif	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend Blow Count Dry Density
0				SP-SM			SAND WITH SILT: pale yellowish brown to white, loose to medium dense, dry, fine to coarse grained	
		1,2,2						
		4,5,4						
5		4,5,5					trace fine to coarse gravels	
10		4,4,4						
							Total Depth 11.5 feet No Groundwater Encountered Cobbles and boulders encountered throughout	
15								
20								



Earth Systems
Southwest

79811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: B-3

Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk SPT MOD Calif	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				SP-SM			SAND WITH SILT: pale yellowish brown to white, loose to medium dense, dry, fine to coarse grained, cobbles throughout, trace fine gravels
		---					
		4,5,5					
5		3,5,5					
10		3,6,7					
15		5,7,10					
20							

Total Depth 16.5 feet

No Groundwater Encountered

Cobbles and boulders encountered throughout

Graphic Trend
Blow Count Dry Density

Boring No: B-4
Project Name: Travertine Project, Madison Street, La Quita, CA
File Number: 11112-02
Boring Location: See Figure 2

Drilling Date: July 31, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 Auto Hammer
Logged By: Dirk Wiggins

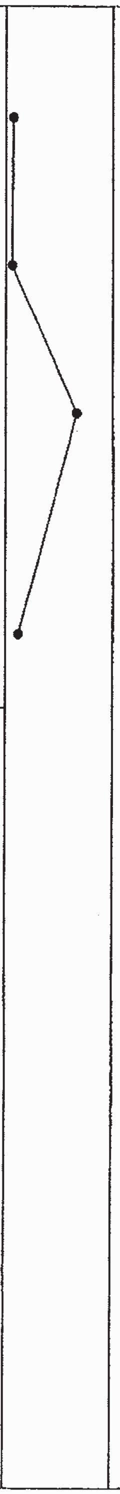
Description of Units

Page 1 of 1

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk, SPT, MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				SM			SILTY SAND: moderate yellowish brown, medium dense to loose, damp to dry, fine to coarse grained, trace fine gravels
	SPT	1,2,5					
	SPT	2,2,4					
5	SPT	LOST					
	SPT	3,4,8					pale to moderate yellowish brown
10							Total Depth 9.5 feet No Groundwater Encountered
15							
20							

Graphic Trend
Blow Count Dry Density



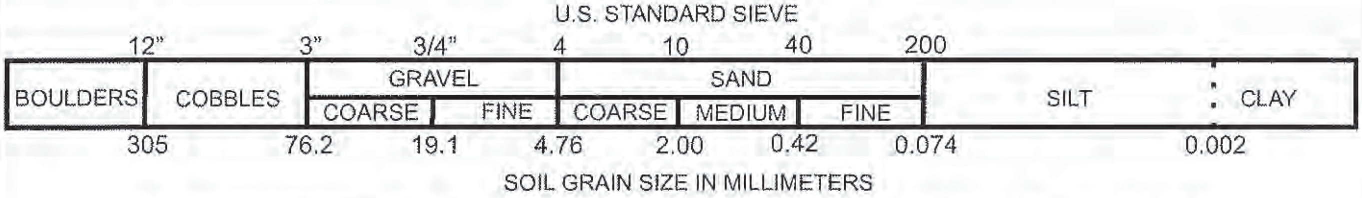
BORINGS BY

EARTH SYSTEMS SOUTHWEST
(2007c)

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE



RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	*N=0-4	RD=0-30	Easily push a 1/2-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a 1/2-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a 1/2-inch reinforcing rod with hammer
Dense	N=31-50	RD=70-90	Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer
Very Dense	N>50	RD=90-100	Drive a 1/2-inch reinforcing rod a few inches with hammer

*N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler, 140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	*N=0-1	*C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very Stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000	Dented slightly by a pencil point or thumbnail

MOISTURE DENSITY

Moisture Condition:	An observational term; dry, damp, moist, wet, saturated.
Moisture Content:	The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.
Dry Density:	The pounds of dry soil in a cubic foot.

MOISTURE CONDITION

Dry.....................Absence of moisture, dusty, dry to the touch
Damp................Slight indication of moisture
Moist.................Color change with short period of air exposure (granular soil)
Below optimum moisture content (cohesive soil)
Wet....................High degree of saturation by visual and touch (granular soil)
Above optimum moisture content (cohesive soil)
Saturated..........Free surface water

RELATIVE PROPORTIONS

Trace............minor amount (<5%)
with/some......significant amount
modifier/and...sufficient amount to influence material behavior (Typically >30%)

PLASTICITY

DESCRIPTION	FIELD TEST
Nonplastic	A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.
Low	The thread can barely be rolled.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit.
High	The thread can be rerolled several times after reaching the plastic limit.

LOG KEY SYMBOLS

▮	Bulk, Bag or Grab Sample
▯	Standard Penetration Split Spoon Sampler (2" outside diameter)
▮	Modified California Sampler (3" outside diameter)
▨	No Recovery

GROUNDWATER LEVEL

▼	Water Level (measured or after drilling)
▽	Water Level (during drilling)

Terms and Symbols used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 sieve size	GRAVEL AND GRAVELLY SOILS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS < 5% FINES	░	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			▓	GP	Poorly-graded gravels, gravel-sand mixtures. Little or no fines
		GRAVELS WITH FINES > 12% FINES	▦	GM	Silty gravels, gravel-sand-silt mixtures
			▩	GC	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS More than 50% of coarse fraction passing No. 4 sieve	CLEAN SAND (Little or no fines) < 5%	░	SW	Well-graded sands, gravelly sands, little or no fines
			▒	SP	Poorly-graded sands, gravelly sands, little or no fines
		SAND WITH FINES (appreciable amount of fines) > 12%	▥	SM	Silty sands, sand-silt mixtures
			▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more of material is smaller than No. 200 sieve size	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	ML	Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity
			▧	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▥	OL	Organic silts and organic silty clays of low plasticity
		LIQUID LIMIT GREATER THAN 50	▥	MH	Inorganic silty, micaceous, or diatomaceous fine sand or silty soils
			▧	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			▩	PT	Peat, humus, swamp soils with high organic contents
VARIOUS SOILS AND MAN MADE MATERIALS			▦		Fill Materials
MAN MADE MATERIALS			■		Asphalt and concrete

Soil Classification System

Earth Systems
Southwest

Boring No: I-1
Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				SM			SILTY SAND: moderate yellowish brown, medium dense, dry, fine grained, few medium to coarse grained
	SPT	6,6,7					
5							
	SPT	6,7,8					pale yellowish brown, fine to medium grained
10							
	SPT			SP-SM			SAND WITH SILT: pale yellowish brown, medium dense, dry, fine to medium grained, grab sample
15							
20							
25							
30							

Total Depth 13 feet

No Groundwater Encountered

Cobbles/Boulders Encountered Throughout

Graphic Trend
Blow Count Dry Density

Boring No: I-2

Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

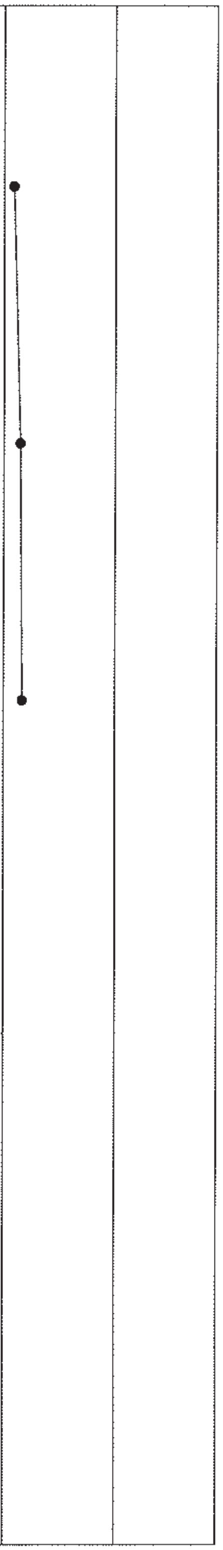
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					▨	SP-SM			SAND WITH SILT: pale yellowish brown to white, loose, dry, fine to coarse grained
		■		3,4,5	▨				medium dense
5					▨				
		■		6,7,8	▨				pale to moderate yellowish brown
10					▨				
		■		6,8,9	▨				
15					▨				
	■				▨				
	■				▨				pale yellowish brown to white, few fine gravel, grab sample
20									Total Depth 20 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout
25									
30									

Graphic Trend
Blow Count Dry Density



Boring No: I-3
Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.	Graphic Trend Blow Count	Graphic Trend Dry Density
0						SP-SM			SAND WITH SILT: pale yellowish brown to white, medium dense, dry, fine to coarse grained, trace fine gravel		
	■										
		■		6,8,10						●	
5											
		■		7,10,11					white minerals, cobbles	●	
10									Auger Refusal at 10 feet Total Depth 10 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout		
15											
20											
25											
30											

Boring No: I-4

Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					⁙	SP-SM			SAND WITH SILT: pale yellowish brown to white, medium dense, dry, fine to coarse grained
		▮		10,11,14	⁙				
		▮		8,12,14	⁙				
5					⁙				
		▮		50/6"	⁙				cobbles
									Auger Refusal at 7 feet
									Total Depth 7 feet
10									No Groundwater Encountered
									Cobbles/Boulders Encountered Throughout
15									
20									
25									
30									

Graphic Trend
Blow Count Dry Density

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Phone (760) 345-1588, Fax (760) 345-7315

Boring No: I-5
Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0			▨	SP-SM			SAND WITH SILT: pale yellowish brown to white, loose, dry, fine to coarse grained, few fine gravel
	SPT		▨				
	SPT	6,6,7	▨				cobbles
5	Bulk, SPT	7,9,10	▨				
10	SPT	10,12,14	▨				
15	SPT		▨				
	SPT	10,11,11	▨				dense
20							
							Total Depth 20 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout
25							
30							

Graphic Trend
Blow Count Dry Density

Boring No: I-6 Project Name: Proposed Travertine Project, La Quinta, CA File Number: 11112-04 Boring Location: See Figure 2	Drilling Date: August 17, 2007 Drilling Method: 8" Hollow Stem Auger Drill Type: Simco 2800 w/ Auto Hammer Logged By: Dirk Wiggins

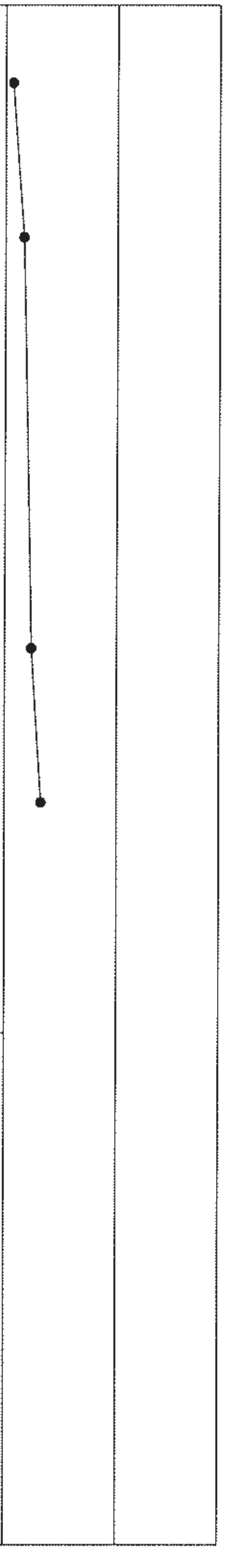
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					▨	SP-SM			SAND WITH SILT: moderate yellowish brown, loose, dry, fine to coarse grained
		■		5,3,4	▨				
5		■		7,8,9	▨				pale to moderate yellowish brown, medium dense
		■			▨				grab sample
10					▨				few fine to coarse gravel
		■		10,11,13	▨				some gravel
15		■		14,15,18	▨				moderate brown, dense, damp, few fine gravel, cobbles
		■			▨				
20									Total Depth 20 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout
25									
30									

Graphic Trend
Blow Count Dry Density



Boring No: I-7
Project Name: Proposed Travertine Project, La Quinta, CA
File Number: 11112-04
Boring Location: See Figure 2

Drilling Date: August 17, 2007
Drilling Method: 8" Hollow Stem Auger
Drill Type: Simco 2800 w/ Auto Hammer
Logged By: Dirk Wiggins

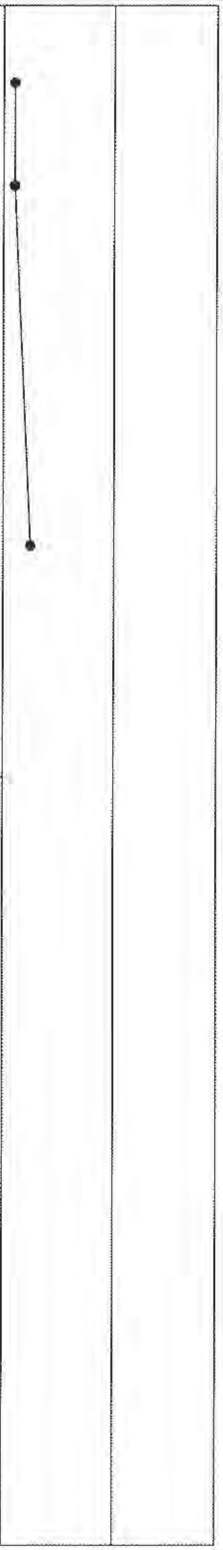
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					▨	SP-SM			SAND WITH SILT: pale to moderate yellowish brown, loose, dry, fine to coarse grained, few fine to coarse gravel
	■	■		2,4,6	▨				
	■				▨				medium dense
	■	■		4,4,6	▨				
5		■			▨				
					▨				cobbles
10		■		8,12,13	▨				medium dense to dense
					▨				dense
		■			▨				
15									Total Depth 15 feet No Groundwater Encountered Cobbles/Boulders Encountered Throughout
20									
25									
30									

Graphic Trend
Blow Count Dry Density



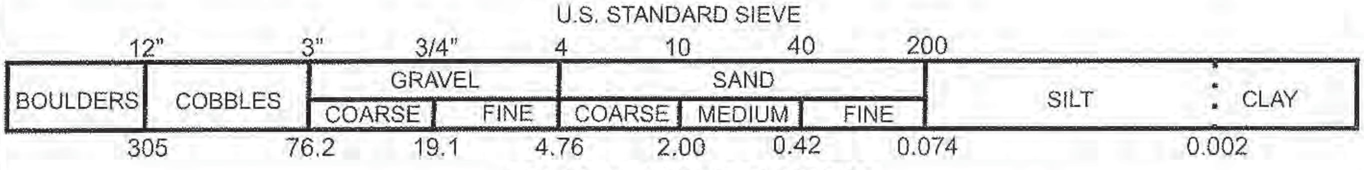
TEST PITS BY

EARTH SYSTEMS SOUTHWEST
(2007d)

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE



SOIL GRAIN SIZE IN MILLIMETERS

RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	*N=0-4	RD=0-30	Easily push a 1/2-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a 1/2-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a 1/2-inch reinforcing rod with hammer
Dense	N=31-50	RD=70-90	Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer
Very Dense	N>50	RD=90-100	Drive a 1/2-inch reinforcing rod a few inches with hammer

*N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler, 140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	*N=0-1	*C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very Stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000	Dented slightly by a pencil point or thumbnail

MOISTURE DENSITY

Moisture Condition:	An observational term; dry, damp, moist, wet, saturated.
Moisture Content:	The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.
Dry Density:	The pounds of dry soil in a cubic foot.

MOISTURE CONDITION

Dry	Absence of moisture, dusty, dry to the touch
Damp	Slight indication of moisture
Moist	Color change with short period of air exposure (granular soil) Below optimum moisture content (cohesive soil)
Wet	High degree of saturation by visual and touch (granular soil) Above optimum moisture content (cohesive soil)
Saturated	Free surface water

RELATIVE PROPORTIONS

Trace	minor amount (<5%)
with/some	significant amount
modifier/and	sufficient amount to influence material behavior (Typically >30%)

PLASTICITY

DESCRIPTION	FIELD TEST
Nonplastic	A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.
Low	The thread can barely be rolled.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit.
High	The thread can be rerolled several times after reaching the plastic limit.

LOG KEY SYMBOLS

▮	Bulk, Bag or Grab Sample
▯	Standard Penetration Split Spoon Sampler (2" outside diameter)
▮	Modified California Sampler (3" outside diameter)
⧅	No Recovery

GROUNDWATER LEVEL

▼	Water Level (measured or after drilling)
▽	Water Level (during drilling)

Terms and Symbols used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 sieve size	GRAVEL AND GRAVELLY SOILS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS < 5% FINES	░	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			▓	GP	Poorly-graded gravels, gravel-sand mixtures. Little or no fines
		GRAVELS WITH FINES > 12% FINES	▥	GM	Silty gravels, gravel-sand-silt mixtures
			▩	GC	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS More than 50% of coarse fraction passing No. 4 sieve	CLEAN SAND (Little or no fines) < 5%	░	SW	Well-graded sands, gravelly sands, little or no fines
			▒	SP	Poorly-graded sands, gravelly sands, little or no fines
		SAND WITH FINES (appreciable amount of fines) > 12%	▥	SM	Silty sands, sand-silt mixtures
			▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more of material is smaller than No. 200 sieve size	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	ML	Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▥	OL	Organic silts and organic silty clays of low plasticity
		LIQUID LIMIT GREATER THAN 50	▥	MH	Inorganic silty, micaceous, or diatomaceous fine sand or silty soils
			▨	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			▒	PT	Peat, humus, swamp soils with high organic contents
VARIOUS SOILS AND MAN MADE MATERIALS			▦		Fill Materials
MAN MADE MATERIALS			■		Asphalt and concrete

Soil Classification System

Earth Systems
Southwest

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-1
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0					SW			WELL GRADED SAND: light brown to white, dry, fine to coarse grained with abundant fine to coarse grained gravels, all sizes of cobbles, small boulders
						114	0.8	
						113	0.53	Approximation By Weight: 40% Sands and Gravels 50% Cobbles (to 12") 10% Boulders
5						111	0.40	
10								
15								
20								GPS: 569416, 3716840 Elevation: 61 feet Total Depth: 20 feet Groundwater not encountered Bedrock not encountered High caving probability due to large boulders Backfilled with native soil
25								
30								

Test Pit No: TP-2
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: dense, dry, sand matrix with predominant boulders, gravels and cobbles to 10 feet Approximation By Weight: 30% Sands and Gravels 30% Cobbles (to 12") 40% Boulders
5				▨				
10				▨				10 to 18 feet: mostly sand and gravels, few cobbles and boulders
15				▨				
				▨				18 to 20 feet: boulders predominant, largest boulders 2.5 feet in diameter, abundant cobbles and gravels, medium grained sands
20								GPS: 569021, 3716850 Elevation: 117 feet Total Depth: 20 feet Groundwater not encountered Bedrock not encountered High caving probability Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-3	Exploration Date: October 16, 2007
Project Name: Travertine	Excavation Method: Excavator
File Number: 11112-04	Logged By: D. Wiggins
Test Pit Location: See Figure 2	

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Page 1 of 1 Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW	116	0.5	WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand with some fine to coarse gravels, boulders from surface to depth, abundant cobbles Approximation By Weight: 20% Sands and Gravels 40% Cobbles 40% Boulders
5				▨				very large boulders (from landslide) encountered at 5 feet
10				▨				
15								
20								GPS: 568662, 3717050 Elevation: 179 feet Total Depth: 13 feet Groundwater not encountered Bedrock not encountered No stratification High caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-4
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW	116	0.7	WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand with fine to coarse gravels, abundant cobbles (to 8" diameter) Approximation By Weight: 70% Sands and Gravels 20% Cobbles 10% Boulders Few large boulders removed here
5				▨				
10				▨				
15								
20								GPS: 567996, 3717080 Elevation: 273 feet Total Depth: 15 feet (due to boulders) Groundwater not encountered Bedrock not encountered No stratification High caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-5

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type			Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
	Bulk	SPT	MOD Calif.					
0				░	SW			WELL GRADED SAND: loose to medium dense, dry, mostly fine to coarse grained sand, few cobbles to 10 feet, fine to coarse grained gravels Approximation By Weight: 60% Sands and Gravels 10% Cobbles 30% Boulders
5				░				
10				░				
15				░				
20								GPS: 567740, 3717370 Elevation: 304 feet Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Some stratification Moderate caving observed in test pit Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-6 Project Name: Travertine File Number: 11112-04 Test Pit Location: See Figure 2	Exploration Date: October 15, 2007 Excavation Method: Excavator Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SP-SM			SAND TO SILTY SAND: light brown to white, medium dense, dry, mostly fine to coarse grained sand, occassional cobble
5				▒	SW			WELL GRADED SAND: light brown, medium dense to dense, dry, mostly medium to coarse grained sand, abundant gravel and cobbles (to 8" diameter) to 9 feet
10 15 20				▒				over size cobbles and boulders dominate by weight from 9 to 25 feet Approximation By Weight: 60% Boulders from 9 to 20 feet 30% Boulders from 20 to 25 feet
25 30								GPS: 567932, 3717684 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Stratification not evident Extreme risk of caving due to boulders and dry conditions below 9 feet Backfilled with native soil

Test Pit No: TP-7
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, dry, fine to coarse grained sand with abundant gravels and cobbles to 12" diameter Approximation By Weight: 50% Sands and Gravels 40% Cobbles 10% Boulders
5				▨				
10				▨				
15								possible cobble layer
20								GPS: 568522, 3717350 Elevation: 176 feet Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-8
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: dense, dry, fine to coarse grained sand, abundant gravels and cobbles from surface to bottom Approximation By Weight: 60% Sands and Gravels 30% Cobbles 10% Boulders
5				▨				
10				▨				
15				▨				
20				▨				boulders at bottom of excavation
25								GPS: 568350, 3717330 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered No stratification visible Moderate caving potential Backfilled with native soil
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-9
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense to dense, dry, fine to coarse grained sand, abundant gravels and cobbles
				▨		119.0	0.9	
				▨		104.5	1.5	Approximation By Weight: 50% Sands and Gravels 40% Cobbles 10% Boulders
5				▨				
				▨		102	1.1	
10				▨				
15				▨				
20				▨				cobble layer (resistant)
				▨				boulders at bottom of excavation
								GPS: 569440, 3717140 Total Depth: 23 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-10
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravels and cobbles, no large boulders
						102.4	0.7	
						116.3	0.35	Approximation By Weight: 48% Sands and Gravels 50% Cobbles 2% Boulders
5						110.5	0.35	
10								
15								
20								
25								GPS: 569483, 3717480 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Some stratification visible Moderate caving potential Backfilled with native soil
30								

Test Pit No: TP-11
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units
Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				░	SP-SM			SAND TO SILTY SAND: light brown, medium dense, dry, fine to coarse grained sand, trace cobbles
5				░	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, stratified with cobbles, abundant gravels, trace oversize and boulders Approximation By Weight: 95% Sands, Gravels, and Cobbles 5% Boulders Note: from surface to 25 feet, at least 15 flood episodes - each "strata" about 2 foot thick
10								
15								
20								
25								GPS: 569517, 3717842 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Moderate caving Backfilled with native soil
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-12

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 16, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Page 1 of 1 Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown, dense, dry, sands near surface, boulders near surface
				▨		117	0.6	predominantly cobbles (to 12" diameter) from 2 feet
				▨		110	0.9	Approximation By Weight: 20% Sands and Gravels 70 to 80% Cobbles and Boulders
5				▨		112	0.9	
10				▨				
15								
20								GPS: 569143, 3717100 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered No stratification obvious High caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-13
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, cobbles > 50%, abundant gravel ~ 10' thick layer of cobbles (8-12") to 12' deep
				▨		102	0.8	Approximation By Weight: 40% Sands and Gravels 40% Cobbles 20% Boulders
5				▨				
10				▨				
15				▨				
				▨				boulders at bottom of excavation
20								GPS: 5691230, 3717355 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-14
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▒	SW			WELL GRADED SAND: light brown, very dense, dry, fine to coarse grained sand on cobbles and boulders abundant gravels Approximation By Weight: 30% Sands and Gravels 20% Cobbles 60% Boulders
1–3	■			▒				
5				▒				
10								Refusal on boulder GPS: 568800, 3717300 Total Depth: 10 feet Groundwater not encountered Bedrock not encountered High caving potential Backfilled with native soil
15								
20								
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-15
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type			Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
	Bulk	SPT	MOD Calif.					
0				░	SW			WELL GRADED SAND: light brown, dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
				░		110	1.0	Approximation By Weight: 75% Sands and Gravels 20% Cobbles < 5% Boulders
5				░				
10				░				
				░				No boulders at bottom of excavation
15								
20								GPS: 568752, 3717410 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-16
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					SM			SILTY SAND: light brown to white, medium dense, dry, fine to coarse grained sand with abundant gravel and cobbles to 10" diameter
								Approximation By Weight: 80% Sands and Gravels
5						103	1.5	20% Cobbles 1% Boulders
	■							
10								
15								
								dense
20								
25								
30								GPS: 568550, 3717728 Total Depth: 26 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-17

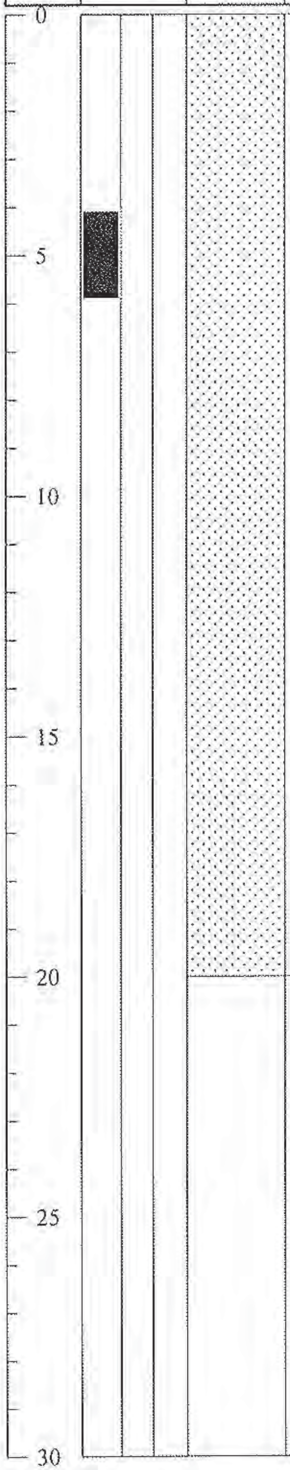
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.



Depth (Ft.)	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant cobbles and gravel
5		106	0.75	Approximation By Weight: 75% Sands and Gravels 20% Cobbles ~ 5% Boulders

GPS: 568726, 3717660
Total Depth: 20 feet
Groundwater not encountered
Bedrock not encountered
Moderate caving potential
Backfilled with native soil

Test Pit No: TP-18
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 18, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown, dense, dry, fine to coarse grained sand, abundant cobbles
	■					112	0.7	Approximation By Weight: 50% Sands and Gravels 40% Cobbles 10% Boulders
5								
10								
15								
20								GPS: 568880, 3717590 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-19
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter, scattered small boulders
				▨		105	0.5	
	■			▨				Approximation By Weight: 80% Sands and Gravels ~ 15% Cobbles < 5% Boulders
5				▨				
10				▨				
				▨				few large boulders in bottom
15								
20								GPS: 569268, 3717590 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-20
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained, abundant gravel and cobbles
	■			░		110	0.3	Approximation By Weight: 75% Sands and Gravels 20% Cobbles < 5% Boulders
5				░				
10				░				
15				░				
20								GPS: 569097, 3717720 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Some thin stratification visible Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-21
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SP-SM			SAND WITH SILT: light brown, medium dense, dry, fine to coarse grained, trace fine gravel
	■			░	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, some fine to coarse gravel and few cobbles to 3" diameter Approximation By Weight: 95% Sands, Gravels and Cobbles to 3" diameter Occasional cobbles > 6" to < 10" Trace small boulders trace larger cobbles and trace small boulders
5								
10								
15								GPS: 568893, 3717822 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Stratification evident ~ 1' thick each throughout Moderate caving potential Backfilled with native soil
20								
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-22

Project Name: Traverline
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** (Page 1 of 1) Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW	103	0.3	WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand to 2', abundant gravel and cobbles to 6" diameter throughout Approximation By Weight: 20% Sands and Gravels 30% Cobbles ~ 50% Boulders
								Refusal on boulders GPS: 568420 E, 3717166 N Total Depth: 12 feet Groundwater not encountered Bedrock not encountered No stratification visible High caving potential Backfilled with native soil

Depth scale: 0, 5, 10, 15, 20, 25, 30

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-23
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 17, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained, gravel below 2', abundant cobbles and gravel
				▨		106	0.9	
				▨				Approximation By Weight: 75% Sands and Gravels 20% Cobbles ~ 5% Boulders
5				▨				
10				▨				
15				▨				
20								GPS: 568200, 3717330 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Some stratification visible Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-24
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type			Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
	Bulk	SPT	MOD Calif.					
0				▨	SW			WELL GRADED SAND: light brown, very loose to loose, dry, fine to coarse grained, few gravel, occasional cobbles to 8" diameter top to bottom
								medium dense
								Approximation By Weight: 85% Sands, Gravels and Cobbles 15% Boulders
5								
								dense
10								
15								
20								GPS: 567893, 3717489 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Thinly bedded stratification evident top to bottom Moderate caving of hole Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-25
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type			Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
	Bulk	SPT	MOD Calif					
0				░	SW			WELL GRADED SAND: light brown, loose, dry, fine to coarse grained sand with abundant gravel and cobbles to 8" diameter medium dense to very dense Approximation By Weight: ~ 50% Sands and Gravels 20% Cobbles 30% Boulders
5				░				
10				░				
15				░				dense
20				░				
25								GPS: 568159, 3717603 Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Thin stratification layers visible Moderate caving potential Backfilled with native soil
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-26 Project Name: Travertine File Number: 11112-04 Test Pit Location: See Figure 2	Exploration Date: October 18, 2007 Excavation Method: Excavator Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand below 2' with abundant gravel and cobbles, trace large boulders
				▨		100	0.9	
				▨				Approximation By Weight: ~ 70% Sands and Gravels 30% Cobbles 1% Boulders
5	■			▨				
10				▨				
15				▨				
20				▨				
								GPS: 568271, 3717471 Total Depth: 23 feet Groundwater not encountered Bedrock not encountered Some thin stratification layers obvious Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-27
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 15, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SP-SM			SAND WITH SILT: light brown to white, medium dense, dry, fine to coarse grained
				░	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, some fine to coarse gravel and cobbles to 3" diameter
5				░				Approximation By Weight: 98% Sands, Gravels and occasional Cobbles to 3" diameter 2% Boulders (trace)
				░				~ 20% Boulders, abundant large cobbles 8-15' deep
10				░				
				░				trace larger cobbles and trace small boulders
15								
20								GPS: 568184, 3717834 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Stratification not very evident Moderate caving of hole Backfilled with native soil
25								
30								

Test Pit No: TP-28 Project Name: Travertine File Number: 11112-04 Test Pit Location: See Figure 2	Exploration Date: Excavation Method: Excavator Logged By: D. Wiggins

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0								
5								Test Pit Not Excavated
10								
15								
20								
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-29

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12"
5	■			▨				Approximation By Weight: 80% Sands and Gravels ~ 19% Cobbles < 1% Boulders
10				▨				cobbles at bottom
15								
20								GPS: 568573 E, 3718706 N Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Hole not backfilled
25								
30								

Test Pit No: TP-30
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					RX			ROCK: ~ 80% boulders at surface to 10', abundant cobbles, dense, dry
5								
10					SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand to mostly gravel, cobbles and sand
15								light brown, damp, abundant gravel and cobbles to 10" diameter, few boulders
20								~ 90% cobbles, sand and gravel, no boulders
25								GPS: 568010, 3718496 N Total Depth: 25 feet Groundwater not encountered Bedrock not encountered High top caving potential Hole not backfilled
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-31
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter, white minerals
				▨				Approximation By Weight: 75% Sands and Gravel 15% Cobbles 10% Boulders
5	■			▨				
10				▨				
				▨				few boulders at bottom
15								Refusal at 15'
20								GPS: 568011 E, 3718070 N' Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-32
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter, some boulders near surface
	■			▨				Approximation By Weight: 80% Sands and Gravel ~ 15% Cobbles
5				▨		111	0.5	~ 5% Boulders
10				▨				
15				▨				
				▨				no boulders at bottom
20								GPS: 567900, 3718060 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-33

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0					RX			ROCK: mostly boulders by weight, dense, dry
5					SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter Approximation By Weight: 80% Sands and Gravel ~ 15% Cobbles ~ 5% Boulders no boulders at bottom
10								
15								
20								GPS: 568300, 3718577 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-34

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 10" diameter
	■			▨				Approximation By Weight: 80% Sands and Gravel ~ 15% Cobbles < 5% Boulders
5				▨				
10				▨				
15				▨				cobbles in bottom, broken irrigation line
20								GPS: 568506 E, 3718546 N Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-35

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
	■			▨		106	1.6	
				▨				Approximation By Weight: 85% Sands and Gravel 10% Cobbles < 5% Boulders
5				▨				
10				▨				very dense
				▨				damp
				▨				boulders at bottom, broken irrigation pipe
15								
20								GPS: 568215 E, 3718062 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-36

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
				░		105	1.3	
				░				Approximation By Weight: 80% Sands and Gravel ~ 15% Cobbles ~ 5% Boulders
5				░				
10				░				
15				░				damp
				░				no boulders or cobbles at bottom
20								GPS: 568608 E, 3718014 N Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-37
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 26, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand , abundant gravel and cobbles to 12" diameter
5	■			░		111	2.6	damp
				░				Approximation By Weight: 75% Sands and Gravels 20% Cobbles < 2% Boulders
10				░				
15				░				
20				░				
				░				no boulders in bottom, broken irrigation pipe
25								GPS: 568808 E, 3718016 N Total Depth: 25 feet Groundwater not encountered Bedrock not encountered Stratification visible High caving potential Backfilled with native soil
30								

Test Pit No: TP-38

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0 5 10 15				▒	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter Approximation By Weight: 75% Sands and Gravel 20% Cobbles 5% Boulders some cobbles, no boulders at bottom
20 25 30								GPS: 568807 E, 3718329 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Stratification visible Moderate caving potential Backfilled with native soil

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

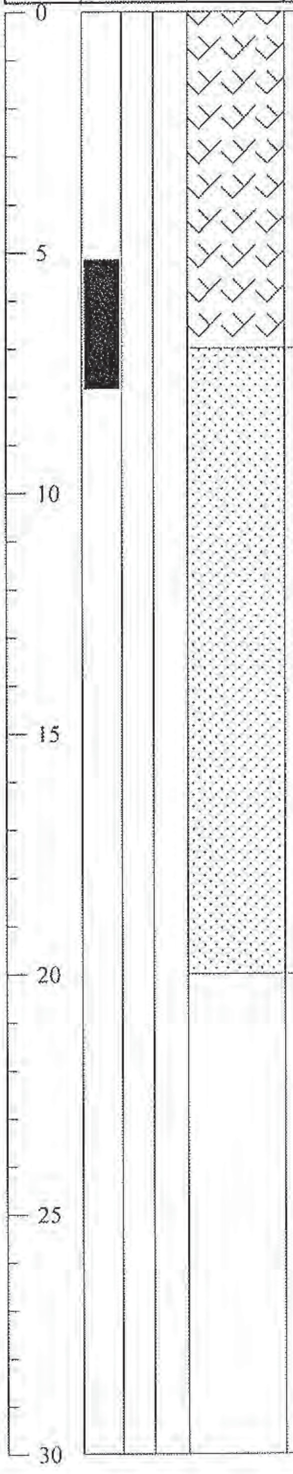
Test Pit No: TP-39
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.



Depth (Ft.)	Sample Type Bulk SPT MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0			RX			ROCK: boulders predominate by weight, very dense, dry, some sands and gravel
5				112	1.0	
			SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter Approximation By Weight: 80% Sands and Gravel 15% Cobbles ~ 5% Boulders no boulders at bottom
20						GPS: 567905, 3718311 N Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil

Test Pit No: TP-40
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 24, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter
				░		114	1.5	
				░				Approximation By Weight: 80% Sands and Gravel 18% Cobbles 2% Boulders
5				░				
10				░				
				░				damp, cobbles, no boulders, broken irrigation pipe
15								
20								GPS: 569005, 3718315 N Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-41
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 25, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type: Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter
	■			░		105	0.6	Approximation By Weight: 90% Sands and Gravel < 10% Cobbles < 1% Boulders
5				░				
10				░				
15				░				damp
				░				no cobbles or boulders at bottom
20								GPS: 569407 E, 3717971 Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Some stratification visible Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-42
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 25, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 8" diameter Approximation By Weight: 75% Sands and Gravel 20% Cobbles 5% Boulders
5				▨				
10				▨				
15				▨				
20				▨				
25								GPS: 568030, 3718828 Total Depth: 22 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-43

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Page 1 of 1 Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter Approximation By Weight: 50% Sands and Gravel ~ 40% Cobbles ~ 10% Boulders
5				░				
10				░				cobbles at bottom
15								
20								GPS: As planned Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-44
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Description of Units

Page 1 of 1

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel, few cobbles to 6" diameter scattered throughout
				▨		103	0.6	Approximation By Weight: 98% Sands and Gravel 2% Cobbles No Boulders
5				▨				
10				▨				slightly damp
15								
20								GPS: 567986 E, 3719298 Total Depth: 15 feet Groundwater not encountered Bedrock at bottom Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-45
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				▨	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel Approximation By Weight:
	■			▨		106	1.0	70% Sands and Gravel 25% Cobbles < 5% Boulders
5				▨				5 to 8 feet: cobbles, few boulders
10				▨				
15								
20								GPS: 567998, 3719216 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-46
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 19, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units
0				░	SW			WELL GRADED SAND: light brown, medium dense, dry, fine to coarse grained sand, abundant gravel, few cobbles
				░		106	0.6	Approximation By Weight: 90% Sands and Gravel 10% Cobbles No Boulders
5				░				
10				░				
15								
20								
								GPS: 568070, 3719220 Total Depth: 15 feet Groundwater not encountered Bedrock near outcrop/ridge Some stratification visible Moderate caving potential Hole not backfilled
25								
30								

Test Pit No: TP-47
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, dense, dry, fine to coarse grained sand, abundant gravel, cobbles and boulders to 12" diameter Approximation By Weight: 30% Sands and Gravel 20% Cobbles 50% Boulders
5				░				
10	■			░				
15								
20								GPS: 567982, 3719012 Total Depth: 15 feet Groundwater not encountered Bedrock not encountered High caving potential Backfilled with native soil
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-48
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

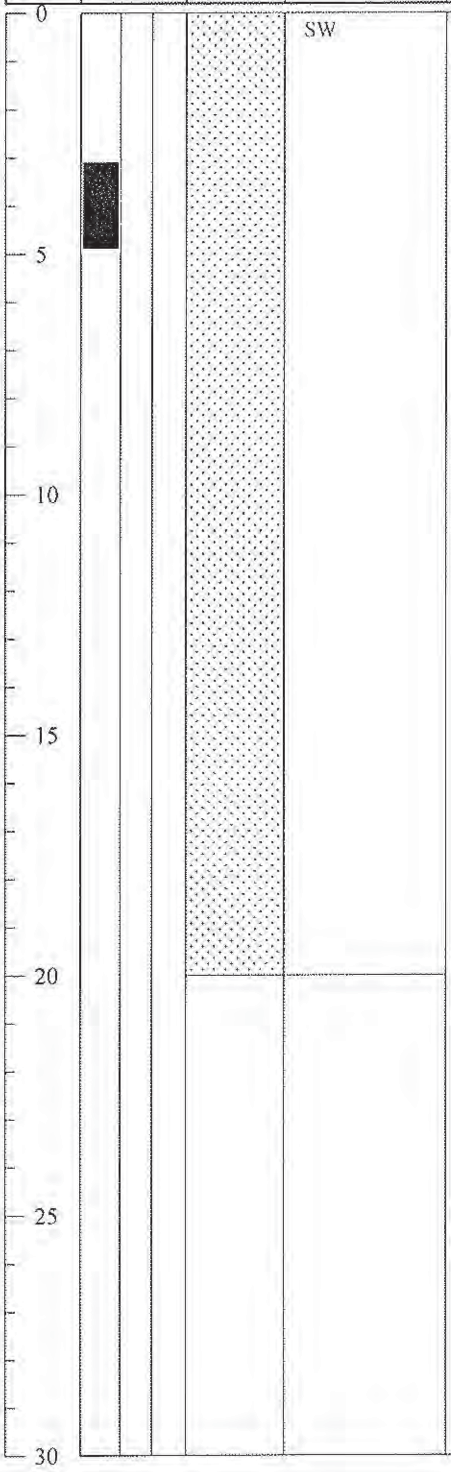
Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type: Bulk / SPT / MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.



WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles

Approximation By Weight:
> 70% Sands and Gravel
30% Cobbles
< 2% Boulders

GPS: 568221, 3719025
Total Depth: 15 feet
Groundwater not encountered
Bedrock not encountered
Thinly statified
Moderate caving potential
Backfilled with native soil

Test Pit No: TP-49
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date:
Excavation Method: Excavator
Logged By: D. Wiggins

Depth (Ft.)	Sample Type Bulk	SPT	MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0								
5								Test Pit Not Excavated
10								
15								
20								
25								
30								

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92203
Telephone (760) 345-1588 Fax (760) 345-7315

Test Pit No: TP-50

Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

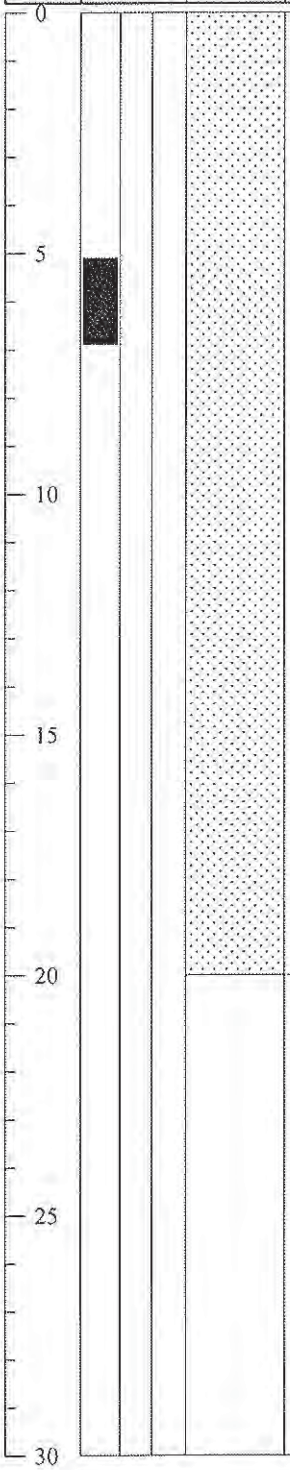
Page 1 of 1

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
0				░	SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to ~ 10", trace boulders below 3' Approximation By Weight: 80% Sands and Gravel 18% Cobbles < 2% Boulders
5				░				
10				░				
15				░				
20								GPS: 568306 E, 3718879 N Total Depth: 18 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil
25								
30								

Test Pit No: TP-51
Project Name: Travertine
File Number: 11112-04
Test Pit Location: See Figure 2

Exploration Date: October 23, 2007
Excavation Method: Excavator
Logged By: D. Wiggins

Page 1 of 1



USCS	Dry Density (pcf)	Moisture Content (%)	**Description of Units** Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.
SW			WELL GRADED SAND: light brown to white, medium dense, dry, fine to coarse grained sand, abundant gravel and cobbles to 12" diameter Approximation By Weight: 80% Sands and Gravel 20% Cobbles < 1% Boulders
			GPS: 568236, 3718773 Total Depth: 20 feet Groundwater not encountered Bedrock not encountered Moderate caving potential Backfilled with native soil

BORING LOGS BY

NMG

APPENDIX C

LABORATORY TEST RESULTS

BY NMG

Hofmann / La Quinta - Travertine
Project Number: 18186-01

APPENDIX
SUMMARY OF SOIL LABORATORY DATA

La Quinta, CA

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2µ)	LL (%)	PI (%)		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)				
H-1	D-1	5.0		40.0	30	120.7	119.1	1.3	8.4															
H-1	B-1	5.0		40.0																				
H-1	D-2	10.0		35.0	40			1.1																Disturbed
H-1	D-3	15.0		30.0	41	117.3	115.3	1.7	9.8															
H-1	D-4	20.0		25.0	45	117.9	116.4	1.3	7.8															
H-1	SPT-1	21.5		23.5	32			1.4		13	2			SM										
H-1	D-5	23.0		22.0	40			0.9																Disturbed
H-1	SPT-2	24.5		20.5	21			1.9																
H-1	D-6	26.0		19.0	30			2.5																Disturbed
H-1	SPT-3	27.5		17.5	15			1.1																
H-1	D-7	29.0		16.0	50	126.5	123.9	2.1	15.5															
H-1	SPT-4	30.5		14.5	32			1.8		10				SW-SM										
H-1	D-8	32.0		13.0	70			1.4																Disturbed
H-1	SPT-5	33.5		11.5	22			2.0																
H-1	D-9	35.0		10.0	57			1.8		7				SW-SM										Disturbed
H-1	SPT-6	36.5		8.5	32			1.6																
H-1	D-10	38.0		7.0	85			1.2																Disturbed
H-1	SB-1	38.1		6.9																				
H-2	D-1	5.0		45.0	24			0.5																Disturbed
H-2	D-2	10.0		40.0	43			0.5																Disturbed
H-2	B-1	10.0		40.0																				
H-2	D-3	15.0		35.0	40			0.7																Disturbed
H-2	D-4	17.0		33.0	50			0.6																Disturbed
H-2	SPT-1	18.5		31.5	24			0.6																
H-2	D-5	20.0		30.0	43			0.7		4				SW										Disturbed
H-2	SPT-2	21.5		28.5	31			0.7																
H-2	D-6	23.0		27.0	60			1.0																Disturbed
H-2	SPT-3	24.5		25.5	48			0.8																
H-2	D-7	26.0		24.0	82/9"			0.9																Disturbed
H-2	SPT-4	27.5		22.5	50/1"																			NR
H-2	D-8	29.0		21.0	89			0.5		5				SW										Disturbed
H-2	SPT-5	30.5		19.5	28			0.8																
H-2	D-9	32.0		18.0	70	118.4	117.5	0.8	4.7					SP/SW										CN
H-2	SPT-6	33.5		16.5	27			0.8																
H-2	D-10	35.0		15.0	58			1.0																Disturbed

Hofmann / La Quinta - Travertine
Project Number: 18186-01

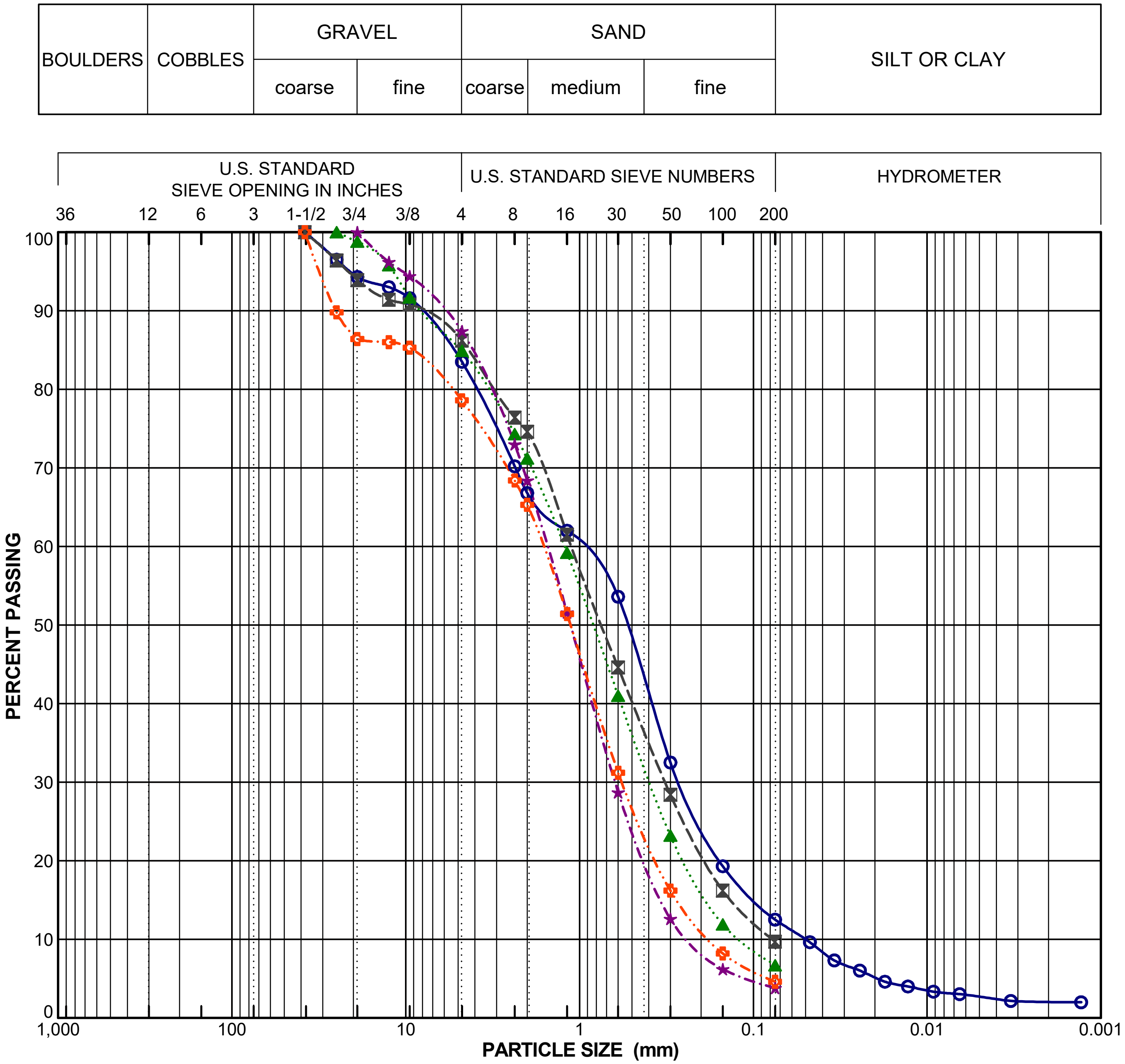
APPENDIX
SUMMARY OF SOIL LABORATORY DATA

La Quinta, CA

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2μ)	LL (%)	PI (%)		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)				
H-2	SPT-7	36.5		13.5	28			0.8																
H-2	D-11	38.0		12.0	55			1.0																Disturbed
P-1	D-1	5.0		40.0	42	122.0	120.5	1.2	8.2															
P-1	D-2	10.0		35.0	26	116.7	112.5	3.8	20.5															
P-1	D-3	15.0		30.0	36	120.4	112.3	7.3	39.1	9	1			SW-SM										
P-1	D-4	20.0		25.0	50/6"																			NR
P-1	D-5	21.5		23.5	64	122.6	118.3	3.7	23.3					SP/SW										CN
P-2	D-1	5.0		38.0	56			1.1																Disturbed
P-2	D-2	10.0		33.0	46																			NR
P-2	D-3	15.0		28.0	31			1.6																Disturbed
P-2	D-4	20.0		23.0	46	122.4	120.6	1.4	9.8															
P-2	D-5	22.5		20.5	77			1.9		4				SP										Disturbed
P-3	D-1	5.0		41.0	18			0.8																Disturbed
P-3	D-2	10.0		36.0	20			1.1																Disturbed
P-3	D-3	13.5		32.5	45			0.8																Disturbed
P-3	D-4	15.0		31.0	44			0.9																Disturbed
P-3	D-5	16.5		29.5	37			0.7		4				SW										Disturbed
P-3	D-6	18.5		27.5	31			0.7																Disturbed
P-4	D-1	5.0		50.0	29			0.8																Disturbed
P-4	D-2	10.0		45.0	28			0.8																Disturbed
P-4	D-3	15.0		40.0	48			1.0																Disturbed
P-4	D-4	20.0		35.0	39																			NR
P-4	D-5	22.0		33.0	46			0.7																Disturbed
P-4	D-6	23.5		31.5	44			0.7																Disturbed
P-5	D-1	5.0		55.0	27			0.7																Disturbed
P-5	B-1	5.0		55.0																				
P-5	D-2	10.0		50.0	50/6"			0.7																Disturbed
P-5	D-3	15.0		45.0	45																			NR
P-5	D-4	20.0		40.0	80			0.5																Disturbed
P-5	D-5	25.0		35.0	55	121.1	120.7	0.3	2.0															
P-5	D-6	27.0		33.0	51			0.7		4				SW										Disturbed
P-5	D-7	28.5		31.5	72			0.6																Disturbed

NMG Geotechnical, Inc.

Sheet 2 of 2

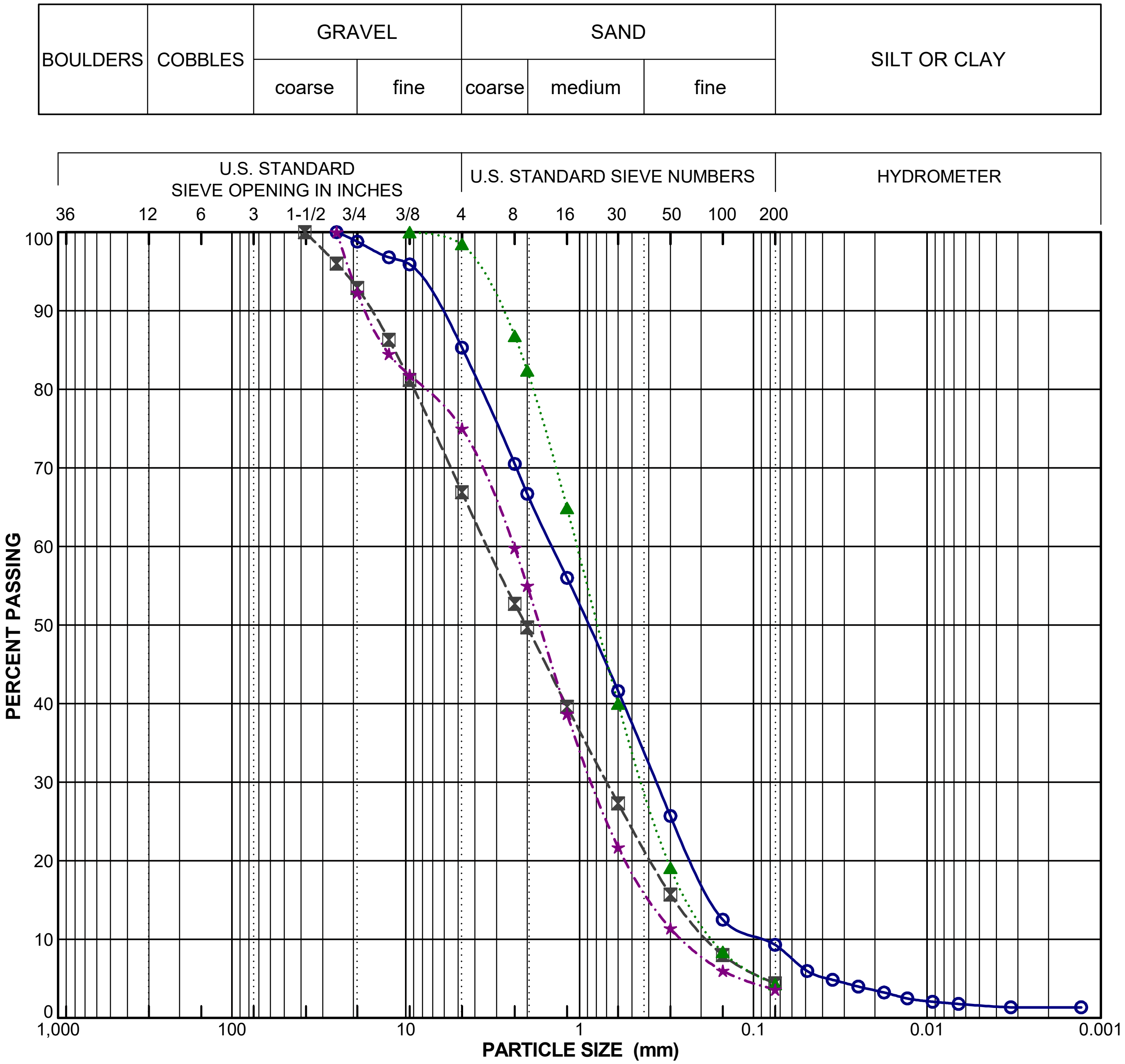


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2µ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2µ (%)	USCS
○	H-1	SPT-1	21.5	1						13	2	SM
☒	H-1	SPT-4	30.5	2				14.4	1.2	10		SW-SM
▲	H-1	D-9	35.0	2				10.5	1.1	7		SW-SM
★	H-2	D-5	20.0	1				6.8	1.1	4		SW
⊕	H-2	D-8	29.0	1				9.3	1.1	5		SW

PARTICLE SIZE DISTRIBUTION

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.

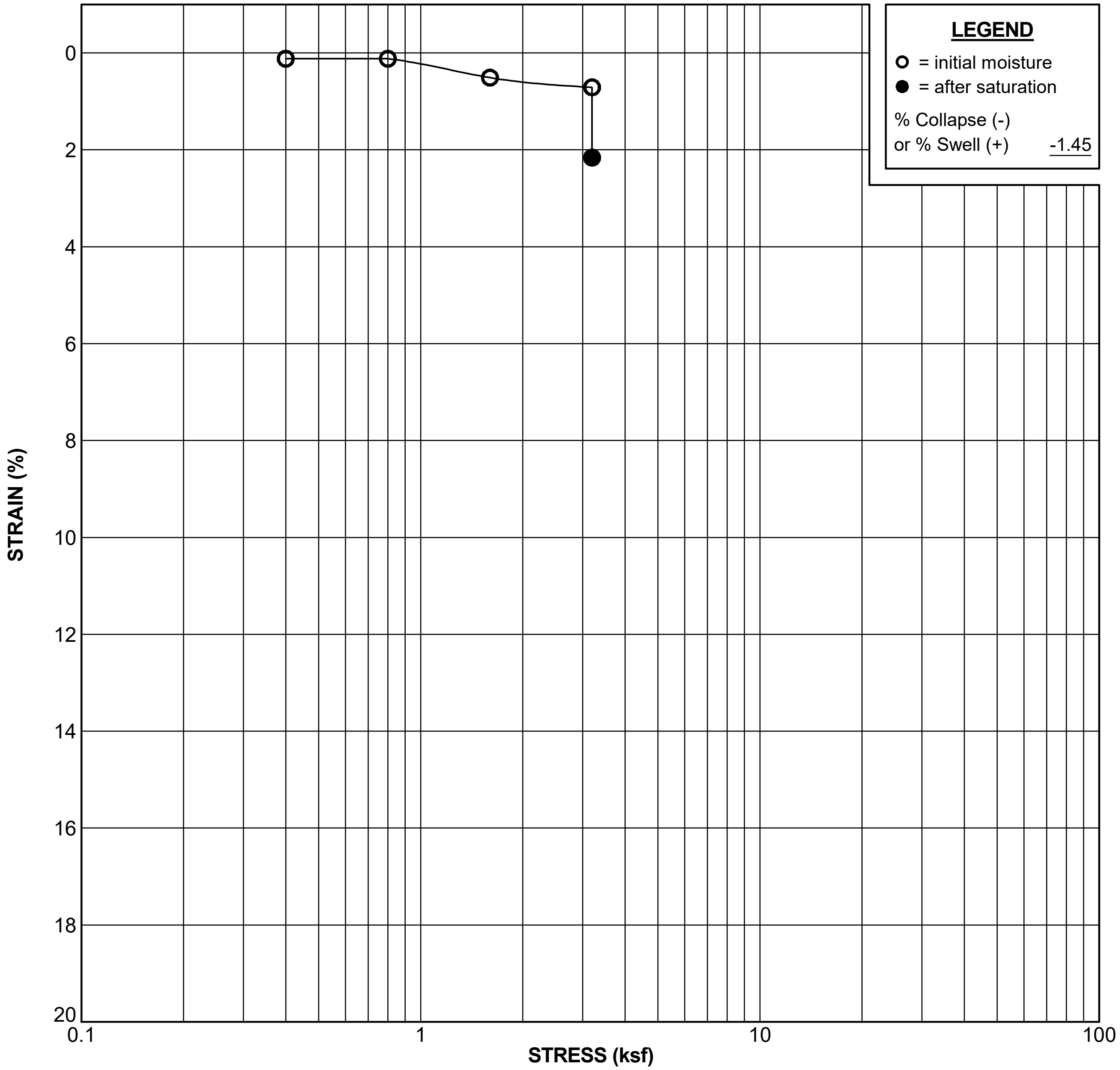


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	P-1	D-3	15.0	7				16.5	1.0	9	1	SW-SM
⊠	P-2	D-5	22.5	2				18.8	0.8	4		SP
▲	P-3	D-5	16.5	1				6.2	1.1	4		SW
★	P-5	D-6	27.0	1				9.5	1.2	4		SW

PARTICLE SIZE DISTRIBUTION

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.



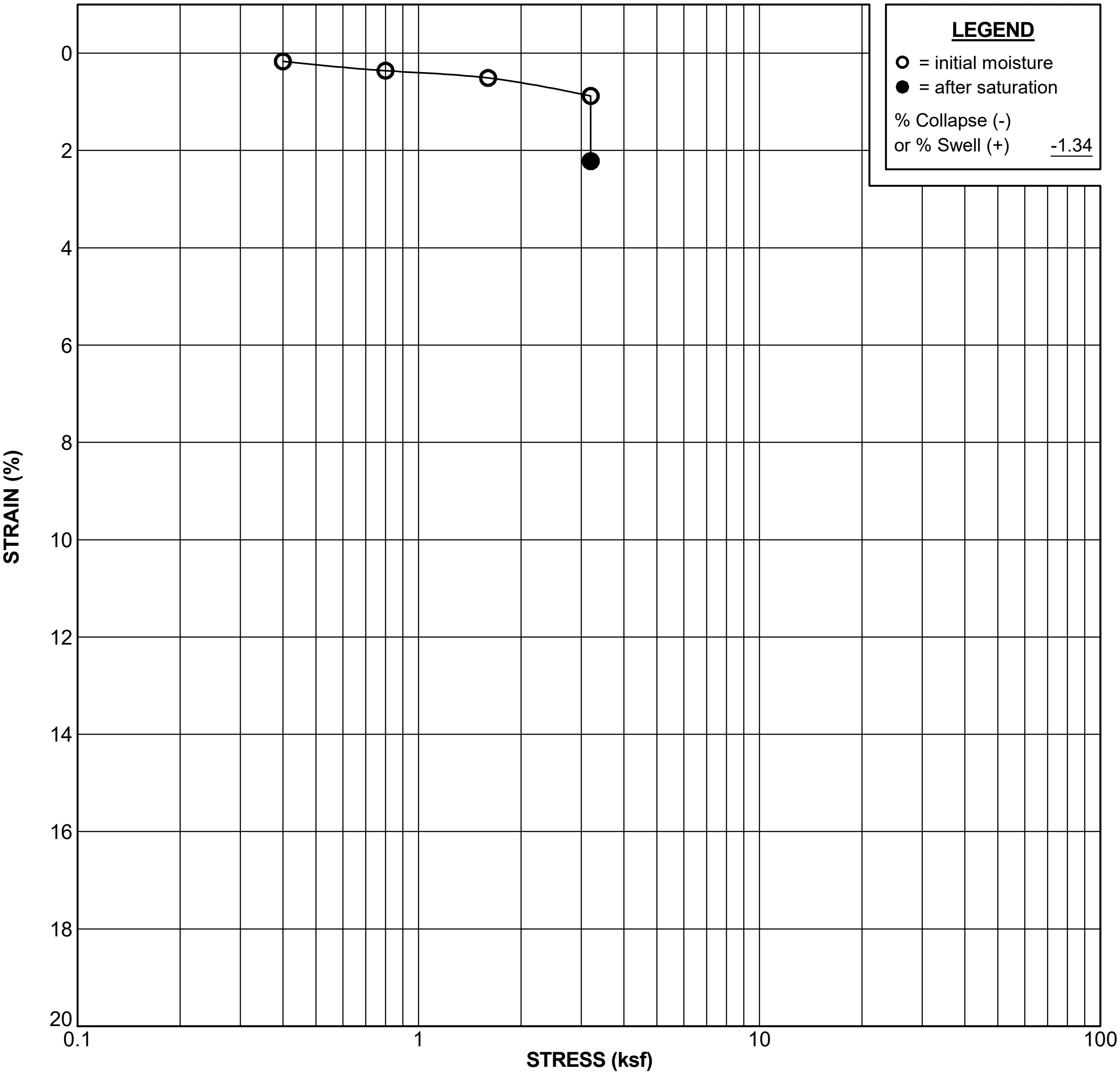
Boring No. H-2	**Sample No. D-9**	**Depth: 32.0 ft**
Sample Description: (Qal) Olive brown SAND		**USCS:** SP/SW
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	1.3	111.3	6.8	0.514
Final	15.9	113.7	89.1	0.482

CONSOLIDATION TEST RESULTS

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.



Boring No. P-1	**Sample No. D-5**	**Depth: 21.5 ft**
Sample Description: (Qal) Olive brown SAND		**USCS:** SP/SW
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	2.0	109.0	9.9	0.546
Final	15.8	111.4	83.3	0.512

CONSOLIDATION TEST RESULTS

Hofmann / La Quinta - Travertine
La Quinta, CA
PROJECT NO. 18186-01

NMG Geotechnical, Inc.

LABORATORY TEST RESULTS

BY OTHERS

LABORATORY TEST RESULTS

BY SLADDEN (2001)

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soils underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of this testing are presented graphically in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil. This is shown on the Boring Logs, and is useful in estimating the strength and compressibility of the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses and Atterberg Limits determinations. These provide information for developing classifications for the soil in accordance with the Unified Classification System. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing are very useful in detecting variations in the soils and in selecting samples for further testing.

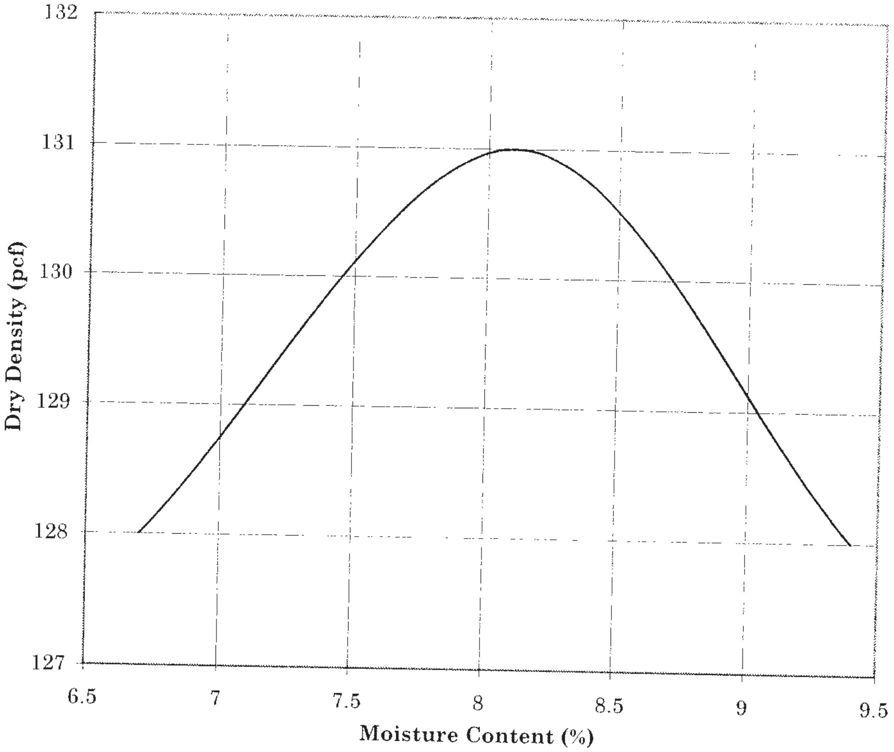
SOIL MECHANIC'S TESTING

Direct Shear Testing: One bulk sample was selected for Direct Shear Testing. This testing measures the shear strength of the soil under various normal pressures and is used in developing parameters for foundation design and lateral design. Testing was performed using recompacted test specimens, which were saturated prior to testing. Testing was performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Expansion Testing: One bulk sample was selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Consolidation Testing: Ten relatively undisturbed samples were selected for consolidation testing. For this testing one-inch thick test specimens are subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. The specimens were saturated at the 575 psf or 720 psf load increment.

Job No.: 544-1211



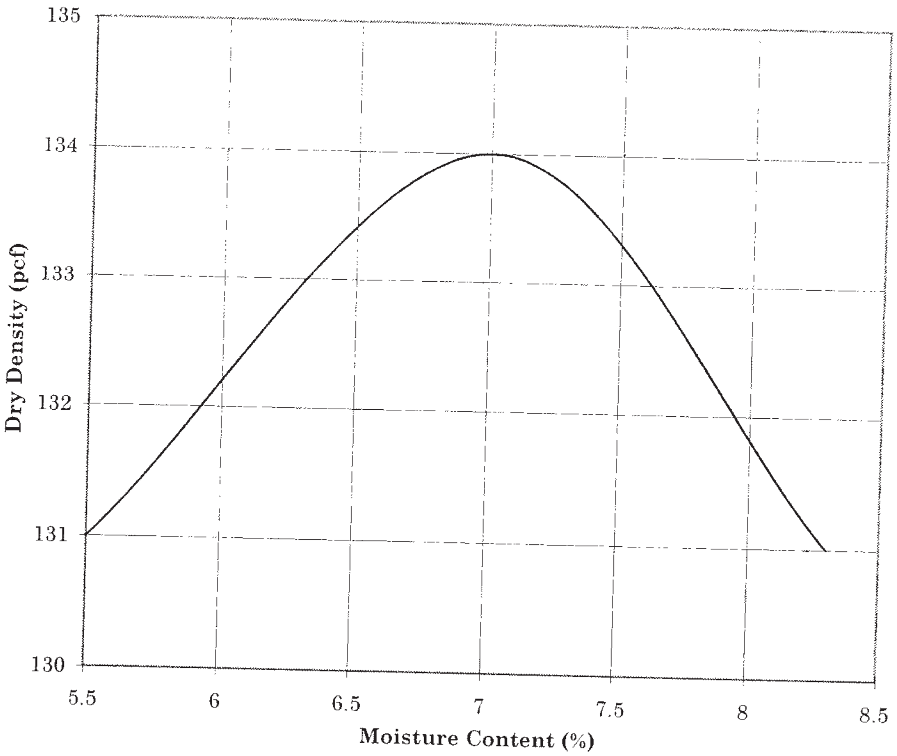
METHOD OF COMPACTION

ASTM D-1557-91, METHOD A OR C

BORING	MAXIMUM UNIT WEIGHT	OPTIMUM MOISTURE CONTENT
1 @ 0 - 5'	131	8.1

MAXIMUM DENSITY-OPTIMUM MOISTURE CURVE

Job No.: 544-1211

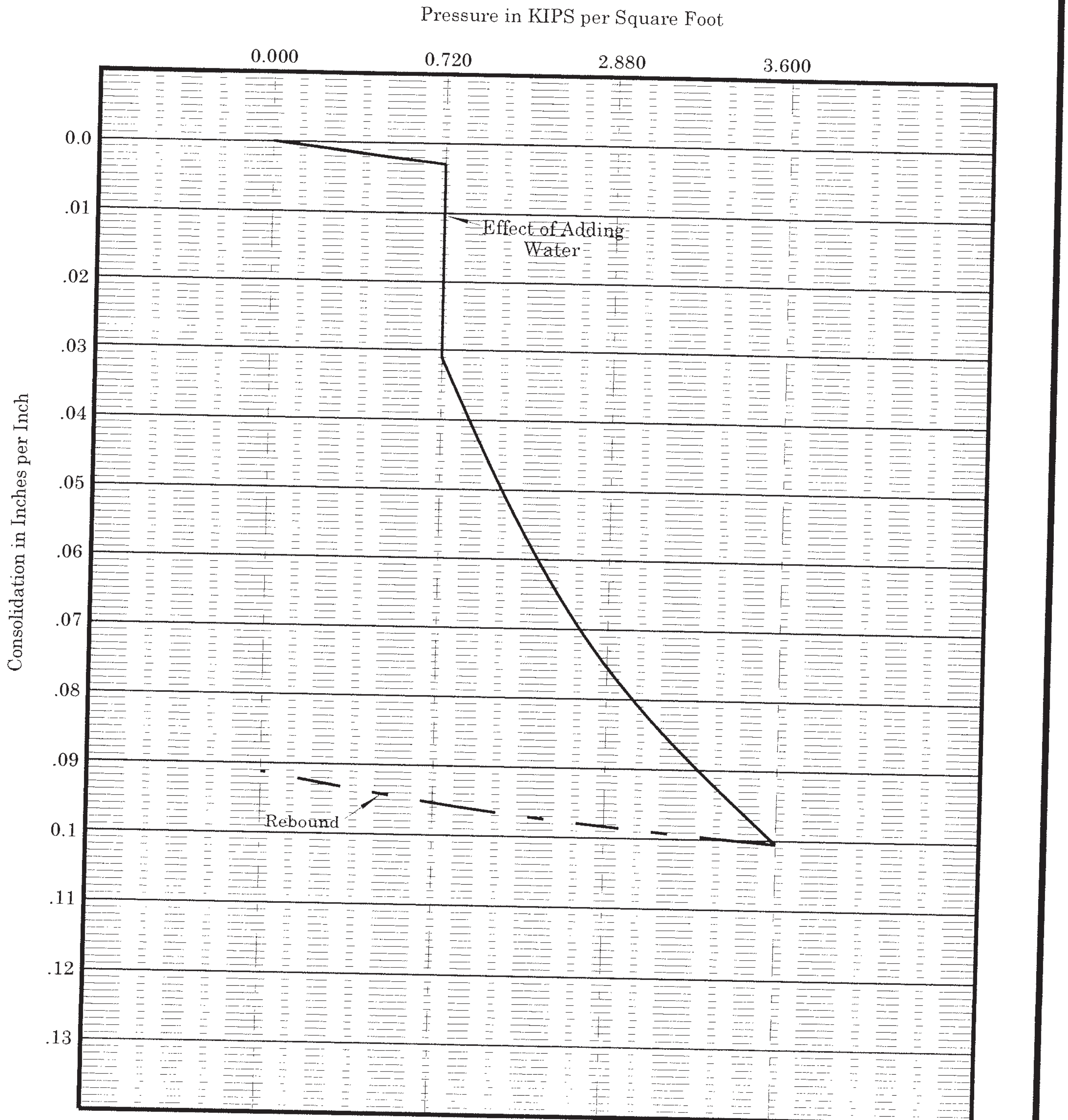


METHOD OF COMPACTION

ASTM D-1557-91, METHOD A OR C

BORING	MAXIMUM UNIT WEIGHT	OPTIMUM MOISTURE CONTENT
3 @ 0 - 5'	134	7.0

MAXIMUM DENSITY-OPTIMUM MOISTURE CURVE



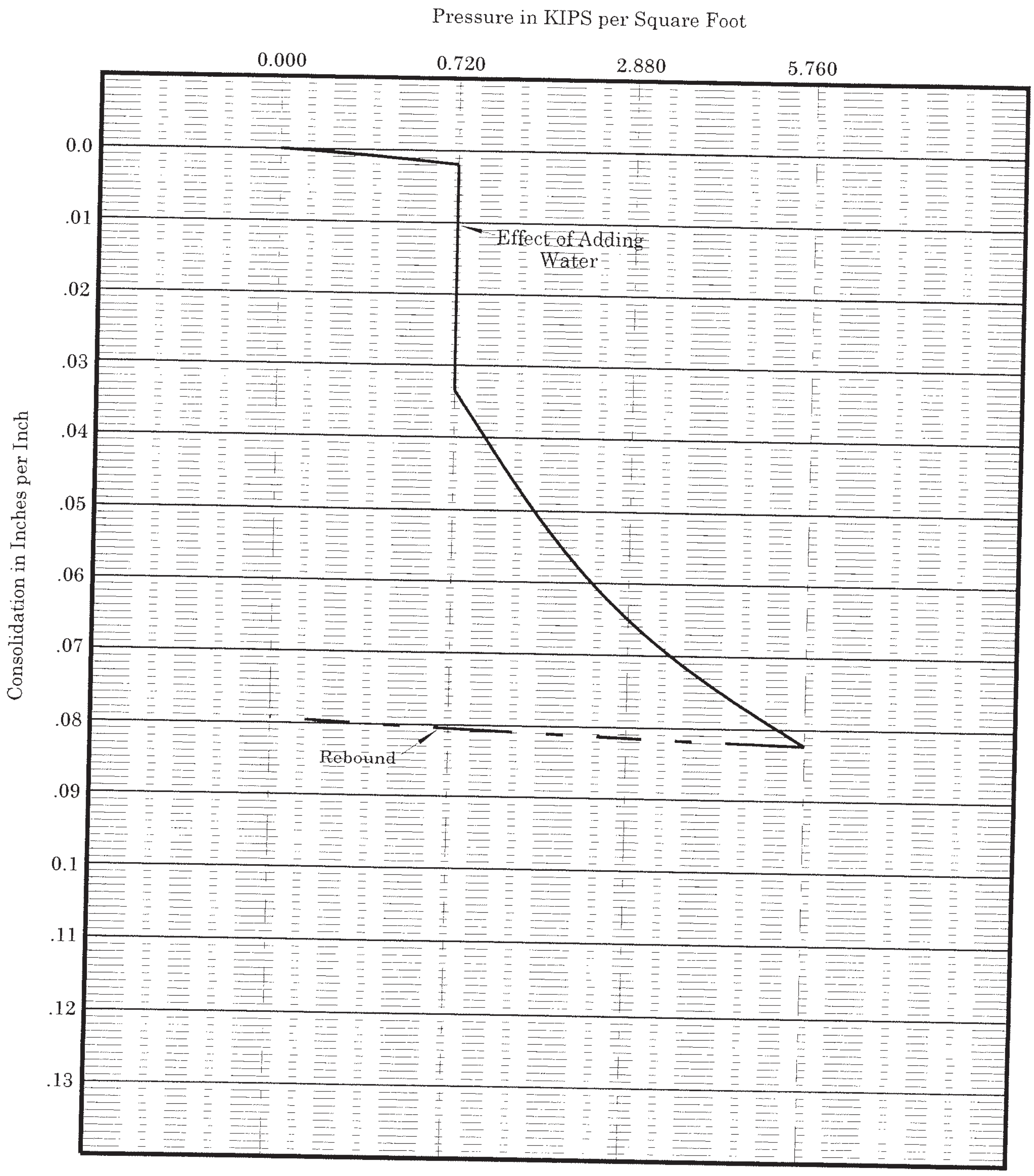
Consolidation Diagram

Trilogy at La Quinta

Boring 1 @ 5'

SLADDEN ENGINEERING

Date: 9/16/01 Job No.: 544-1211



Consolidation Diagram

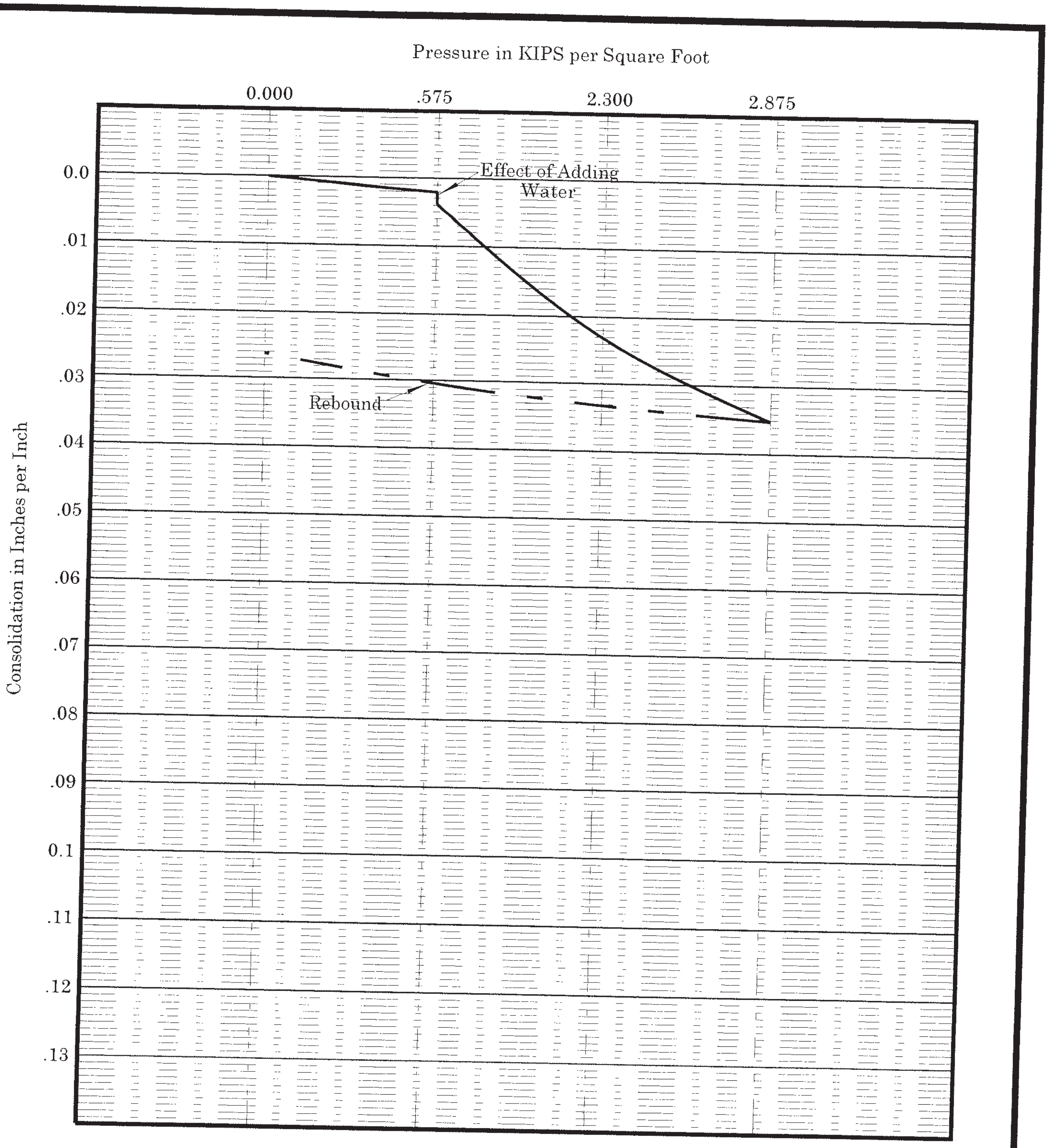
Trilogy at La Quinta

Boring 1 @ 15'

SLADDEN ENGINEERING

Date: 9/16/01

Job No.: 544-1211



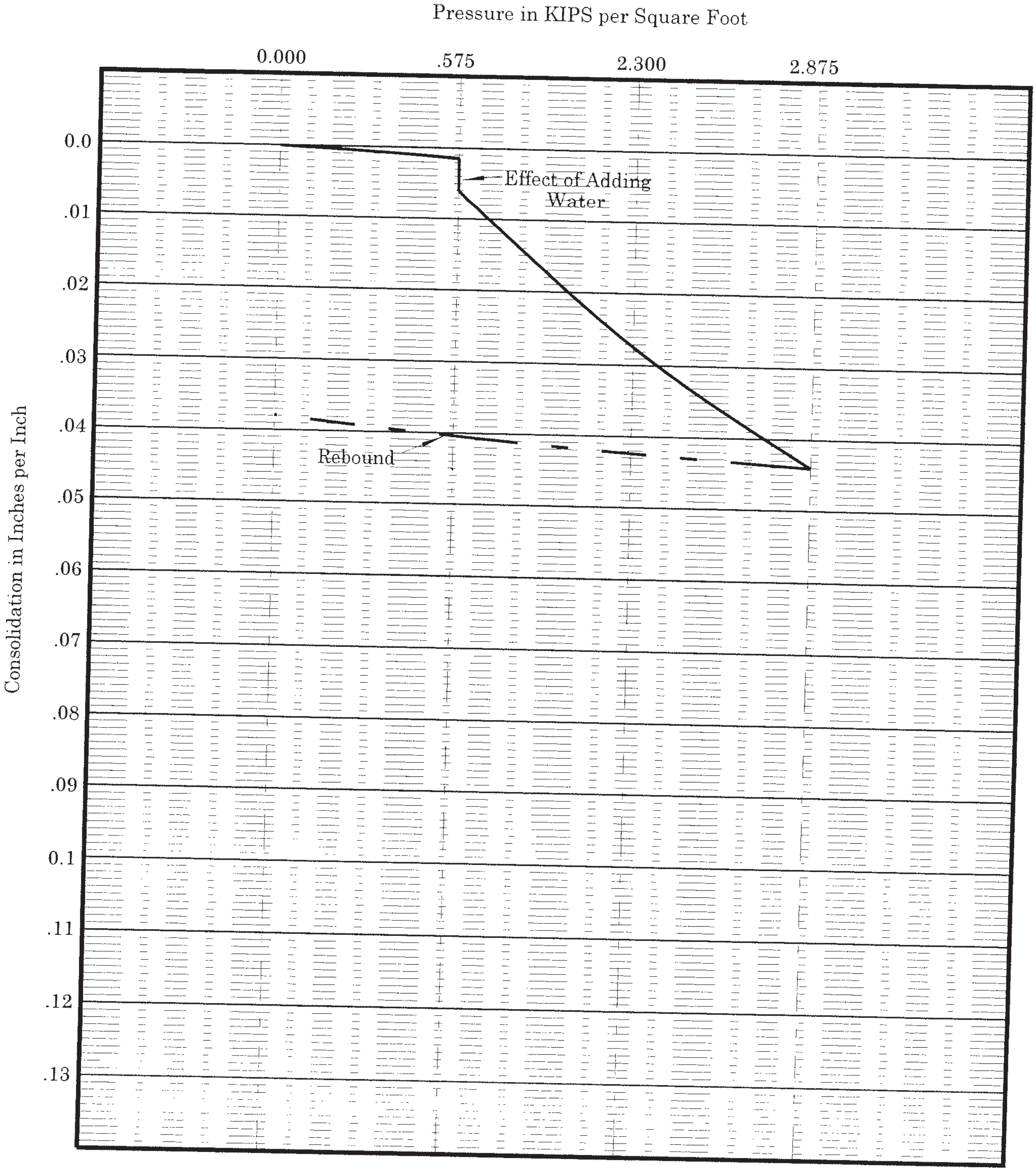
Consolidation Diagram

Trilogy at La Quinta

Boring 1 @ 20'

SLADDEN ENGINEERING

Date: 9/16/01	Job No.: 544-1211



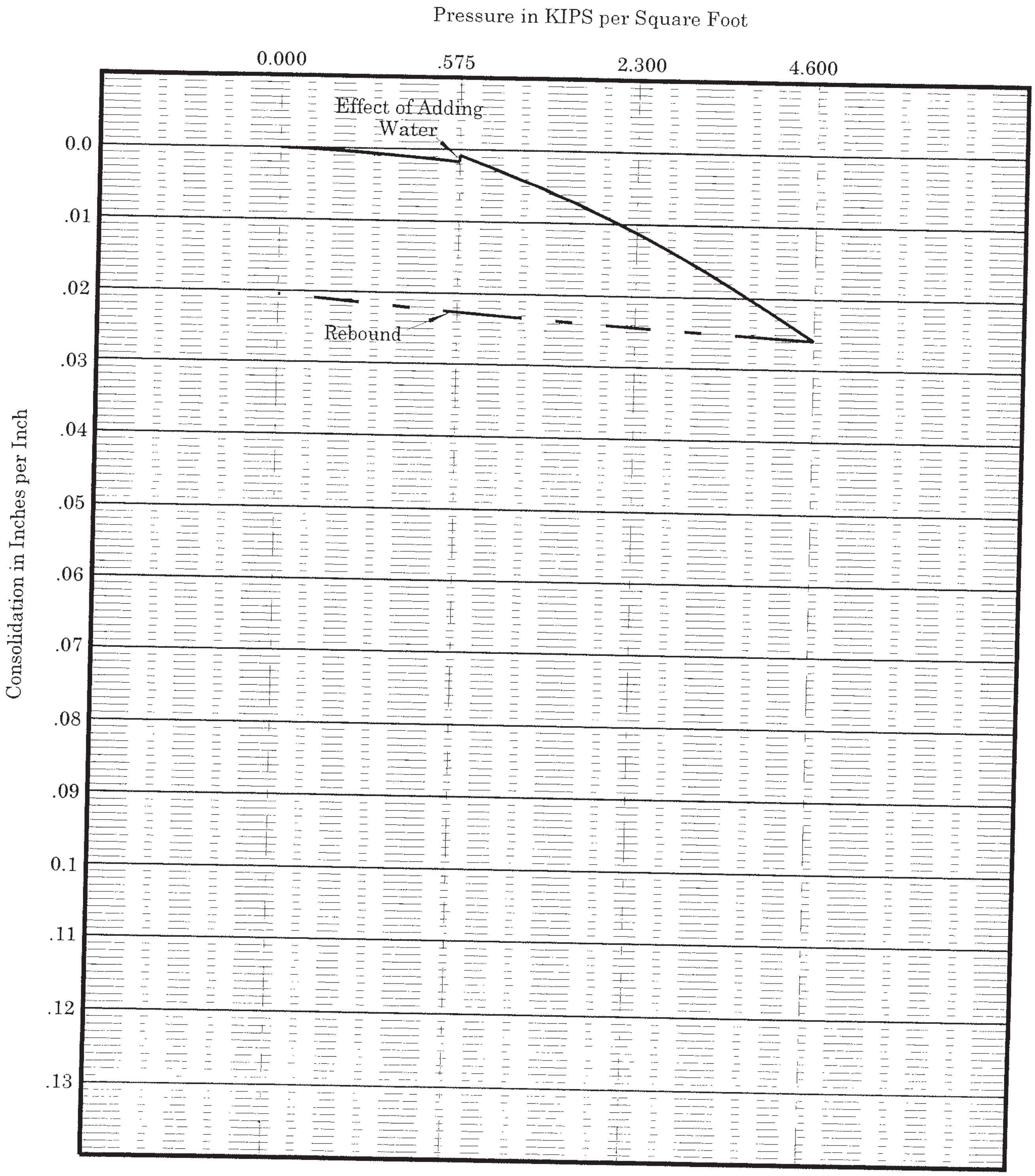
Consolidation Diagram

Trilogy at La Quinta

Boring 1 @ 25'

SLADDEN ENGINEERING

Date: 9/16/01 Job No.: 544-1211



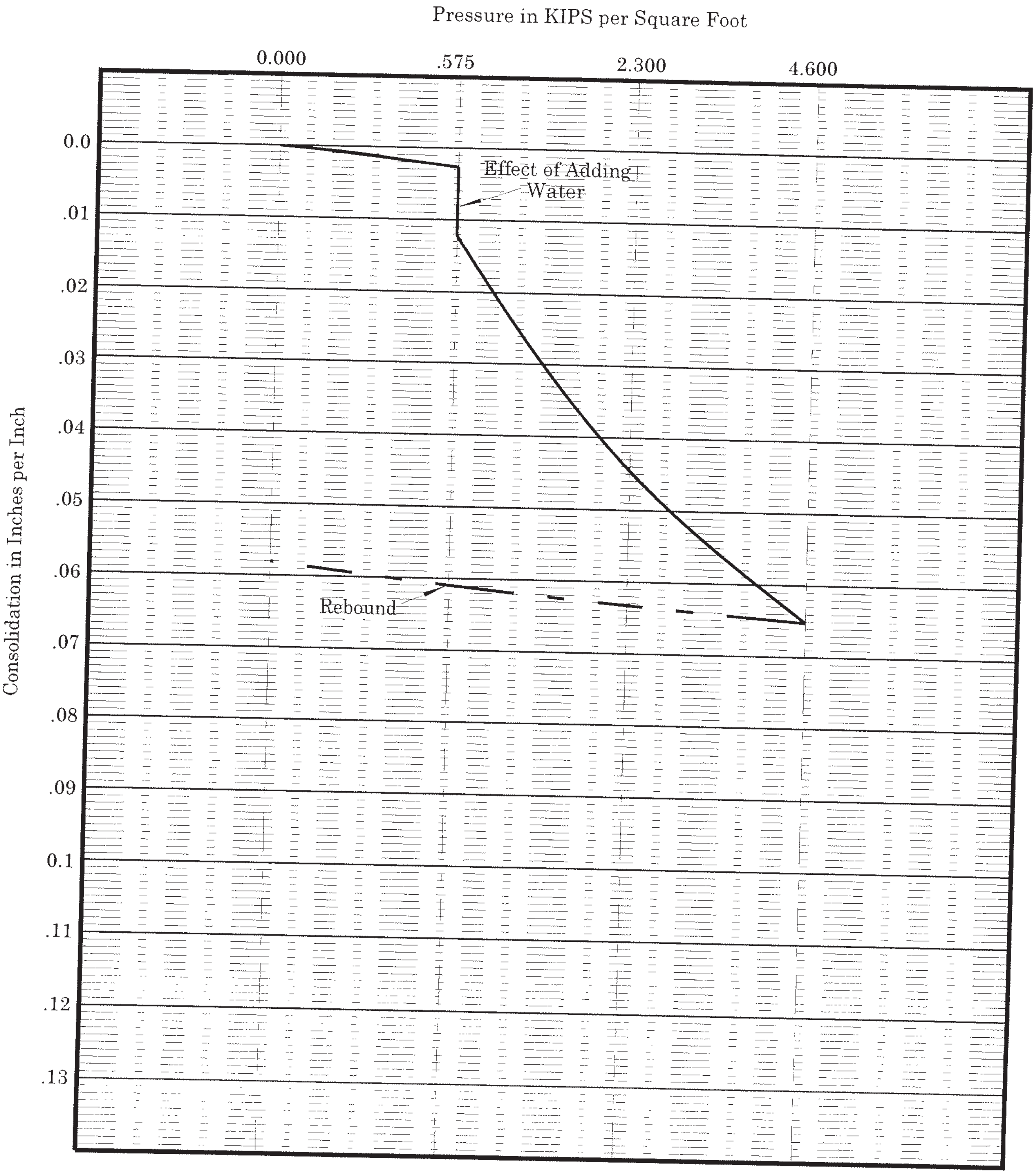
Consolidation Diagram

Trilogy at La Quinta

Boring 1 @ 30'

SLADDEN ENGINEERING

Date: 9/16/01	Job No.: 544-1211



Consolidation Diagram

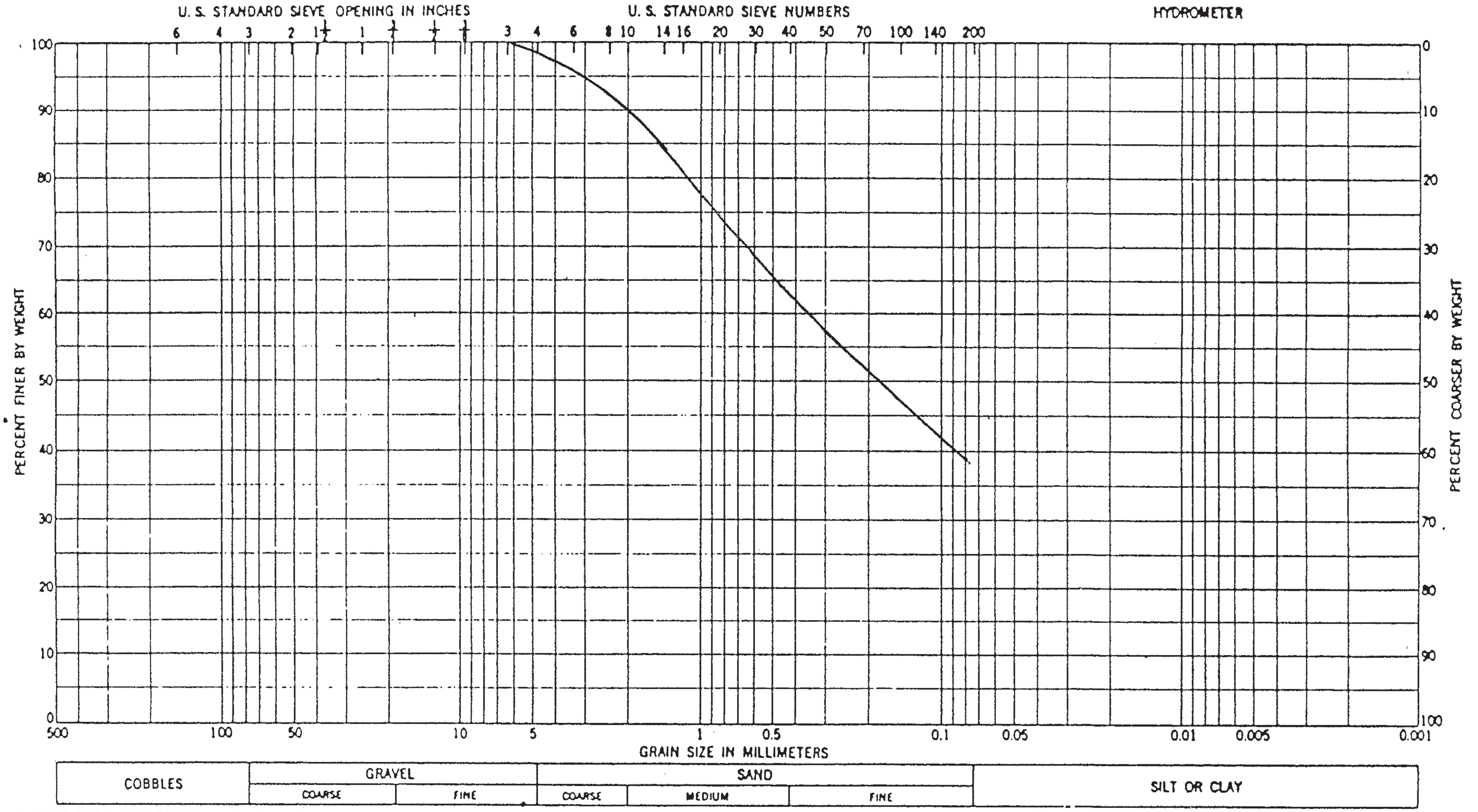
Trilogy at La Quinta

Boring 1 @ 40'

SLADDEN ENGINEERING

Date: 9/16/01

Job No.: 544-1211



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

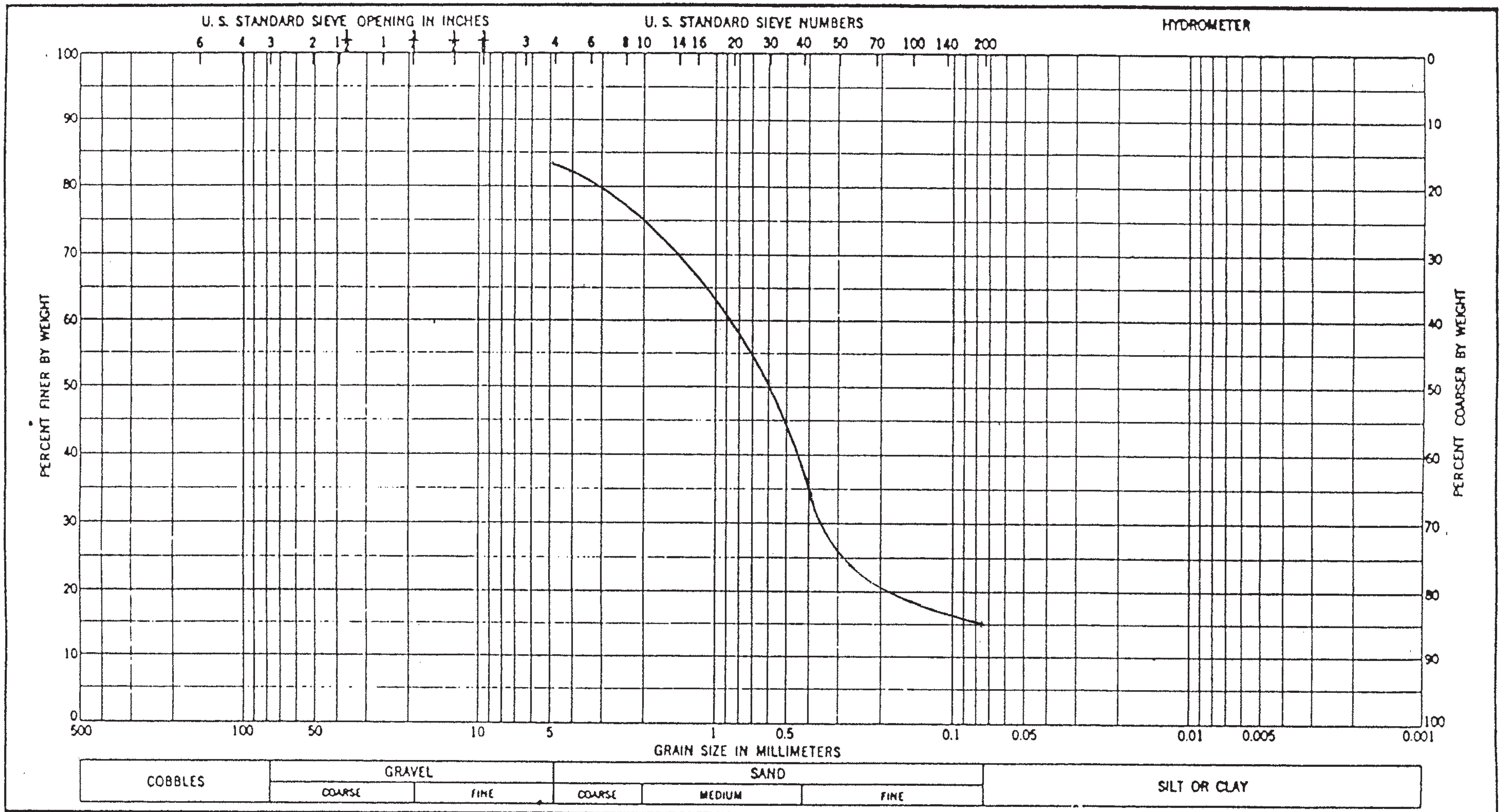
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 1 @ 0 - 5'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

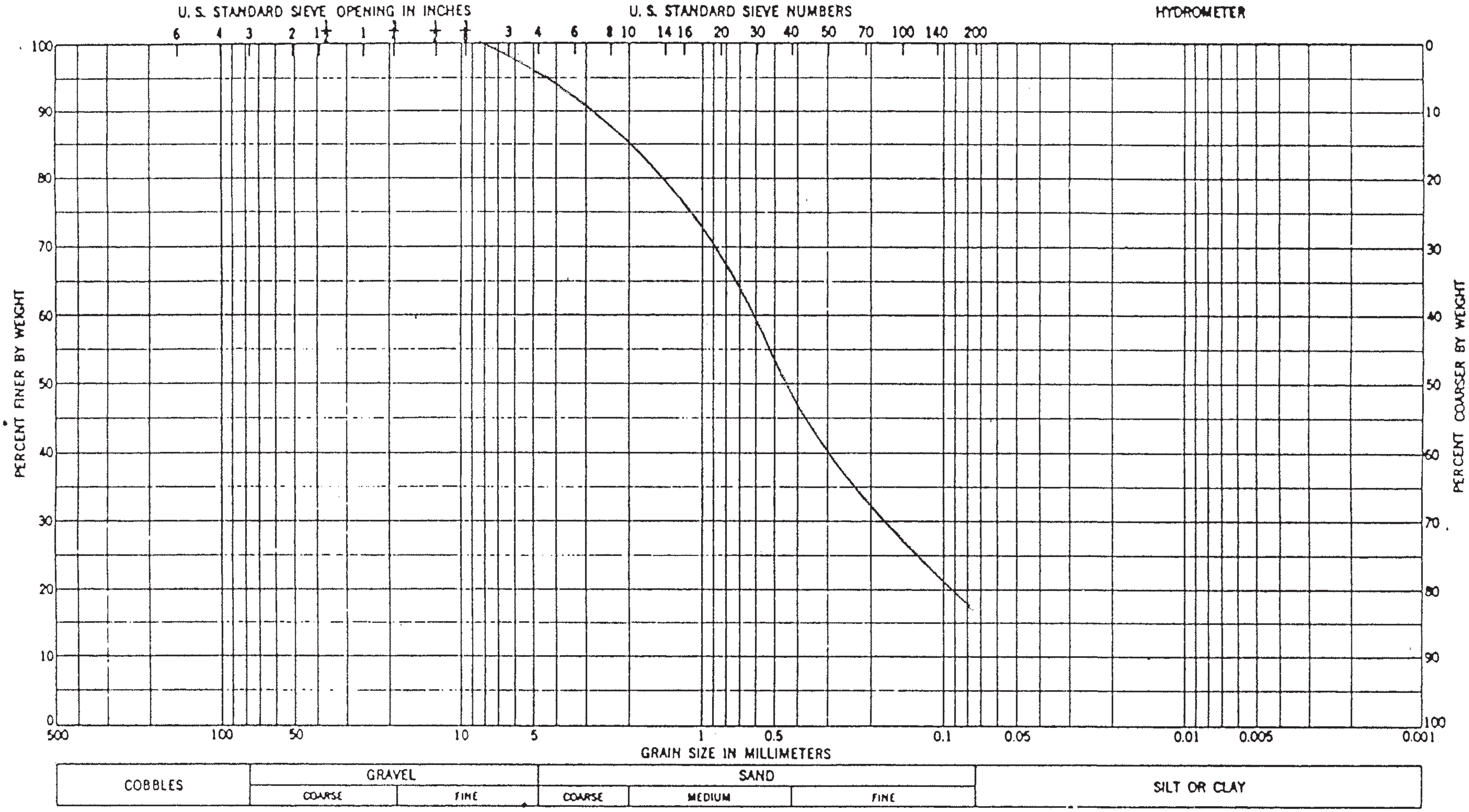
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 3 @ 0 - 5'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

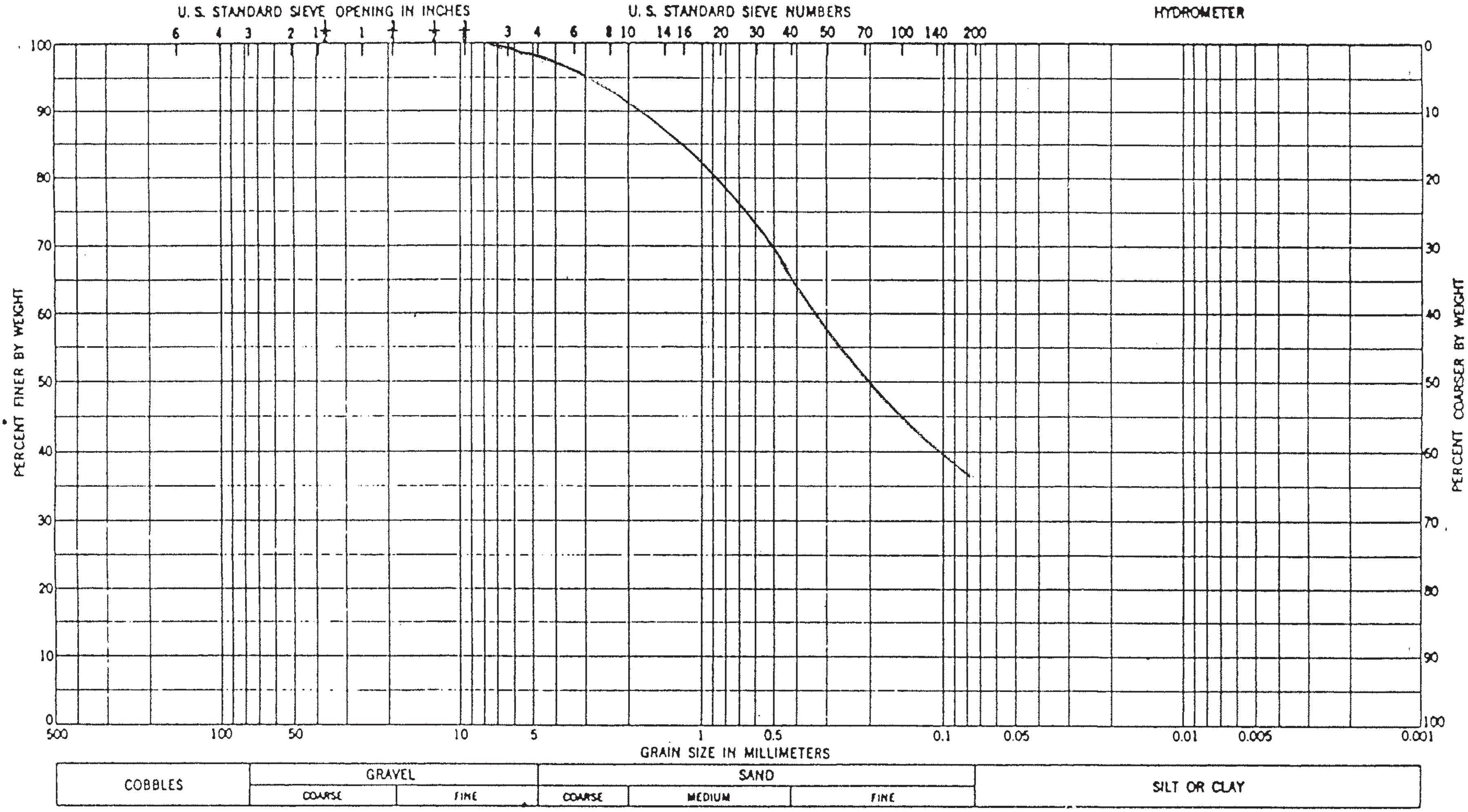
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 2 @ 5'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

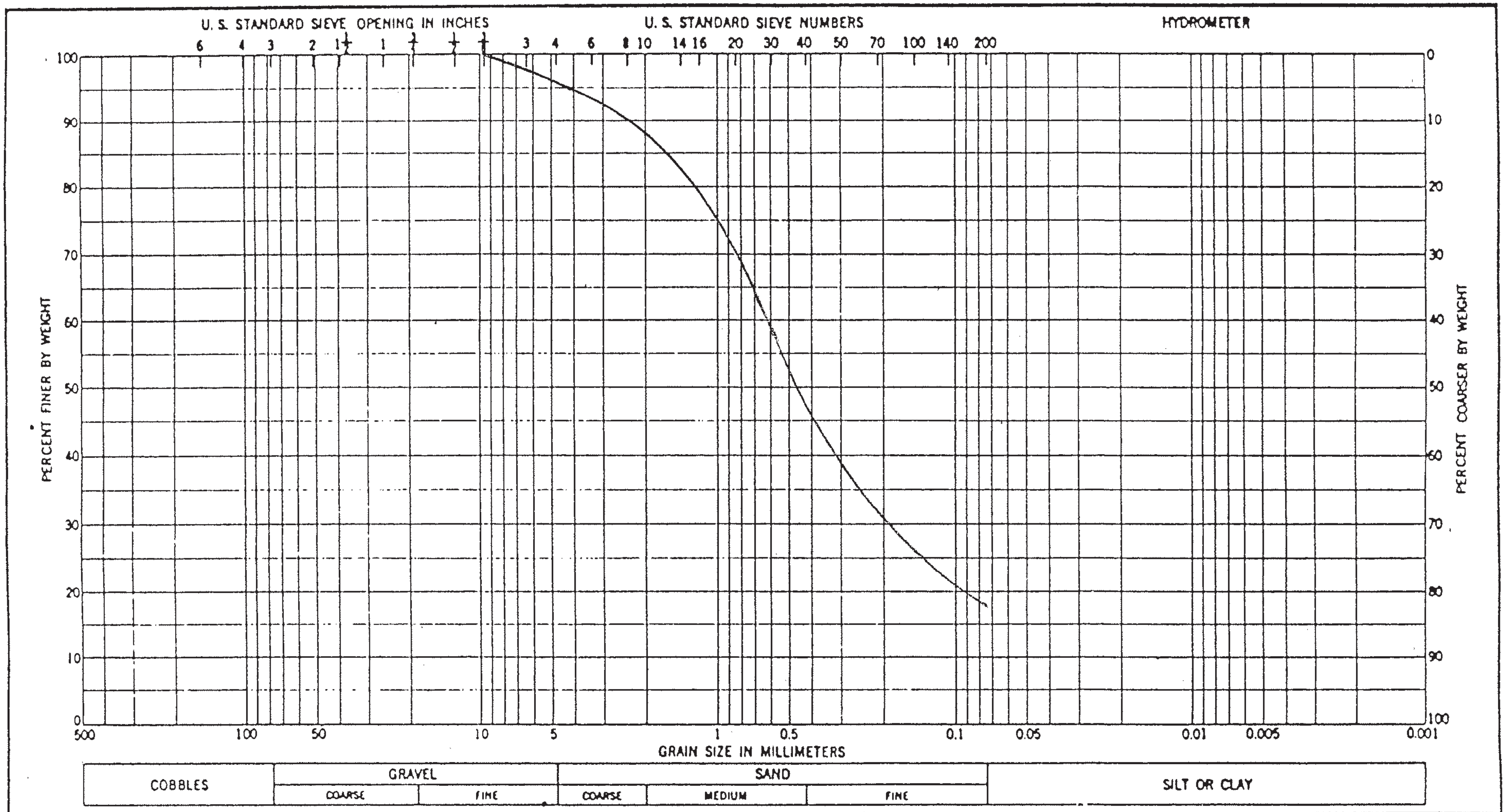
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 2 @ 10’



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

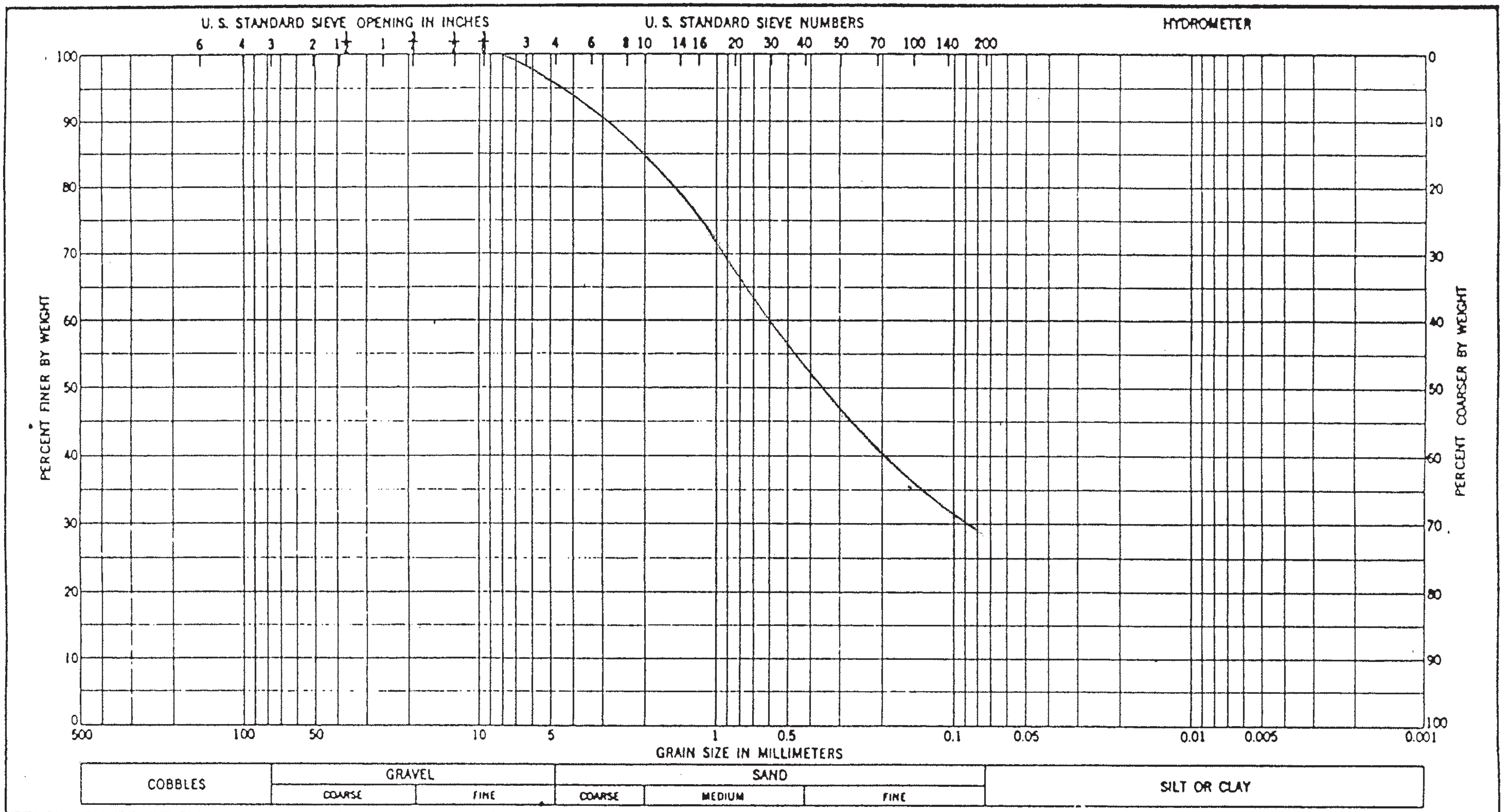
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 2 @ 20’



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

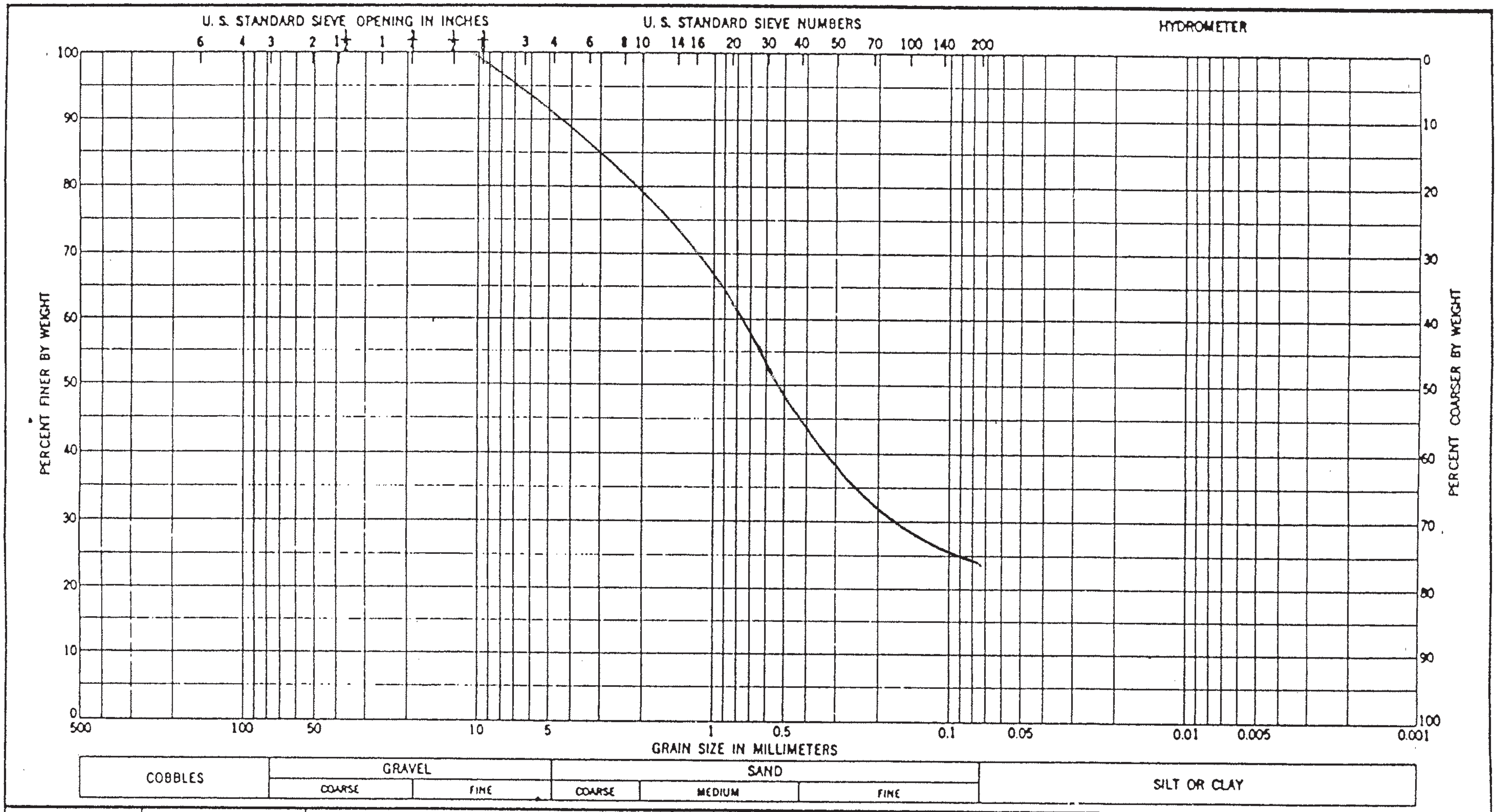
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 5'



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

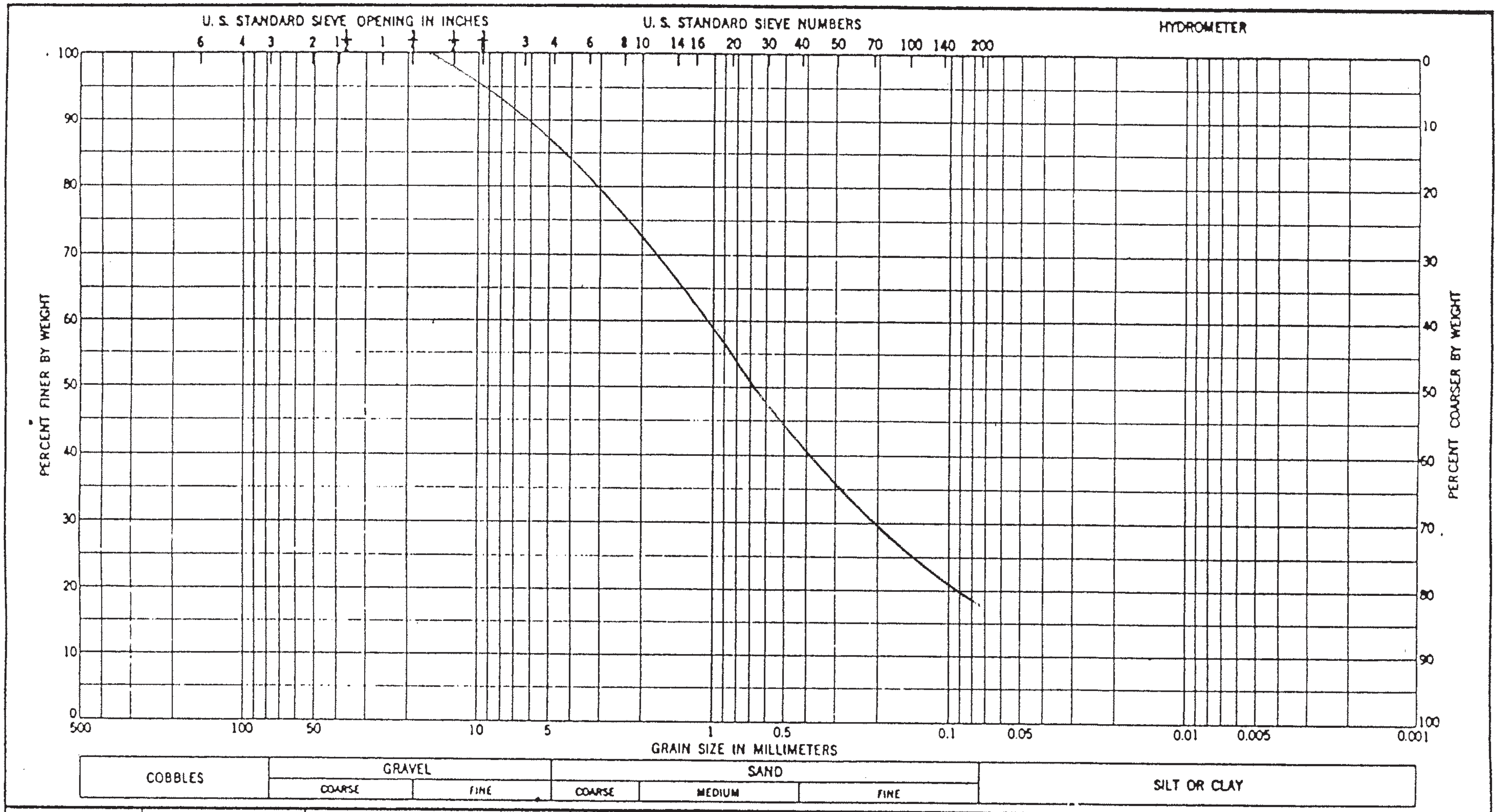
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 10’



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

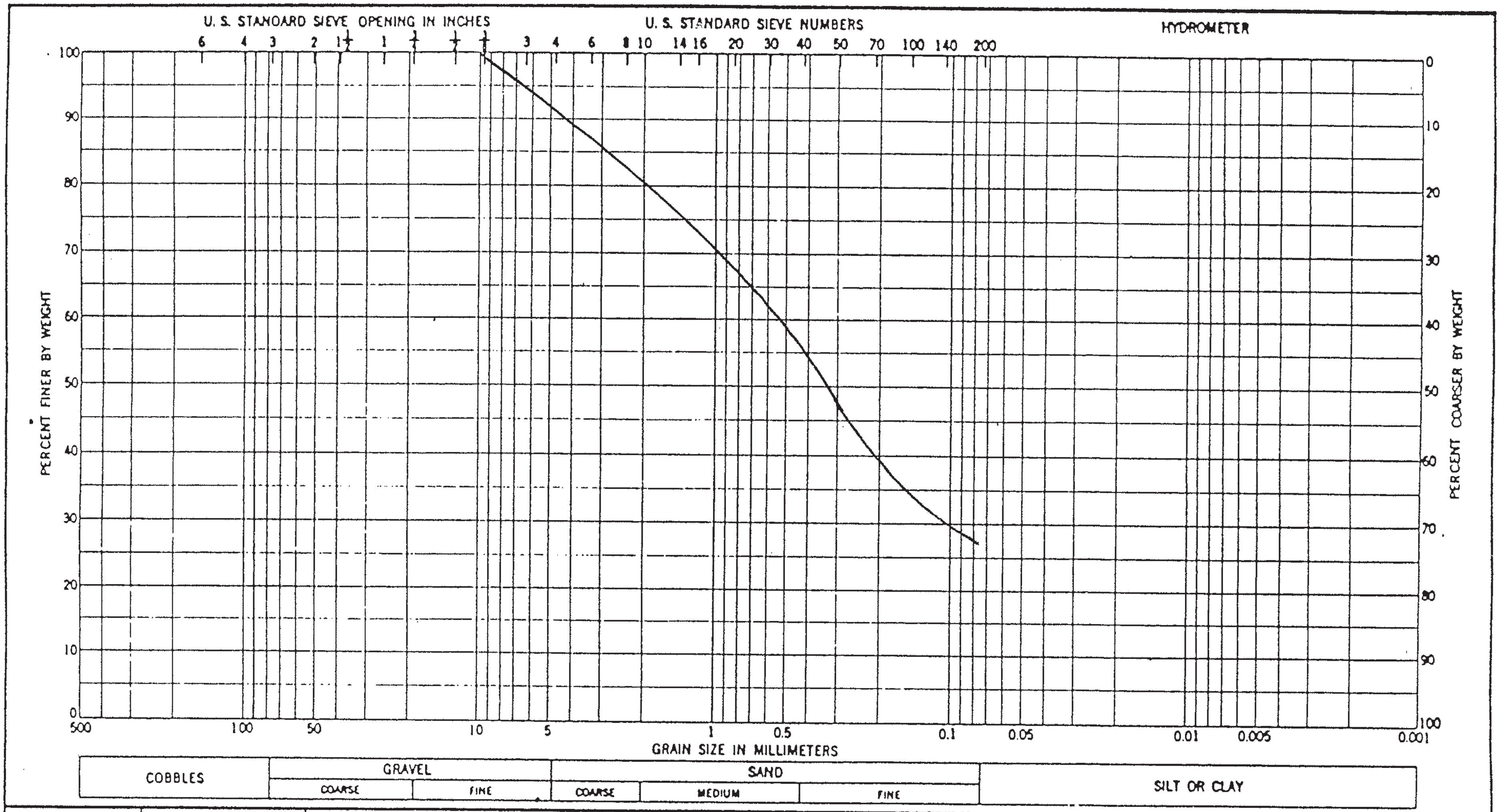
Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 15’



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

Area

Boring No.

Date

GRADATION CURVES

ENG FORM 1 MAY 63 2087

Project No.: 544-1211
Boring 5 @ 20’

ANAHEIM TEST LABORATORY

3008 S. ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

AUG 30 2001

TO: SLADDEN ENGINEERING:
6782 STANTON AVE. SUITE E
BUENA PARK, CA. 90621

ATTN: BRETT/DAVE

PROJECT: #544-1211

DATE: 8/28/01

P.O. No. Chain of Custody

Shipper No.

Lab. No. B 8961 1-2

Specification:

Material: SOIL

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

	pH	SOLUBLE SULFATES per CA. 417 ppm	SOLUBLE CHLORIDES per CA. 422 ppm	MIN. RESISTIVITY per CA. 643 ohm-cm
#1 Bulk H-1 @ 0-5'	8.1	255	787	600 max
#2 Bulk H-3 @ 0-5'	9.1	49	37	2,628

RESPECTFULLY SUBMITTED

POPPY BRIDGER Chief Chemist

FORM #2

INLAND FOUNDATION ENGINEERING, INC.
Consulting Geotechnical Engineers
1310 South Santa Fe Avenue
San Jacinto, California 92583-4638
(909) 654-1555
FAX (909) 654-055

September 17, 2001
Project No.: S435-001
Your Project No.: 544-1211 Trilogy

SLADDEN ENGINEERING
Attention: Brett Anderson
6782 Slanton Avenue, Suite E
Buena Park, California 90621

Re: Laboratory Testing – Permeability Study

Gentlemen:

Transmitted herewith are the results of laboratory testing performed on soil samples obtained by your representative and delivered to our laboratory on August 30, 2001 for testing. Our testing was performed in accordance with current ASTM test methods. The results of our testing are as follows:

BORING NO.	DEPTH (FT.)	AVERAGE PERMEABILITY (cm/sec.)
H-2 S-3	0.0-15	2.09 E-05
H-6 S-9	0.0-45	5.30 E-04
H-6 S-3	0.0-15	3.60 E-05
H-2 S-8	0.0-40	1.40 E-05

These test results relate only to those items tested. This report may be reproduced for the purpose of your investigation and report. The laboratory testing was performed in accordance with the appropriate methodology as-well-as contemporary principals and practice. We make no other warranty, either express or implied.

We hope this information is sufficient for your present needs. If you have any questions, please contact our office.

Respectfully,
INLAND FOUNDATION ENGINEERING, INC.

DONALD O. SWENSON
No. 4254

Donald O. Swenson, P.E.

DOS:jg
Distribution: Addressee (2)

LABORATORY TEST RESULTS

URS CORPORATION

(2002)

TABLE C-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information							Sieve			Atterberg Limits			Lab Compaction		
Boring Number	Sample Number	Depth, feet	Elevation, feet MSL	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	Gravel, %	Sand, %	< #200, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %	Other Tests
B-1	1	2.5-4	17.0	SP			14.3	80.8	4.9						
B-1	2	5-6.5	14.5	SP	1.5										SE=79
B-1	3	10-11.5	9.5	SP-SM	1.8				10.3						
B-2	SK-1	0-5	35.3	SP	0.4		9.8	85.9	4.3				122.0	3.0	
B-2	1	2-3.5	33.5	SP	0.4										
B-2	3	6.5-8	29.0	SP-SM	0.6				6.7						
B-2	5	15-16.5	20.5	SW-SM			12.4	80.9	6.7						
B-3	SK-1	0-5	19.3	SW	0.6		30.7	64.8	4.5						
B-3	1	2.5-4	17.0	SW-SM	0.5				8.7						
B-3	3	10-11.5	9.5	SW-SM	0.6										
B-4	SK-1	0-5	3.3	SW-SM	0.7		8.5	85.1	6.4						
B-4	1	2-3.5	1.5	SW-SM	0.5										
B-4	3	10-11.5	-6.5	SW-SM	0.8										
B-5	SK-1	0-10	13.3	SW	0.4		17.7	77.7	4.6						
B-5	1	2.5-4	11.0	SW	0.3										
B-5	3	7-8.5	6.5	SW-SM	0.5				6.3						
B-6	1	2.5-4	3.0	SW-SM	0.5		4.6	85.4	10.0						
B-6	2	5-6.5	0.5	SW-SM	0.5										SE=75
B-6	5	20-21.5	-14.5	SM					28.7						
B-7	SK-1	0-8	11.3	SP	0.4		10.6	85.9	3.5						
B-7	2	5-6.5	6.5	SP	1.2										
B-7	3	10-11.5	1.5	SP	0.8										
B-7	5	20-21.5	-8.5	SM					31.3						
B-8	1	2.5-4	63.0	SM	0.9										
B-8	3	10-11.5	55.5	SM	0.1										
B-8	4	15-16.5	50.5	SW-SM			19.9	72.1	7.9						
B-8	7	26.5-28	39.0	SW-SM					9.8						
B-9	1	2.5-4	82.0	SP-SM	0.5				5.8						
B-9	3	6.5-8	78.0	SM	1.0				12.5						
B-9	4	10-11.5	74.5	SM											SE=69
B-9	6	16.5-18	68.0	SM	0.9										
B-9	7	20-21.5	64.5	SP-SM					7.0						
B-10	SK-1	0-7	49.3	SW-SM	0.5		15.3	78.2	6.4						

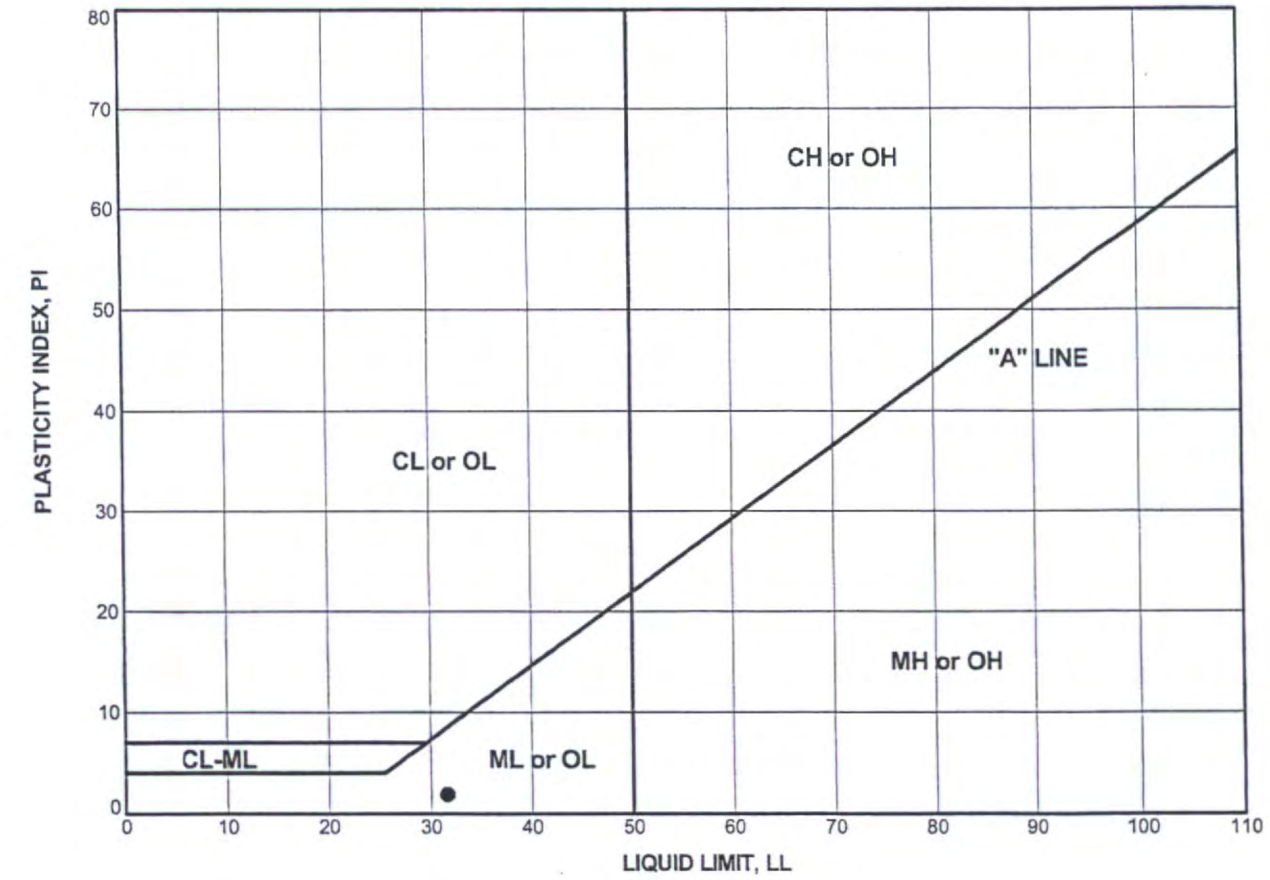
Report SOIL_1_PORTRAIT_GVILL; DIKE4COA.GPJ; 01/10/2003

TABLE C-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information							Sieve			Atterberg Limits			Lab Compaction		
Boring Number	Sample Number	Depth, feet	Elevation, feet MSL	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	Gravel, %	Sand, %	< #200, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %	Other Tests
B-10	1	2.5-4	47.0	SW-SM	0.4										
B-10	3	10-11.5	39.5	SW-SM	0.9										
B-10	7	21.5-23	28.0	SW-SM	0.7				9.3						
B-11	SK-1	0-10	7.3	SP	0.8		9.6	85.7	4.6						
B-11	1	2.5-4	5.0	SP	0.7										
B-11	3	6.5-8	1.0	SP	0.7										
B-11	6	20-21.5	-12.5	SP-SM	0.5										
B-11	8	26.5-28	-19.0	SP-SM					11.4						
B-12	SK-1	0-7	12.3	SW	0.5		11.8	84.4	3.8						
B-12	1	2.5-4	10.0	SW	0.5										
B-12	2	5-6.5	7.5	SW	0.4										
B-12	3	10-11.5	2.5	SW											SE=69
B-12	4	15-16.5	-2.5	SM					18.0						
B-12	5	20-21.5	-7.5	SM	1.0										
TP-1	SK-1	0-4	4.2	SP-SM	0.8		11.3	82.4	6.3						
TP-1	PB-3	12-13	-6.2	ML	2.8				71.1	32	30	2			
TP-1	SK-2	12-15	-7.3	SW-SM	0.9		9.4	80.1	10.5						
TP-2	SK-1	0-5	20.7	SW-SM	0.7		6.8	86.3	6.9				125.0	4.0	
TP-2	SK-2	10-15	10.7	SW	0.8		11.4	84.0	4.6						
TP-3	SK-1	0-5	44.7	SP	0.5		14.2	83.0	2.8				121.5	3.5	
TP-3	SK-2	10-14	35.2	SW-SM	1.2		12.4	80.3	7.3						
TP-4	SK-1	0-5	61.7	SP	0.4		11.1	85.8	3.1						
TP-5	SK-1	5-10	27.7	SP	0.7		17.4	78.5	4.1						
TP-6	SK-1	0-6	15.2	SP-SM	0.8		14.3	80.2	5.4				123.0	4.5	
TP-7	SK-1	0-5	7.7	SP	0.7		11.3	84.3	4.5						
TP-8	SK-1	0-10	11.2	SP	0.8		18.3	78.4	3.3						

NOTE: The laboratory tests were performed in general accordance with the following standards:

Water Content - ASTM Test Method D2216
Dry Unit Weight - ASTM Test Method D2937
Particle Size Distribution Analysis by Mechanical Sieving - ASTM Test Method D422
Atterberg Limits - ASTM Test Method D4318
Laboratory Compaction by Modified Effort - ASTM Test Method D1557
Sand Equivalent [SE] - ASTM Test Method D2419

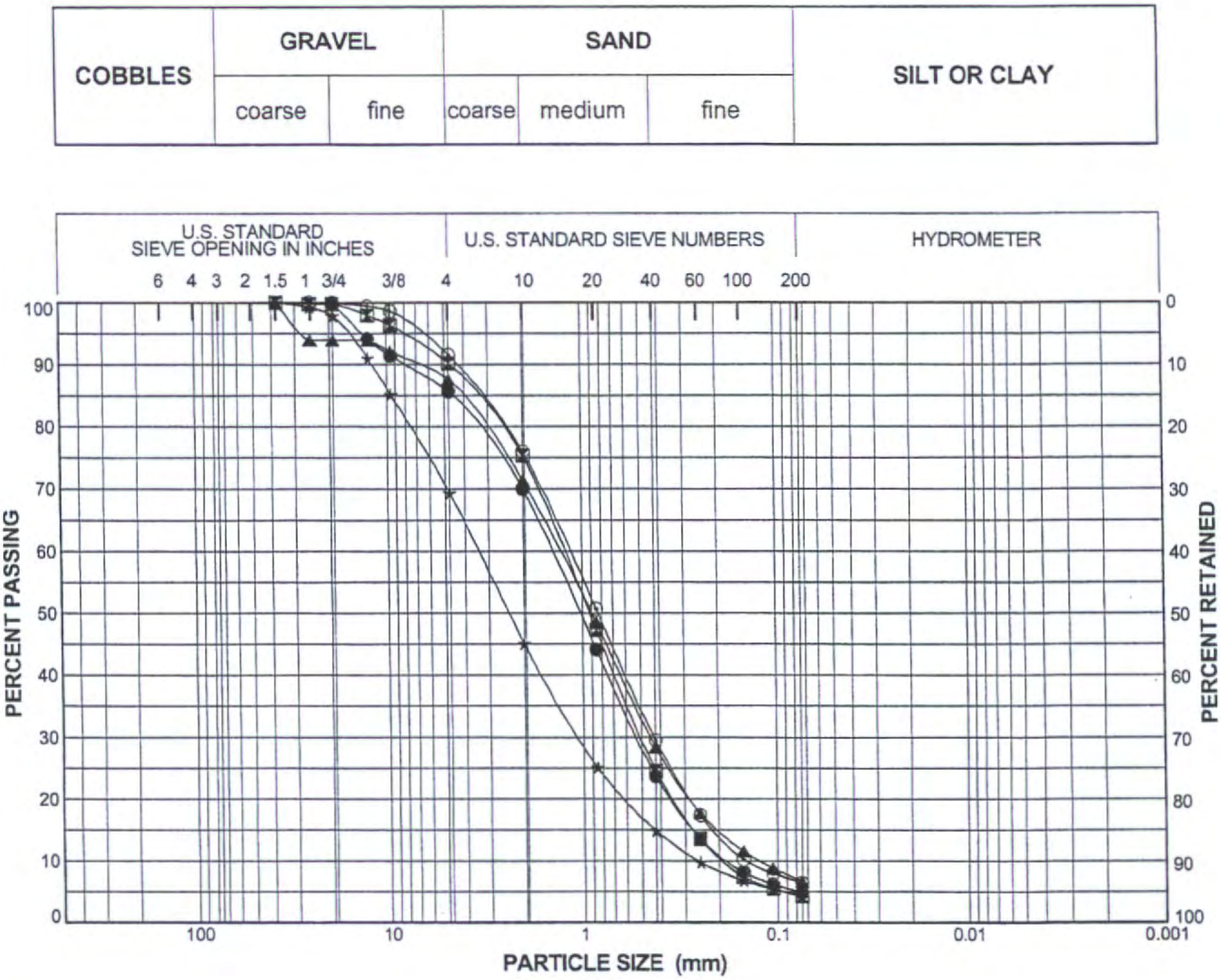


Boring Number	Sample Number	Depth (feet)	Test Symbol	Water Content (%)	LL	PL	PI	Classification
TP-1	PB-3	12-13	●	3	32	30	2	Silt with Sand (ML)

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PLASTICITY CHART

Figure C-1



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-1	1	2.5-4	●			Poorly Graded Sand (SP)
B-2	SK-1	0-5	⧗			Poorly Graded Sand (SP)
B-2	5	15-16.5	▲			Well-Graded Sand with Silt (SW-SM)
B-3	SK-1	0-5	★			Well-Graded Sand with Gravel (SW)
B-4	SK-1	0-5	⊙			Well-Graded Sand with Silt (SW-SM)

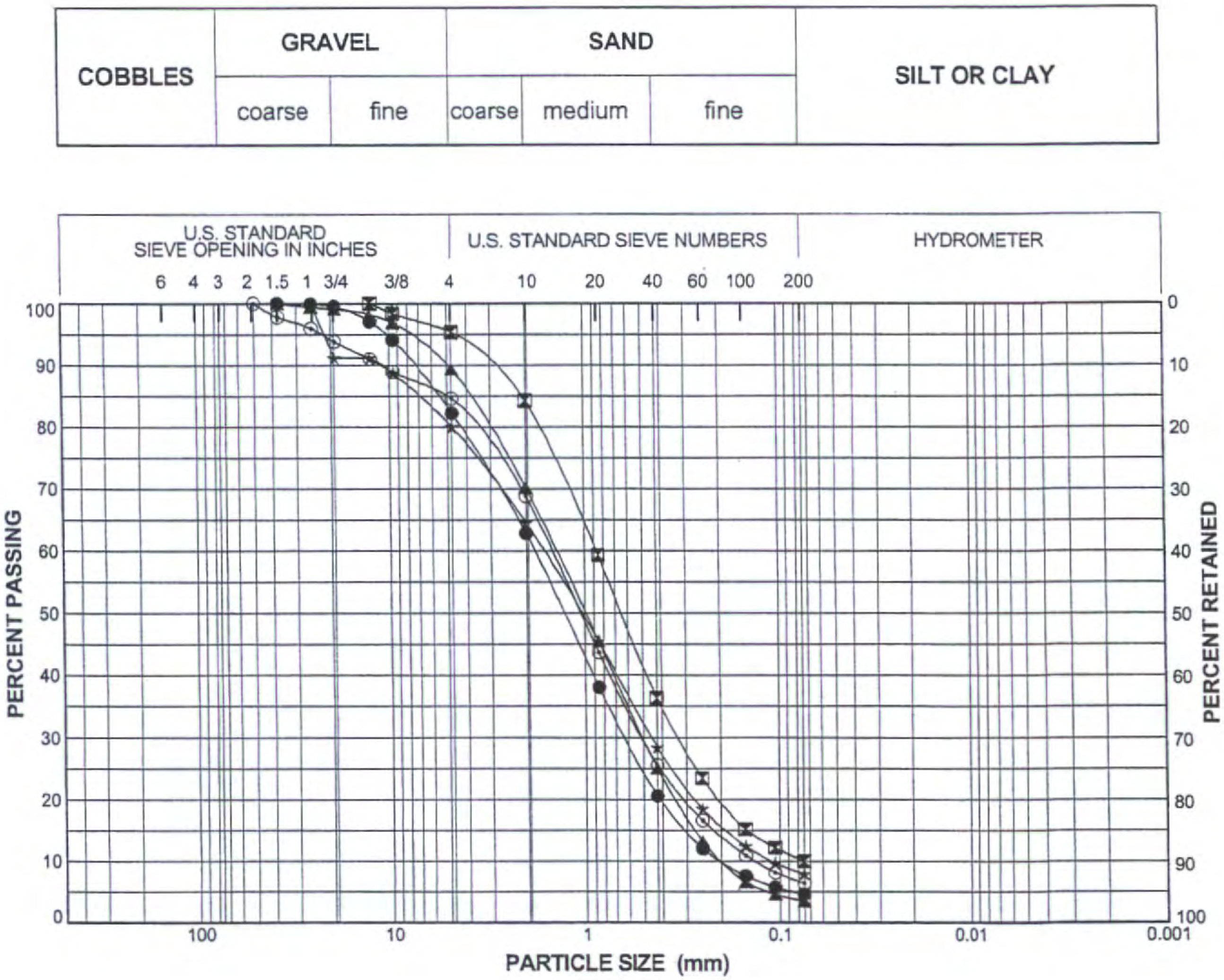
Report: SIEVE_5_CURVES_SNA; File: DIKE4COA.GPJ; 1/7/2003 B-04

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

URS

Figure C-2



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-5	SK-1	0-10	●			Well-Graded Sand with Gravel (SW)
B-6	1	2.5-4	⧗			Well-Graded Sand with Silt (SW-SM)
B-7	SK-1	0-8	▲			Poorly Graded Sand (SP)
B-8	4	15-16.5	★			Well-Graded Sand with Silt and Gravel (SW-SM)
B-10	SK-1	0-7	⊙			Well-Graded Sand with Silt and Gravel (SW-SM)

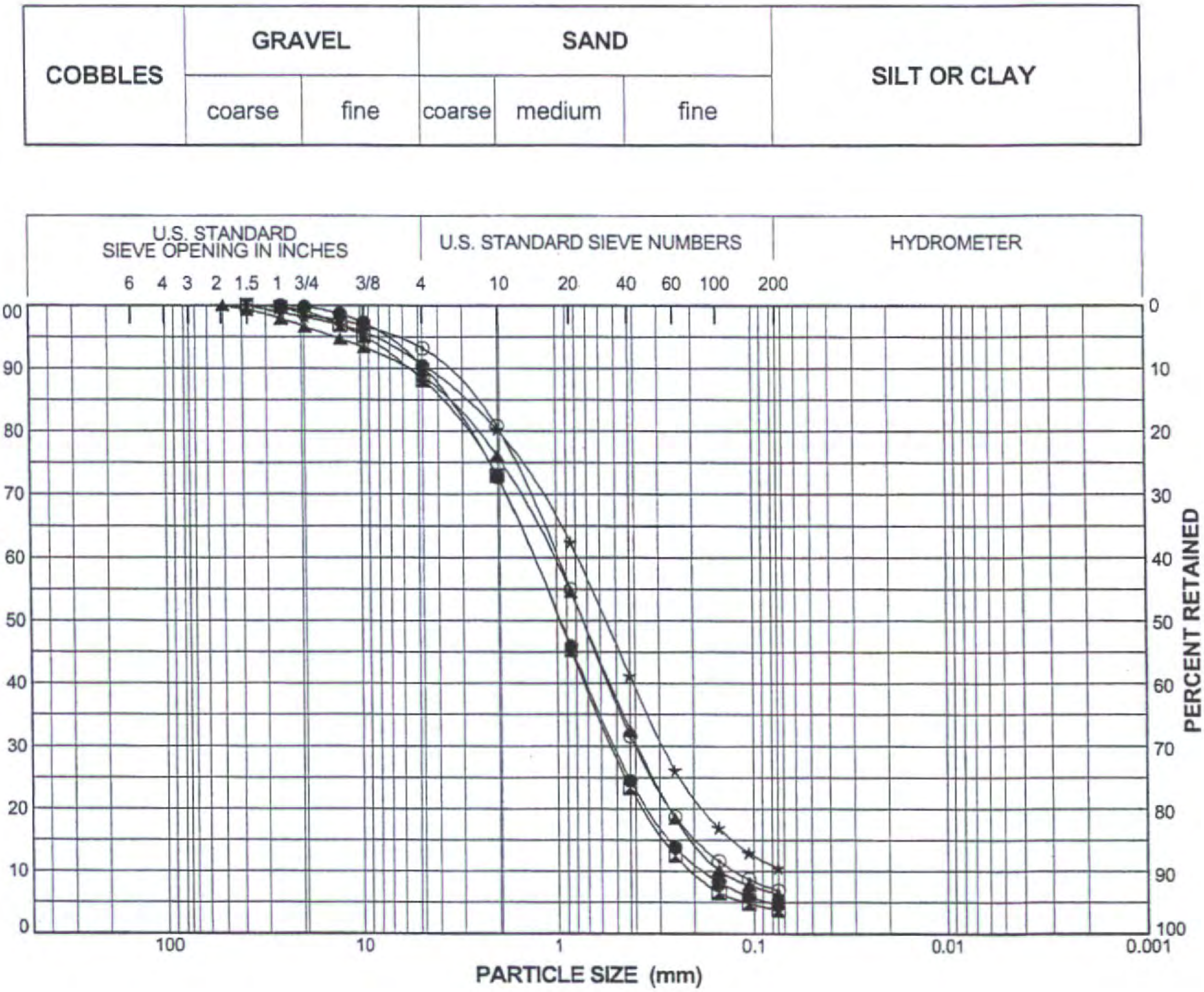
Report: SIEVE_5_CURVES_SNA; File: DIKE4COA.GPJ; 1/7/2003 B-10

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

Figure C-3

URS



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
B-11	SK-1	0-10	●			Poorly Graded Sand (SP)
B-12	SK-1	0-7	⧗			Well-Graded Sand (SW)
TP-1	SK-1	0-4	▲			Poorly Graded Sand with Silt (SP-SM)
TP-1	SK-2	12-15	★			Well-Graded Sand with Silt (SW-SM)
TP-2	SK-1	0-5	⊙			Well-Graded Sand with Silt (SW-SM)

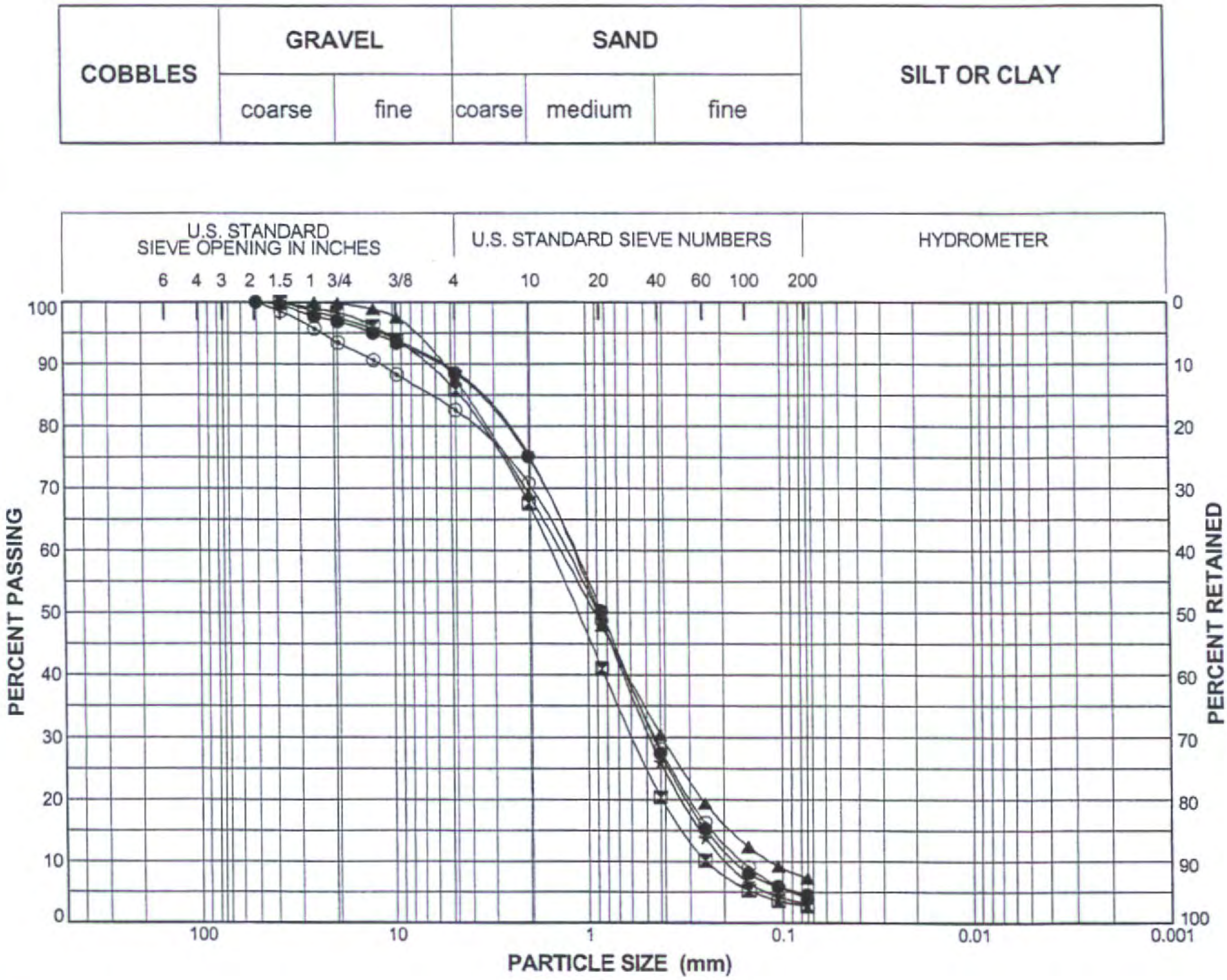
Report: SIEVE_5_CURVES_SNA; File: DIKE4COA.GPJ; 1/7/2003 TP-02

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

URS

Figure C-4

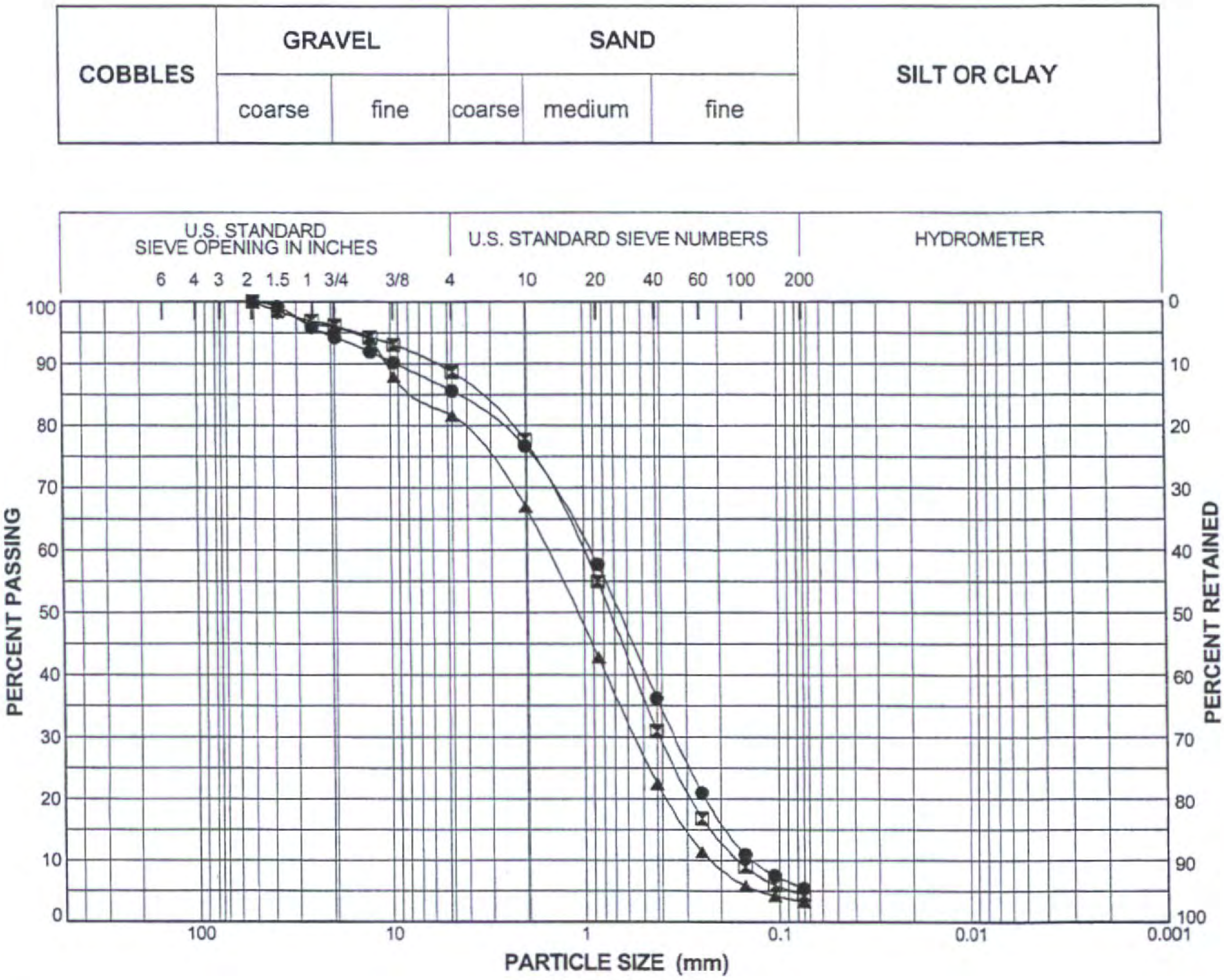


Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
TP-2	SK-2	10-15	●			Well-Graded Sand (SW)
TP-3	SK-1	0-5	⧗			Poorly Graded Sand (SP)
TP-3	SK-2	10-14	▲			Well-Graded Sand with Silt (SW-SM)
TP-4	SK-1	0-5	★			Poorly Graded Sand (SP)
TP-5	SK-1	5-10	⊙			Poorly Graded Sand with Gravel (SP)

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

Figure C-5



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
TP-6	SK-1	0-6	●			Poorly Graded Sand with Silt (SP-SM)
TP-7	SK-1	0-5	⧗			Poorly Graded Sand (SP)
TP-8	SK-1	0-10	▲			Poorly Graded Sand with Gravel (SP)

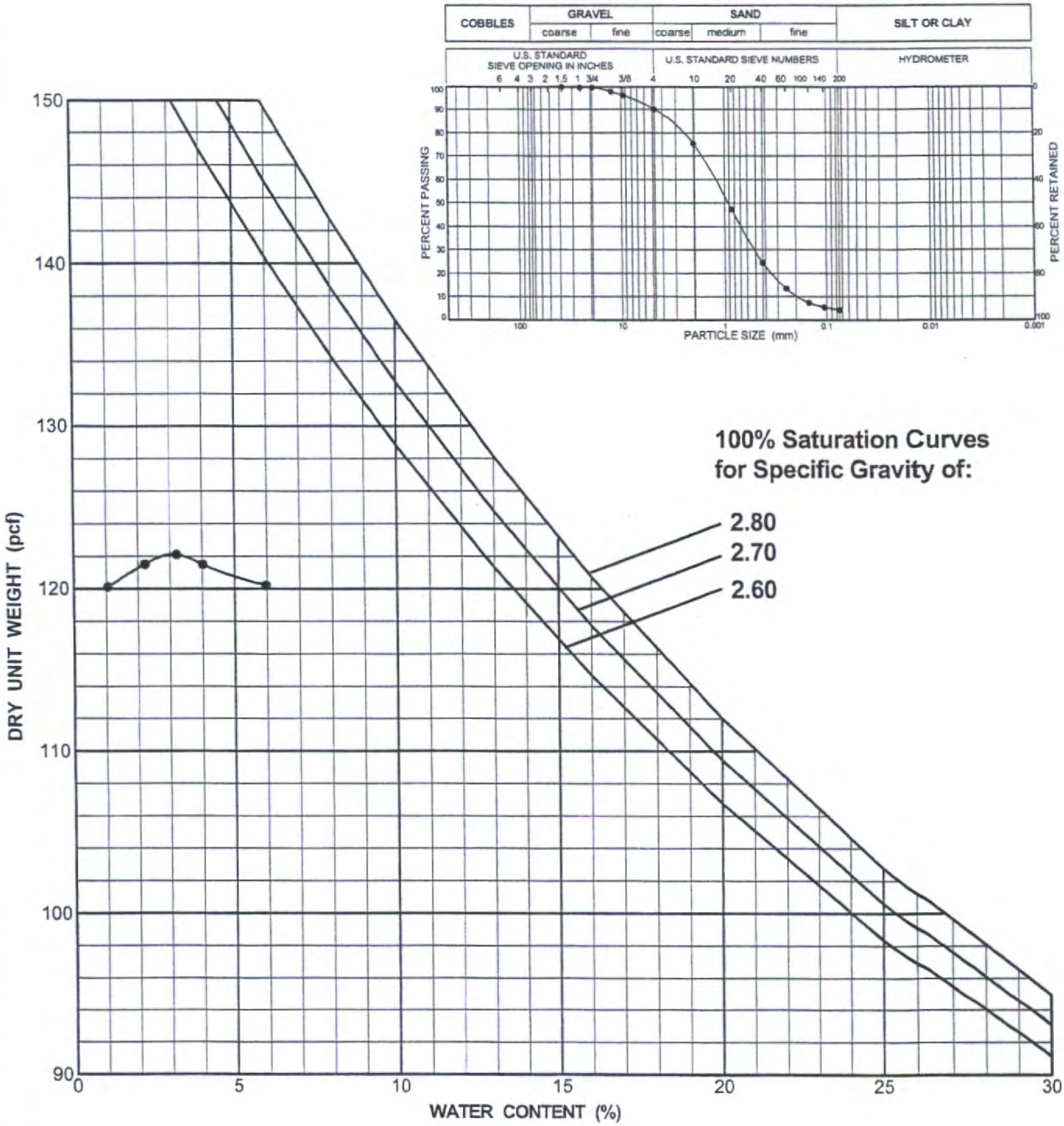
Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

PARTICLE SIZE DISTRIBUTION CURVES

Figure C-6

URS

B-02 0.70 B-02 0.70



Boring Number **Sample Number**	**B-2** **SK-1 at 0-5 ft**		**Maximum Dry Unit Weight**	122.0 pcf	
Test Method	ASTM D1557B		**Optimum Water Content**	3.0 %	
Description	Poorly Graded Sand (SP)				
Liquid Limit		**Plasticity Index**		**Specific Gravity**	

Report: COMPACTION_SPLINE_FIT; File: DIKE4COA.GPJ; 1/9/2003 B-02

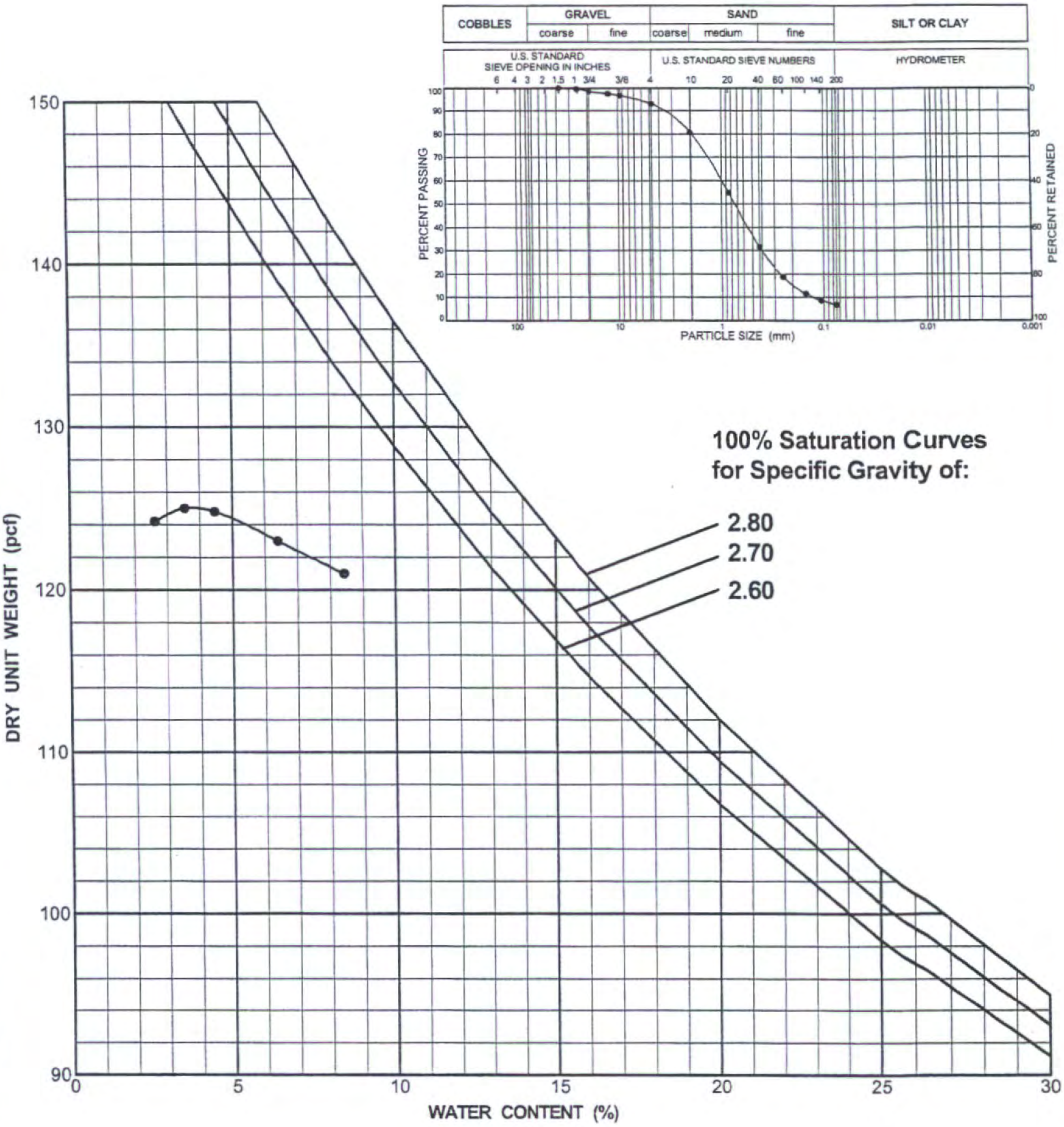
Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

COMPACTION TEST

URS

Figure C-7

TP-02 2.30 TP-02 2.30



Boring Number **Sample Number**	**TP-2** **SK-1 at 0-5 ft**	**Maximum Dry Unit Weight**	125.0 pcf
Test Method	ASTM D1557B	**Optimum Water Content**	4.0 %
Description	Well-Graded Sand with Silt (SW-SM)		
Liquid Limit	**Plasticity Index**	**Specific Gravity**	

Report: COMPACTION_SPLINE_FIT; File: DIKE4COA.GPJ; 1/9/2003 TP-02

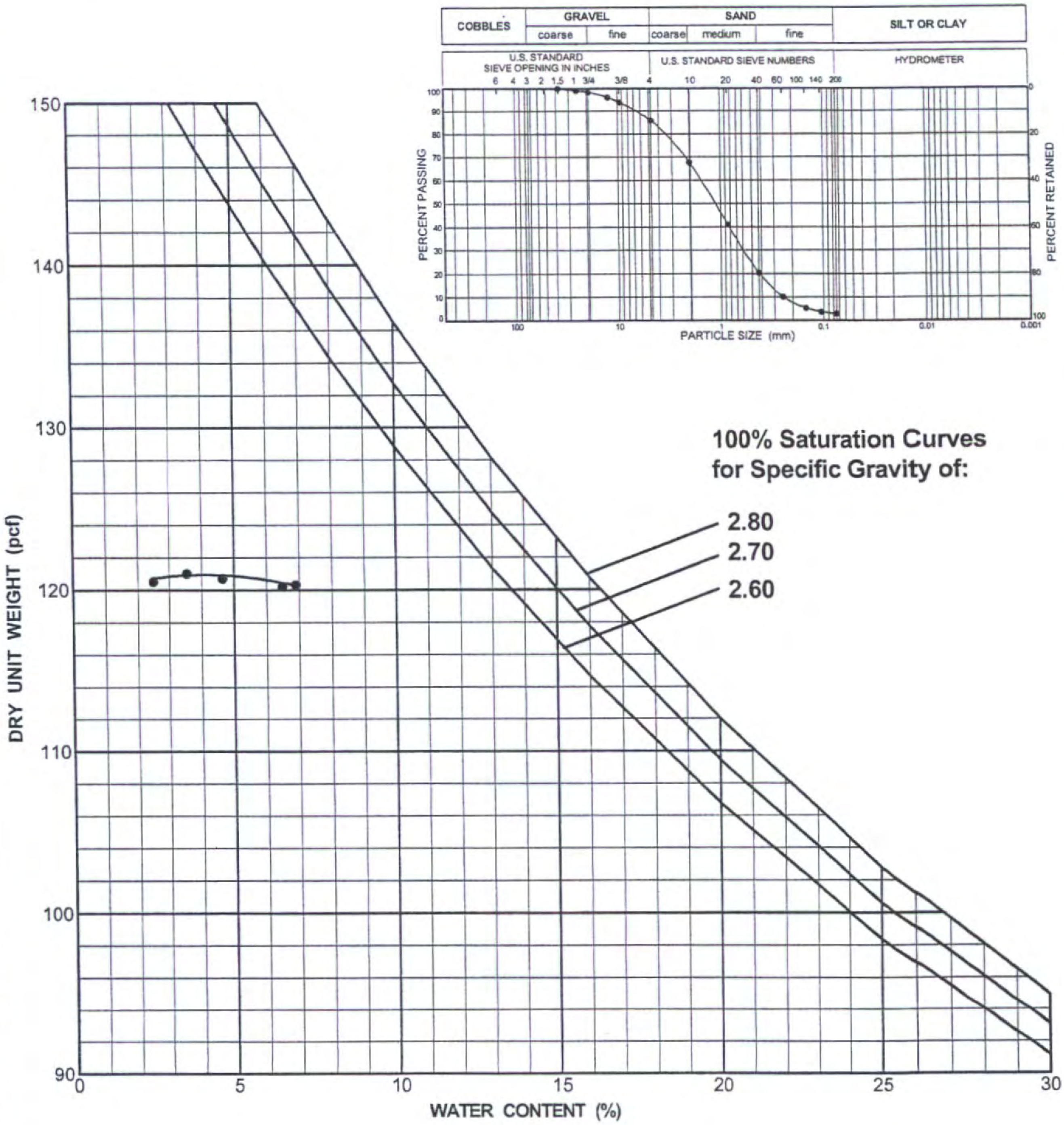
Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

COMPACTION TEST

URS

Figure C-8

TP-03 2.30 TP-03 2.30



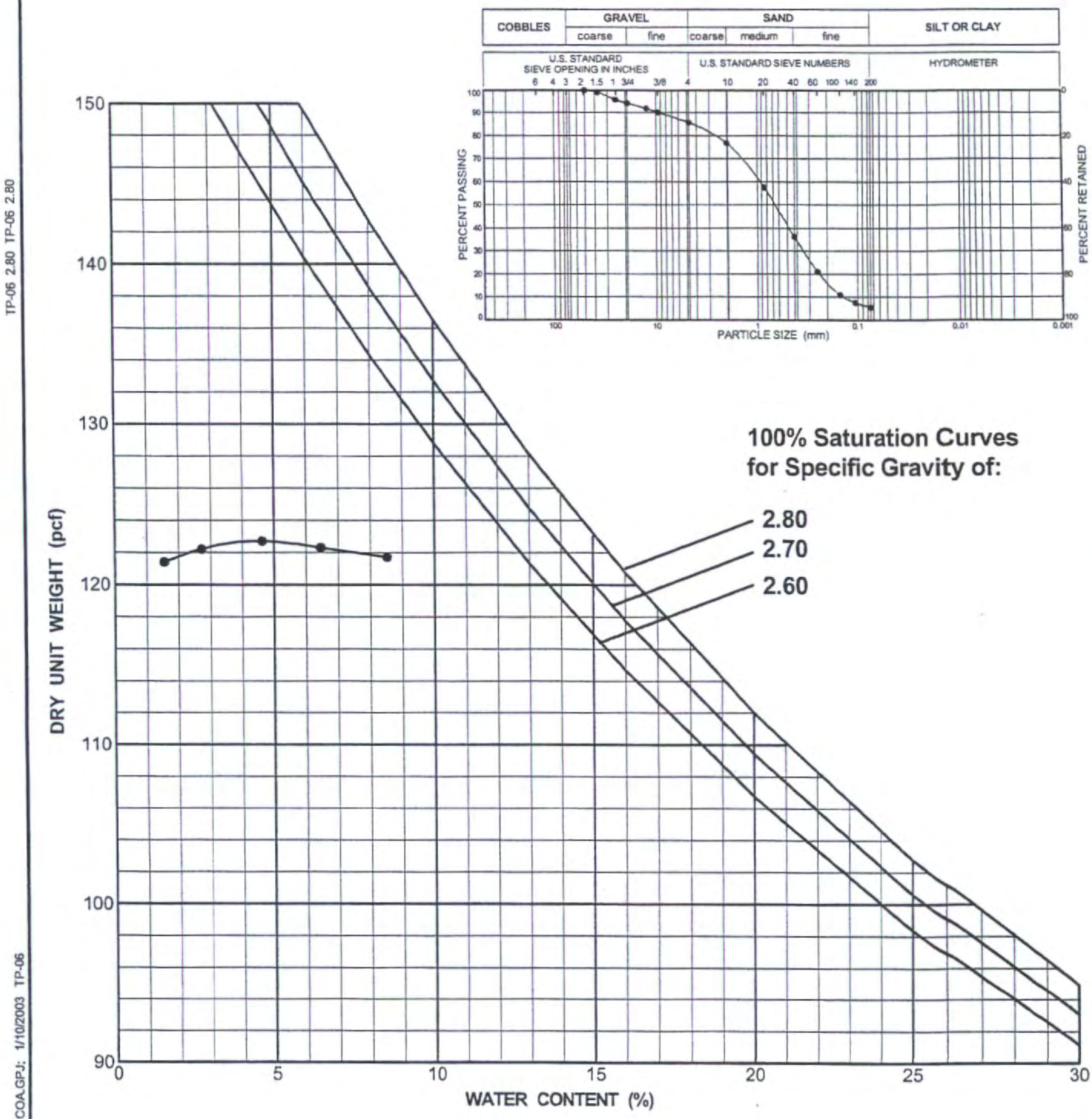
Boring Number **Sample Number**	**TP-3** **SK-1 at 0-5 ft**		**Maximum Dry Unit Weight**	121.5 pcf	
Test Method	ASTM D1557B		**Optimum Water Content**	3.5 %	
Description	Poorly Graded Sand (SP)				
Liquid Limit		**Plasticity Index**		**Specific Gravity**	

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

COMPACTION TEST

Figure C-9

Report: COMPACTION_PARABOLA; File: DIKE4COA.GPJ; 1/9/2003 TP-03



Boring Number	**TP-6**	**Maximum Dry Unit Weight**	123.0 pcf
Sample Number	**SK-1 at 0-6 ft**		
Test Method	ASTM D1557B	**Optimum Water Content**	4.5 %
Description	Poorly Graded Sand with Silt (SP-SM)		
Liquid Limit	**Plasticity Index**	**Specific Gravity**	

Dike No. 4 Recharge Facility
Coachella, California
29864604.00001

COMPACTION TEST

URS

Figure C-10

LABORATORY TEST RESULTS

BY SLADDEN (2005a)

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soils underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of this testing are presented graphically in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil. This is shown on the Boring Log, and is useful in estimating the strength and compressibility of the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses and Atterberg Limits determinations. These provide information for developing classifications for the soil in accordance with the Unified Classification System. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing are very useful in detecting variations in the soils and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Direct Shear Testing: One bulk sample was selected for Direct Shear Testing. This testing measures the shear strength of the soil under various normal pressures and is used in developing parameters for foundation design and lateral design. Testing was performed using recompacted test specimens, which were saturated prior to testing. Testing was performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Expansion Testing: One bulk sample was selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Consolidation Testing: Four relatively undisturbed samples were selected for consolidation testing. For this testing one-inch thick test specimens are subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. The specimens were saturated at the 575 psf or 720 psf load increment.

Gradation

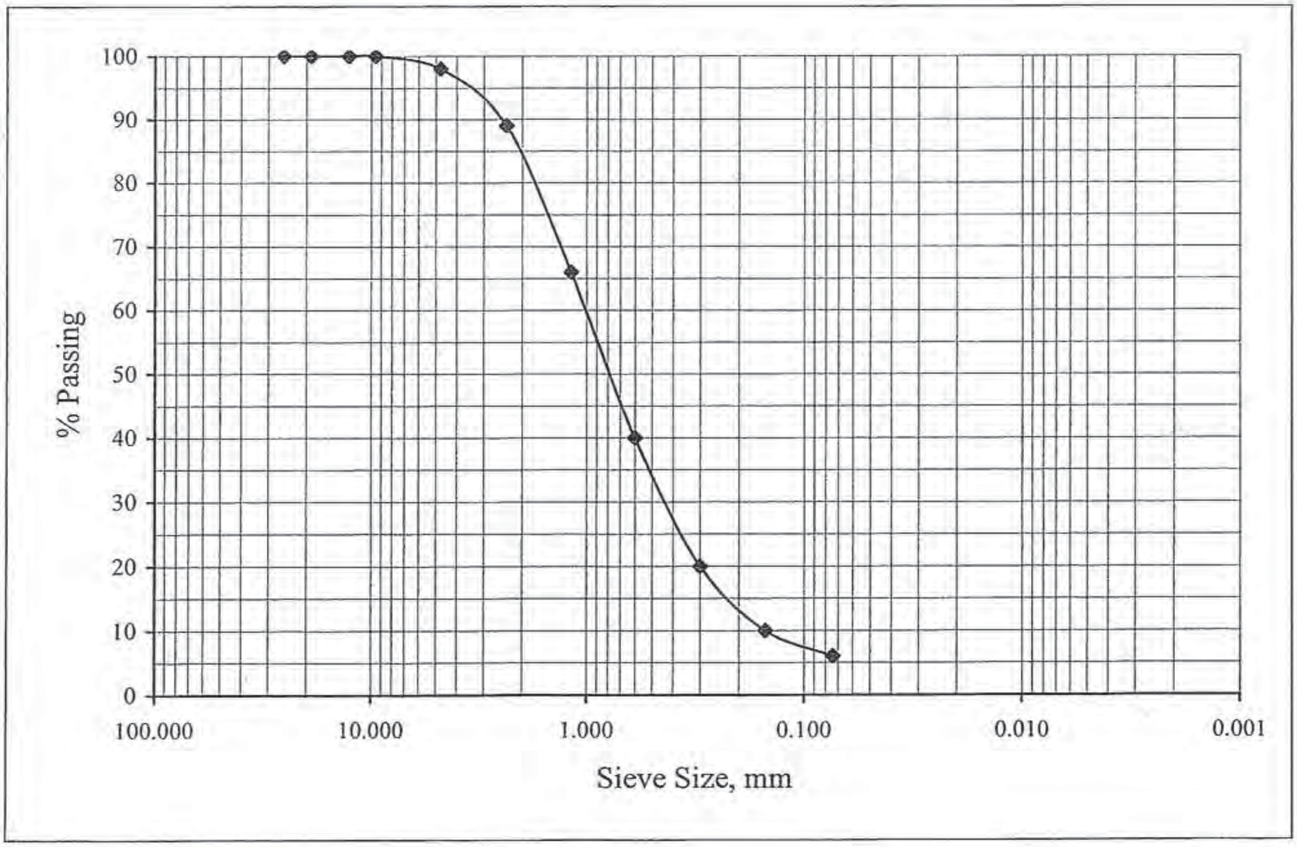
ASTM C117 & C136

Project Number: 544-4769
Project Name: S.W.C. 38th & Jefferson, La Quinta

December 22, 2004

Sample ID: Bulk 8 @ 0-5'

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.0
#8	2.36	89.0
#16	1.18	66.0
#30	0.60	40.0
#50	0.30	20.0
#100	0.15	10.0
#200	0.074	6.0



Gradation

ASTM C117 & C136

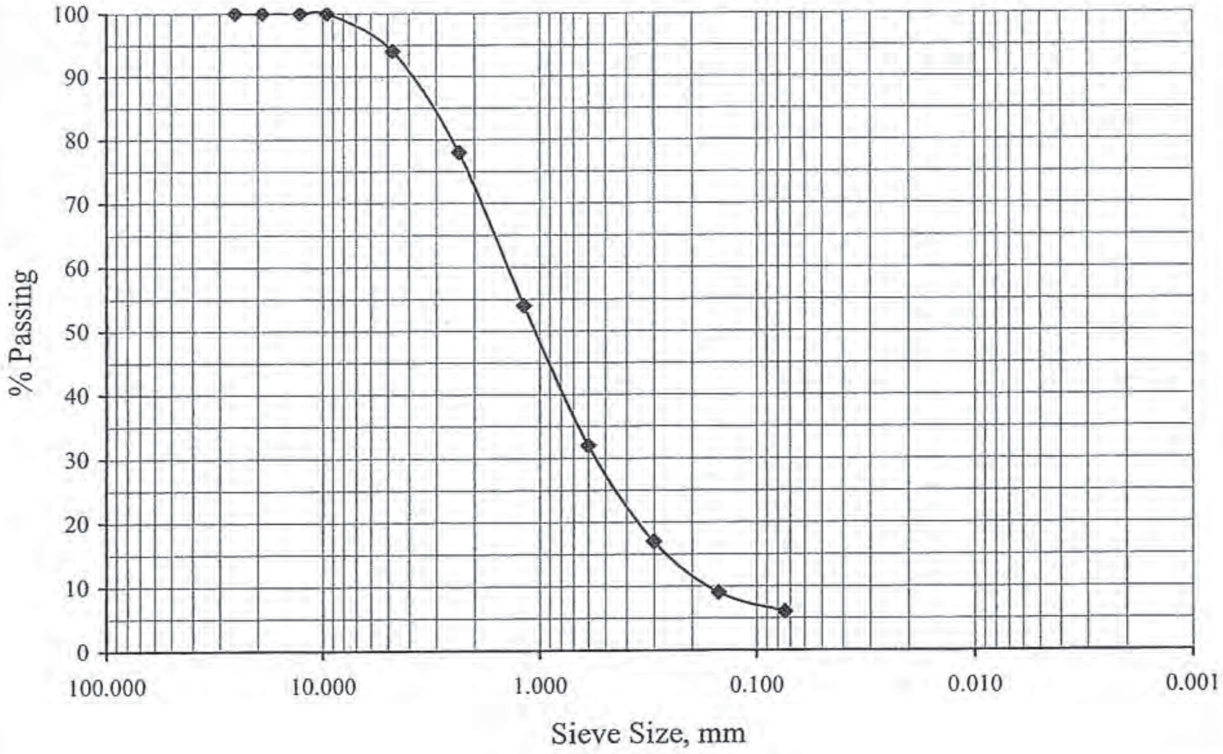
Project Number: 544-4769

Project Name: S.W.C. 38th & Jefferson, La Quinta

December 22, 2004

Sample ID: Boring 8 @ 5'

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	94.0
#8	2.36	78.0
#16	1.18	54.0
#30	0.60	32.0
#50	0.30	17.0
#100	0.15	9.0
#200	0.074	6.0



Gradation

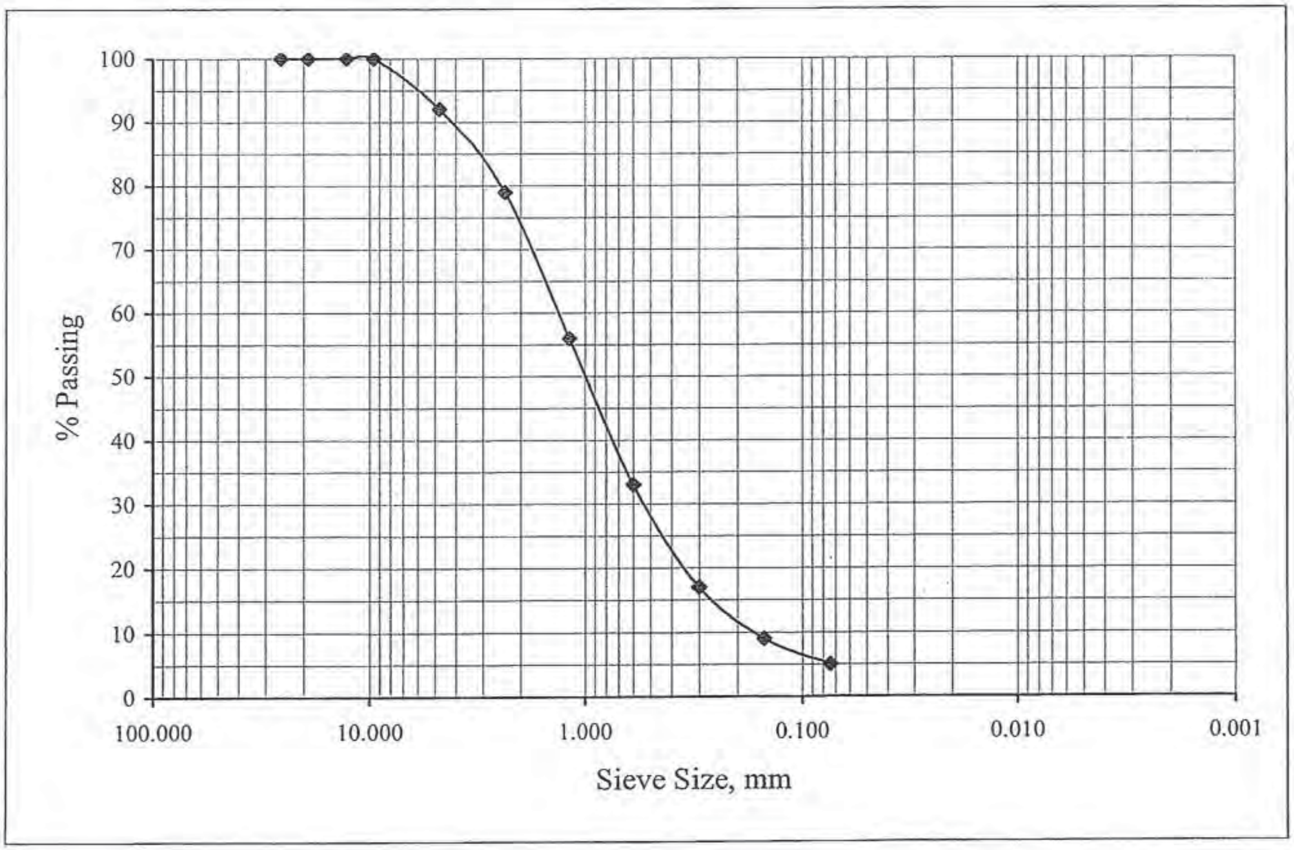
ASTM C117 & C136

Project Number: 544-4769
Project Name: S.W.C. 38th & Jefferson, La Quinta

December 22, 2004

Sample ID: Boring 8 @ 10'

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	92.0
#8	2.36	79.0
#16	1.18	56.0
#30	0.60	33.0
#50	0.30	17.0
#100	0.15	9.0
#200	0.074	5.0



Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number: 544-4769

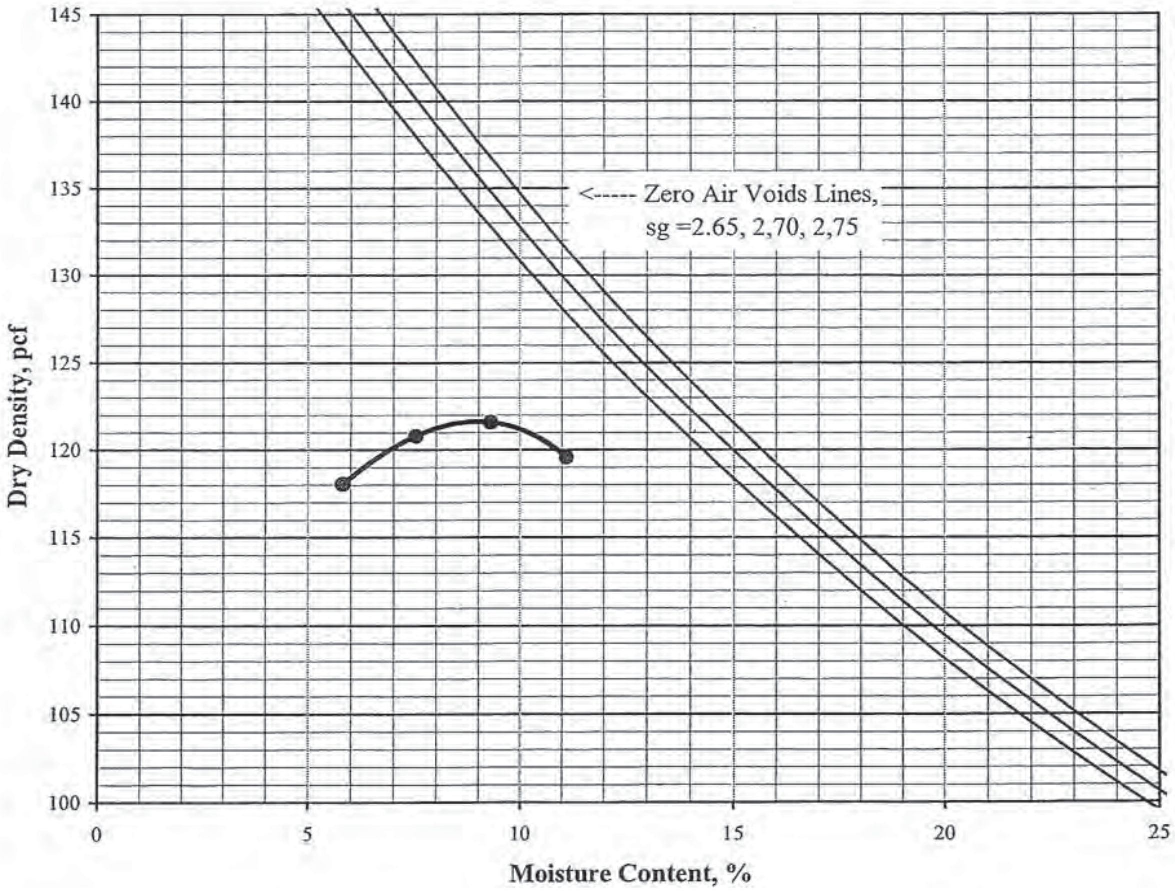
December 22, 2004

Project Name: S.W.C. 38th & Jefferson, La Quinta
Lab ID Number:
Sample Location: Bulk 8 @ 0-5'
Description: Sand with Gravel

ASTM D-1557 A
Rammer Type: Manual

Maximum Density: **122 pcf**
Optimum Moisture: **9.5%**

Sieve Size	% Retained
3/4"	
3/8"	
#4	0.0



Expansion Index

ASTM D 4829/UBC 29-2

Job Number: 544-4769

Date: 12/22/2004

Job Name: S.W.C. 38th & Jefferson, La Quin

Tech: Jake

Lab ID:

Sample ID: Bulk 8 @ 0-5'

Soil Description: Sand with Gravel

Wt of Soil + Ring:	595.0
Weight of Ring:	179.0
Wt of Wet Soil:	416.0
Percent Moisture:	8%

Wet Density, pcf:	126.0
Dry Denstiy, pcf:	116.7

% Saturation:	48.7

Expansion **Rack #**

Date/Time	12/24/2004	10:30 AM
Initial Reading	0.500	
Final Reading	0.500	

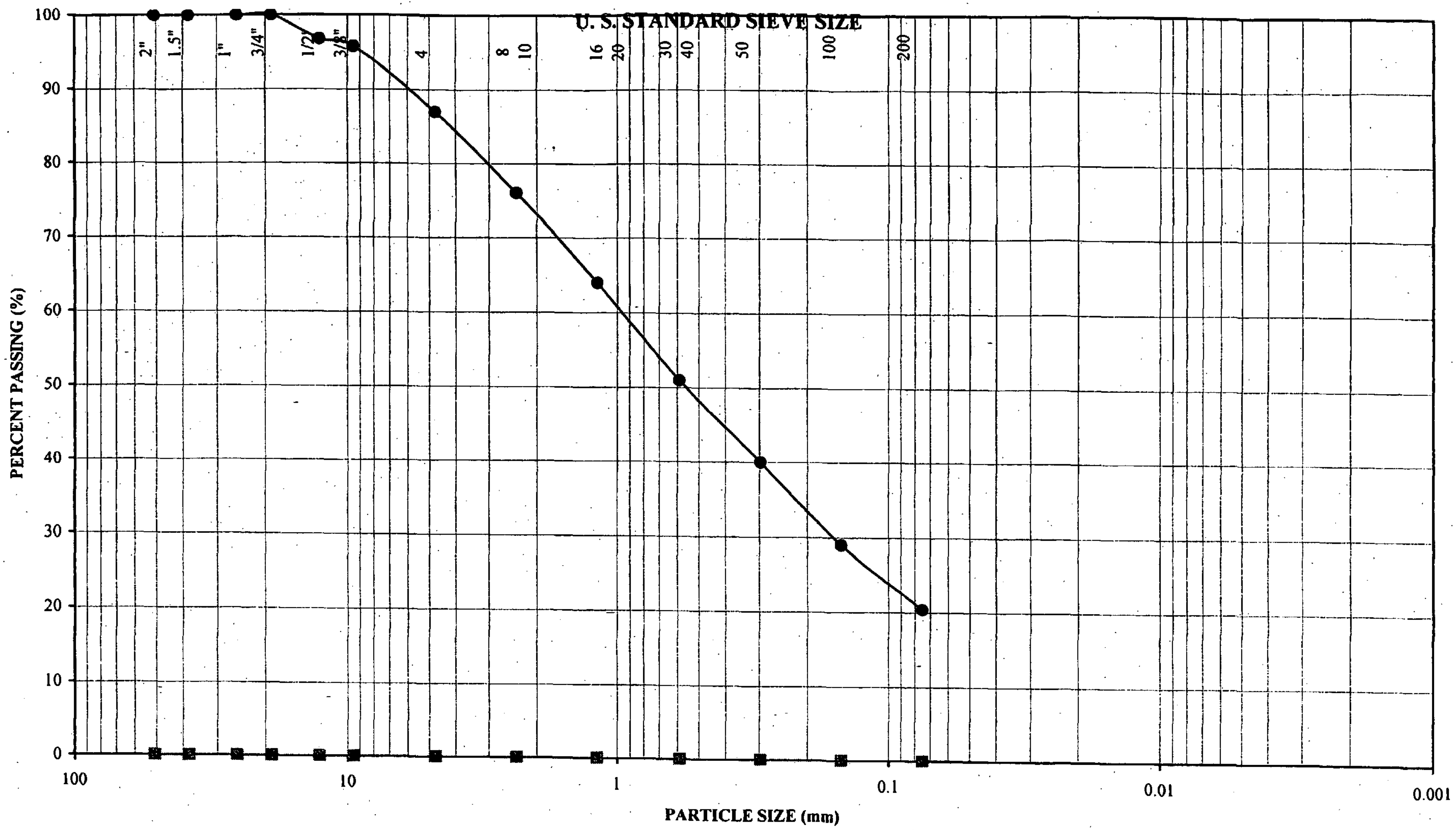
Expansion Index **0**

(Final - Initial) x 1000

LABORATORY TEST RESULTS

CONSTRUCTION TESTING & ENGINEERING, INC.

(2007)

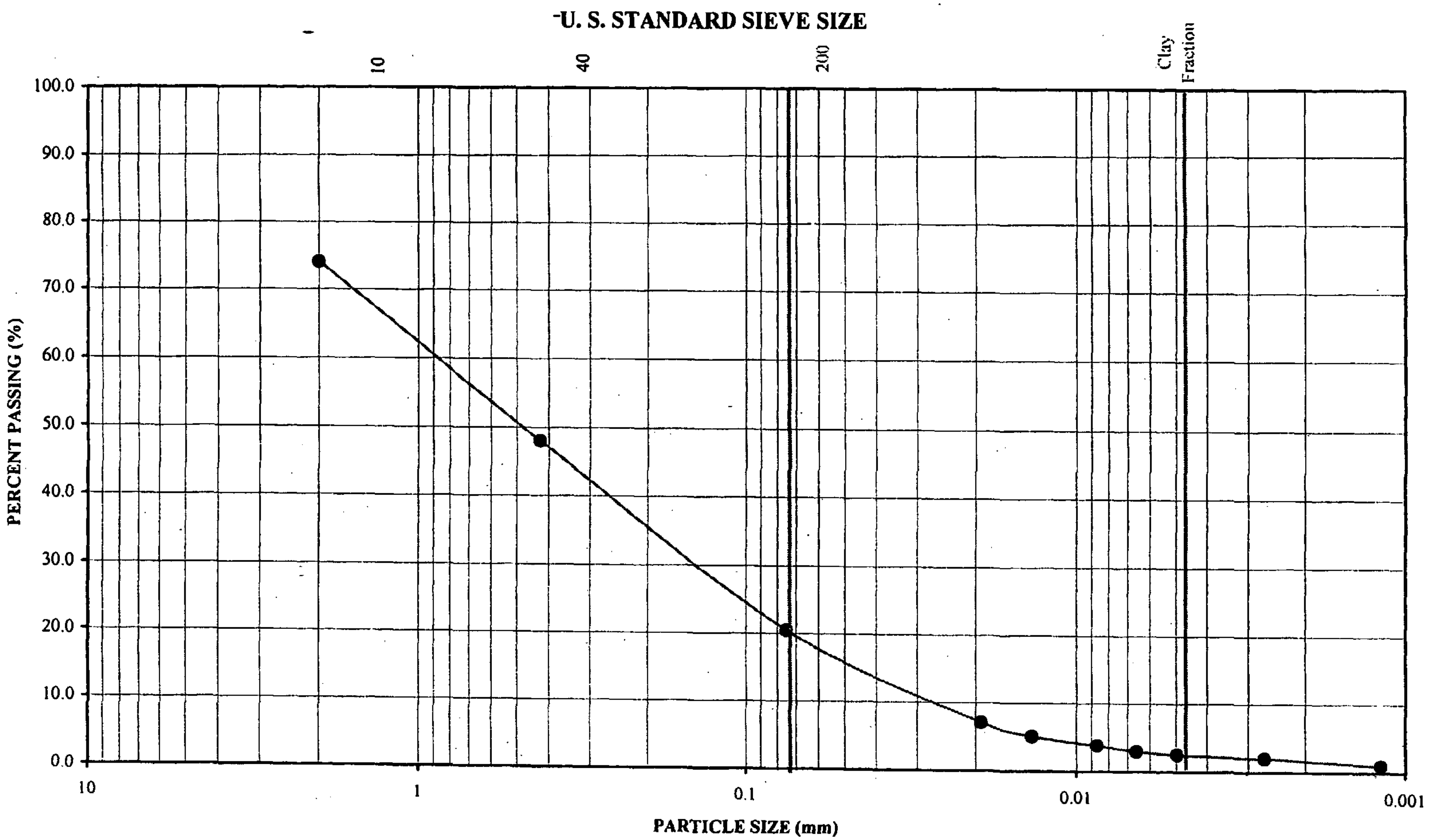


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	0-6 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

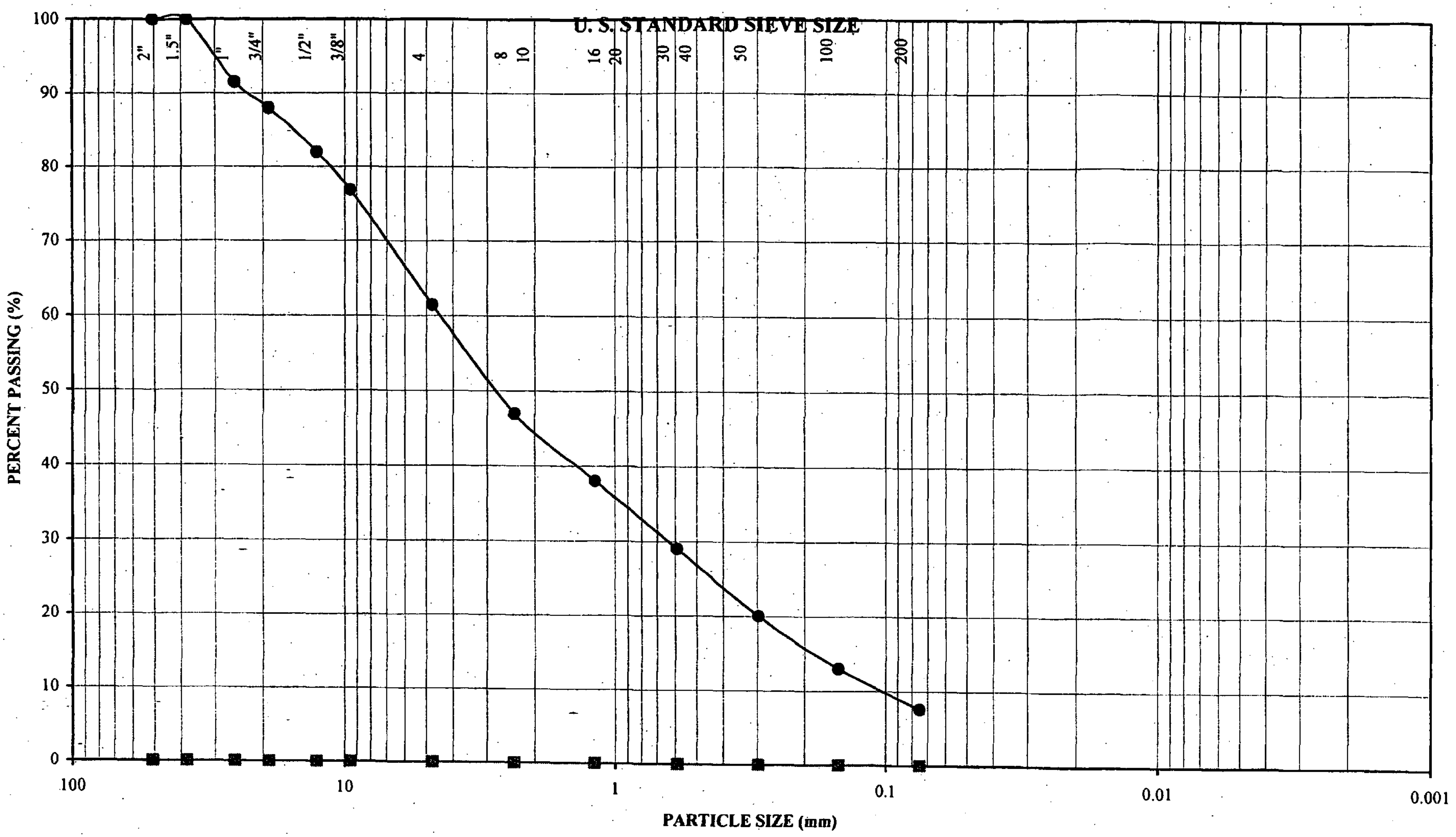


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
[illegible]

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-1	0-6 inches			SM

CTE JOB NUMBER: 40-2251

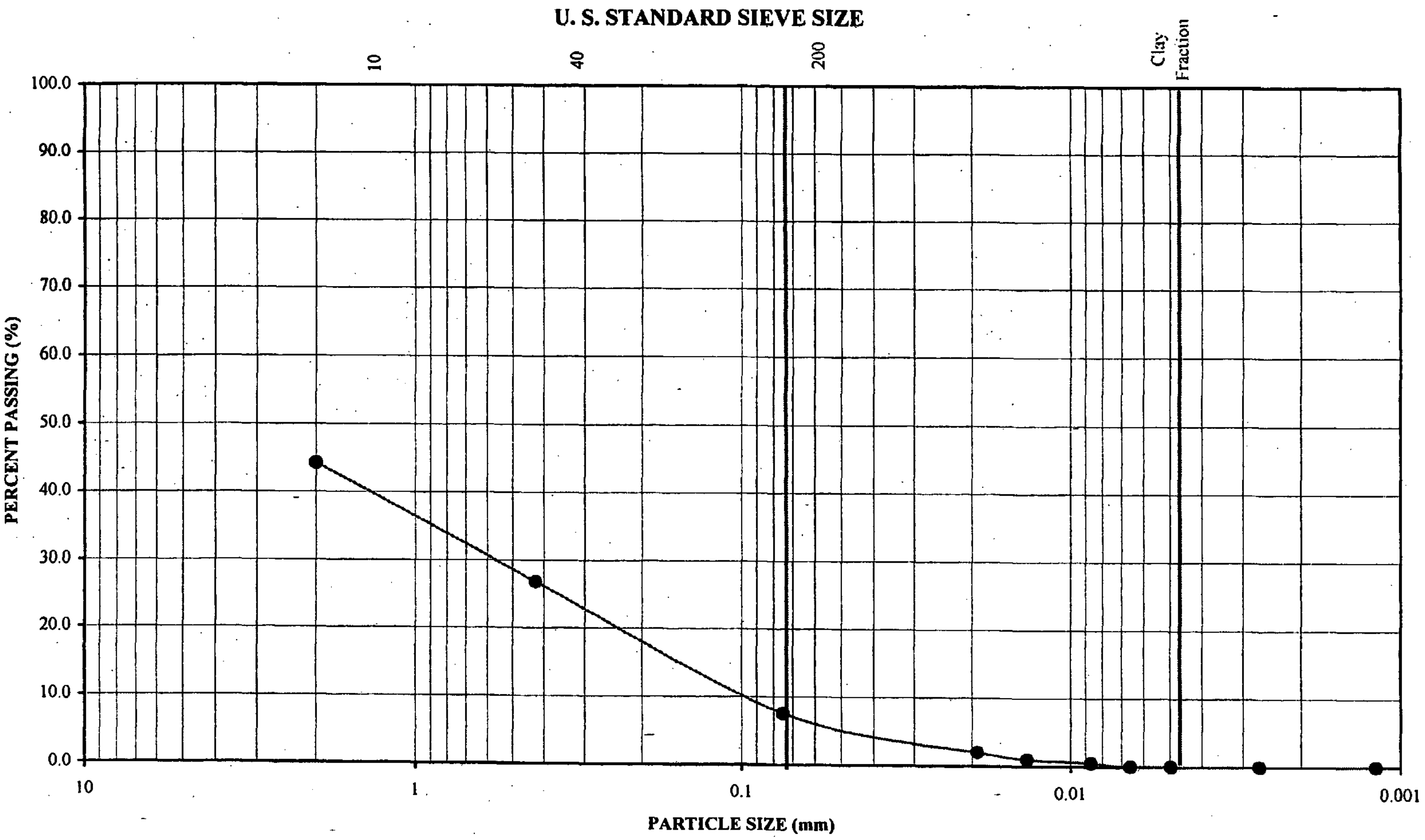


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	36-42 inches	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251

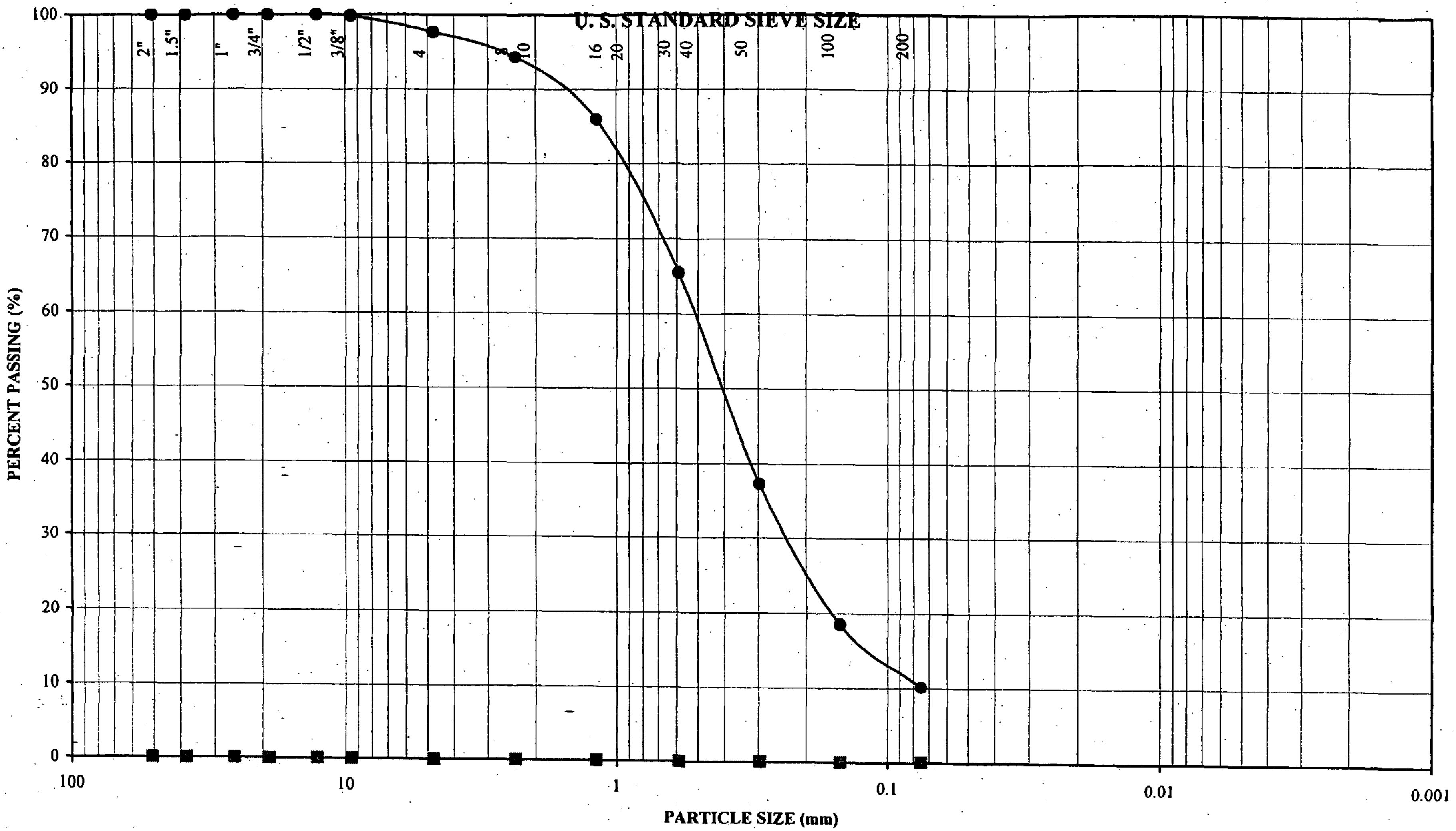


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
[illegible] Meridian Parkway, Suite A | Riverside, CA [illegible] | [illegible] | Fax [illegible]

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-1	36-42 inches			SP-SM

CTE JOB NUMBER: 40-2251

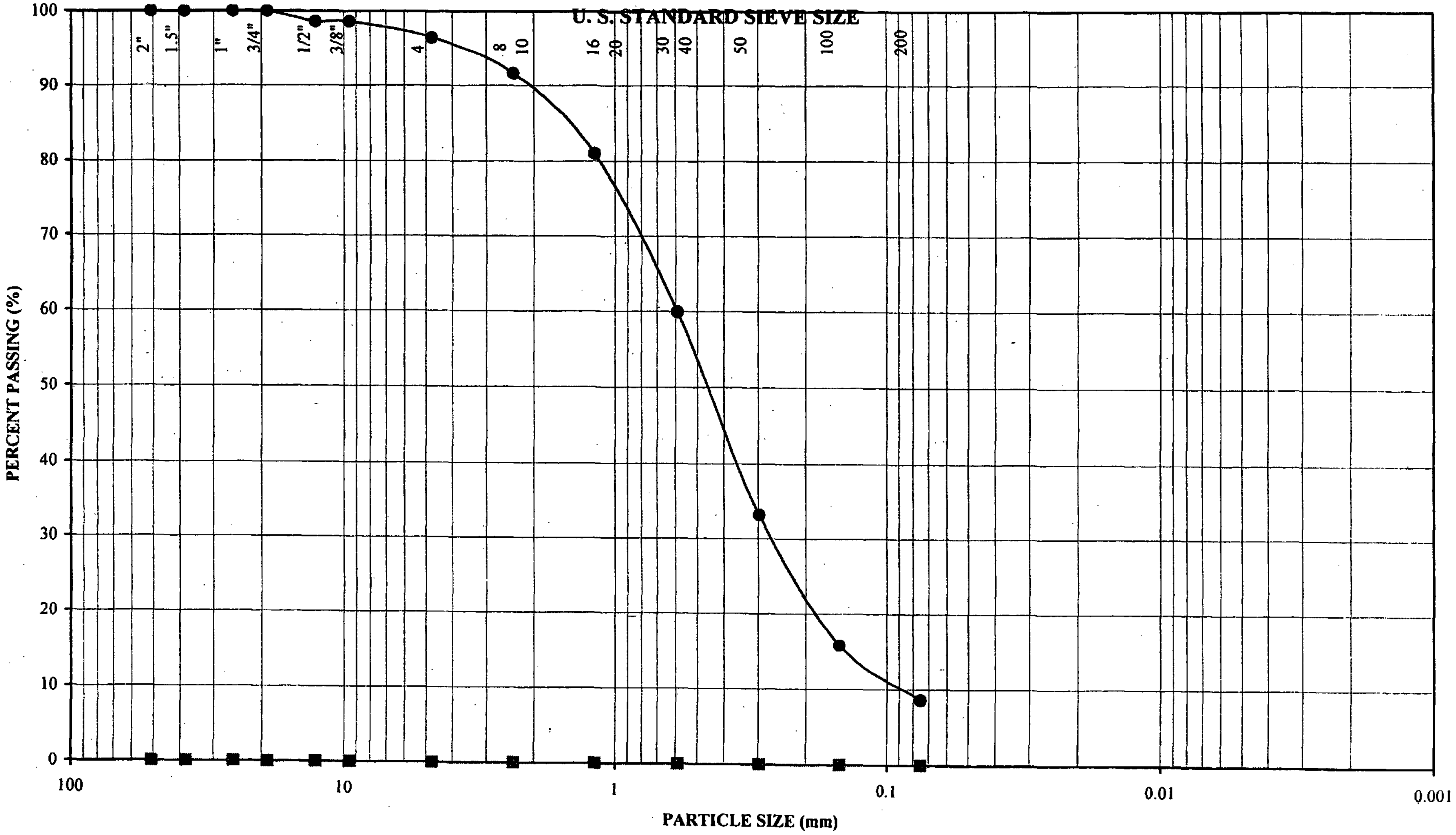


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14530 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-2	0-12"	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251



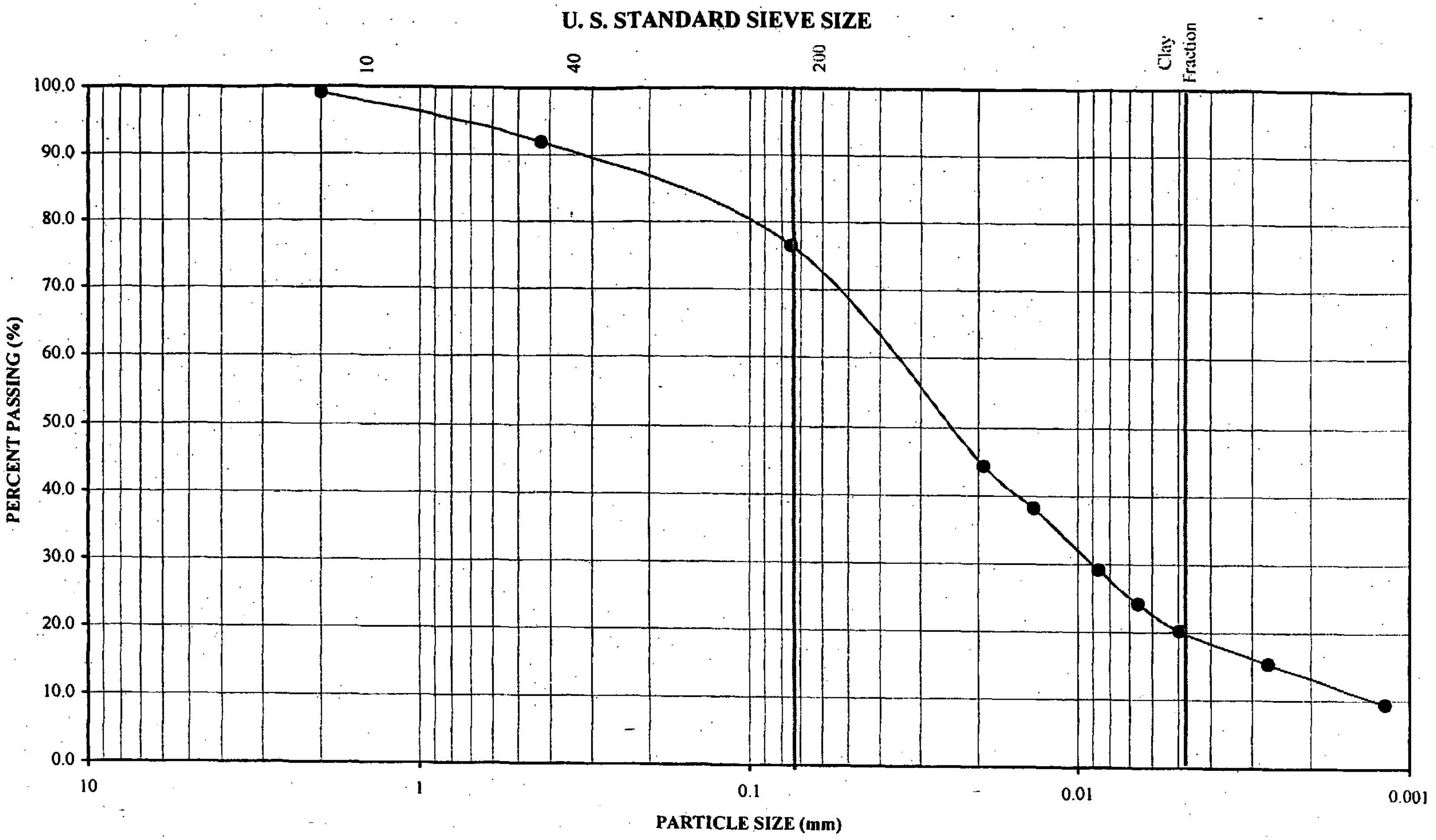
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-2	24-33"	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251

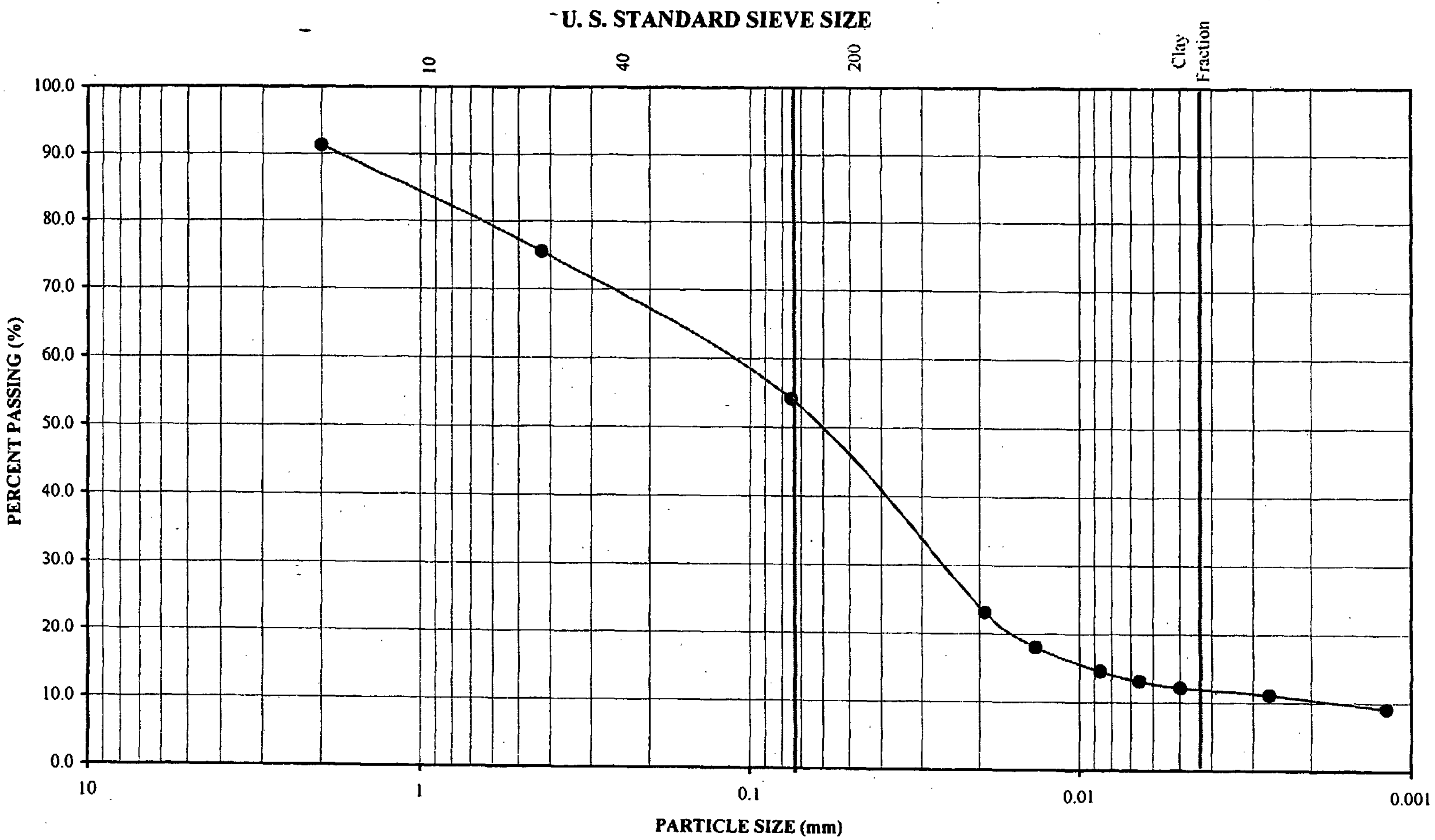


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-2	33-66 inches			ML

CTE JOB NUMBER: 40-2251

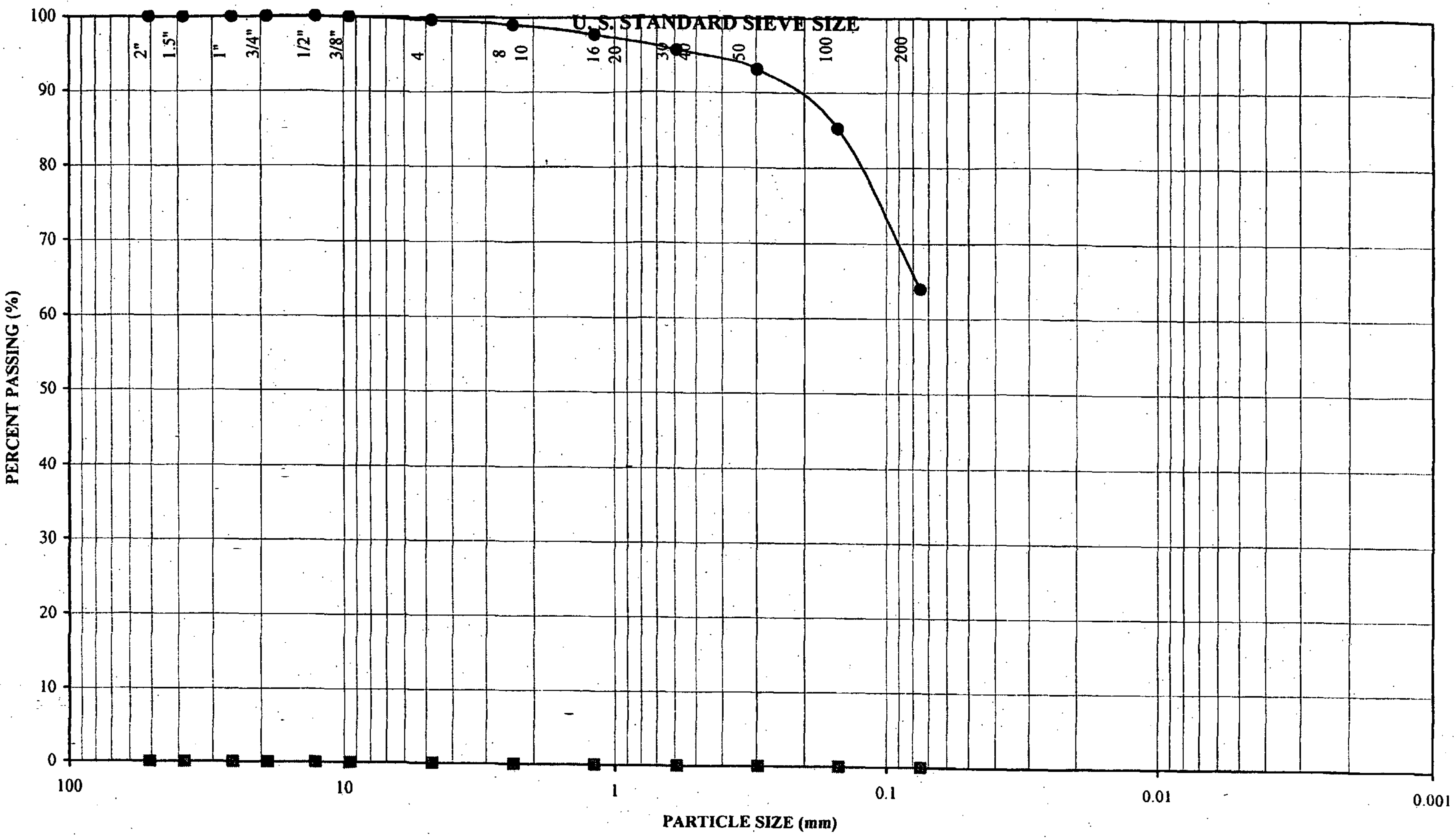


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-3	6-12 inches			ML

CTE JOB NUMBER: 40-2251



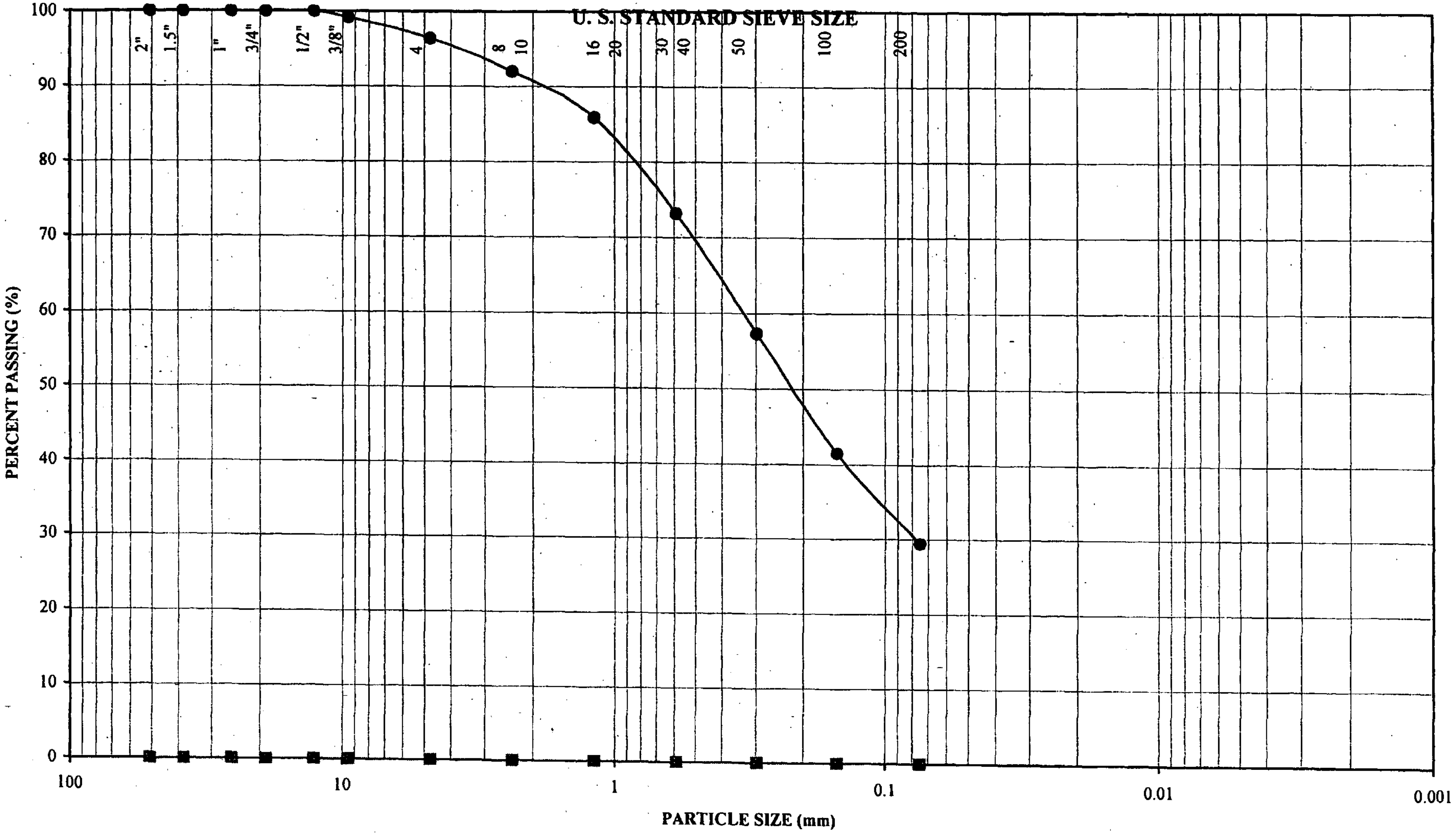
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-3	18-24"	●	NR	NR	ML
		■			

CTE JOB NUMBER: 40-2251

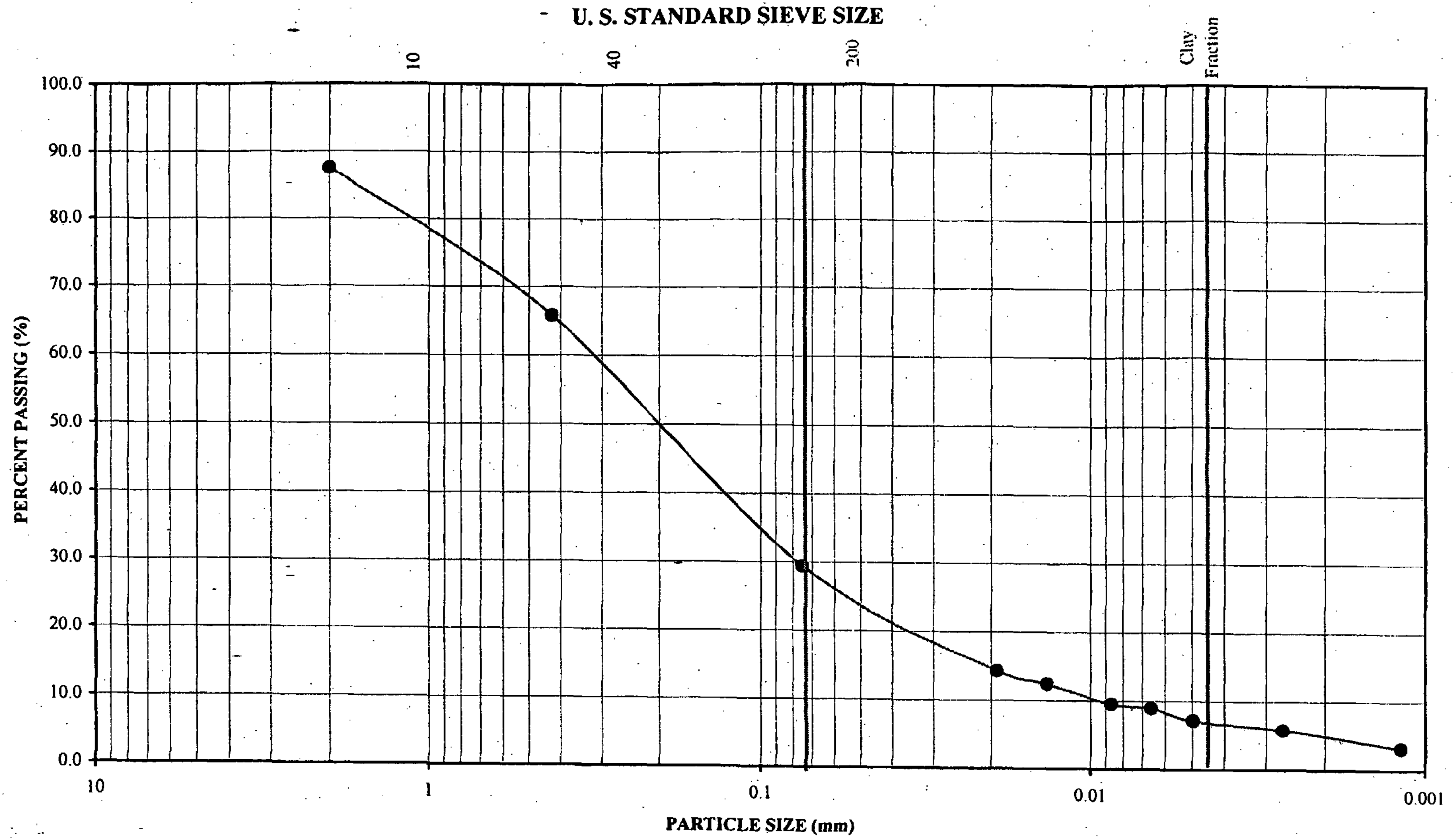


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, Ca 92518 | 951.571.4081 | Fax 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-4	0-12 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

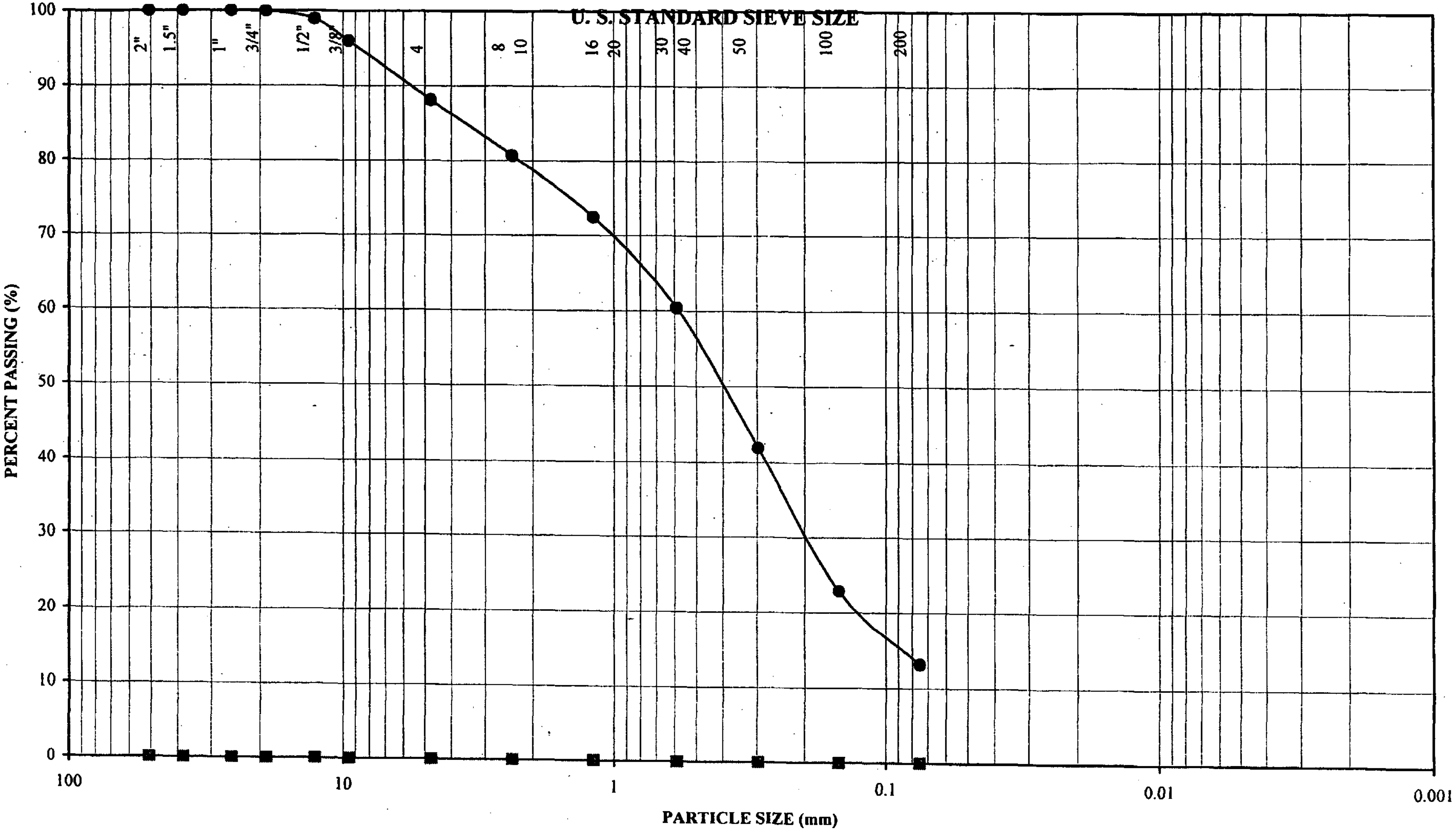


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-4	0-12 inches			SM

CTE JOB NUMBER: 40-2251



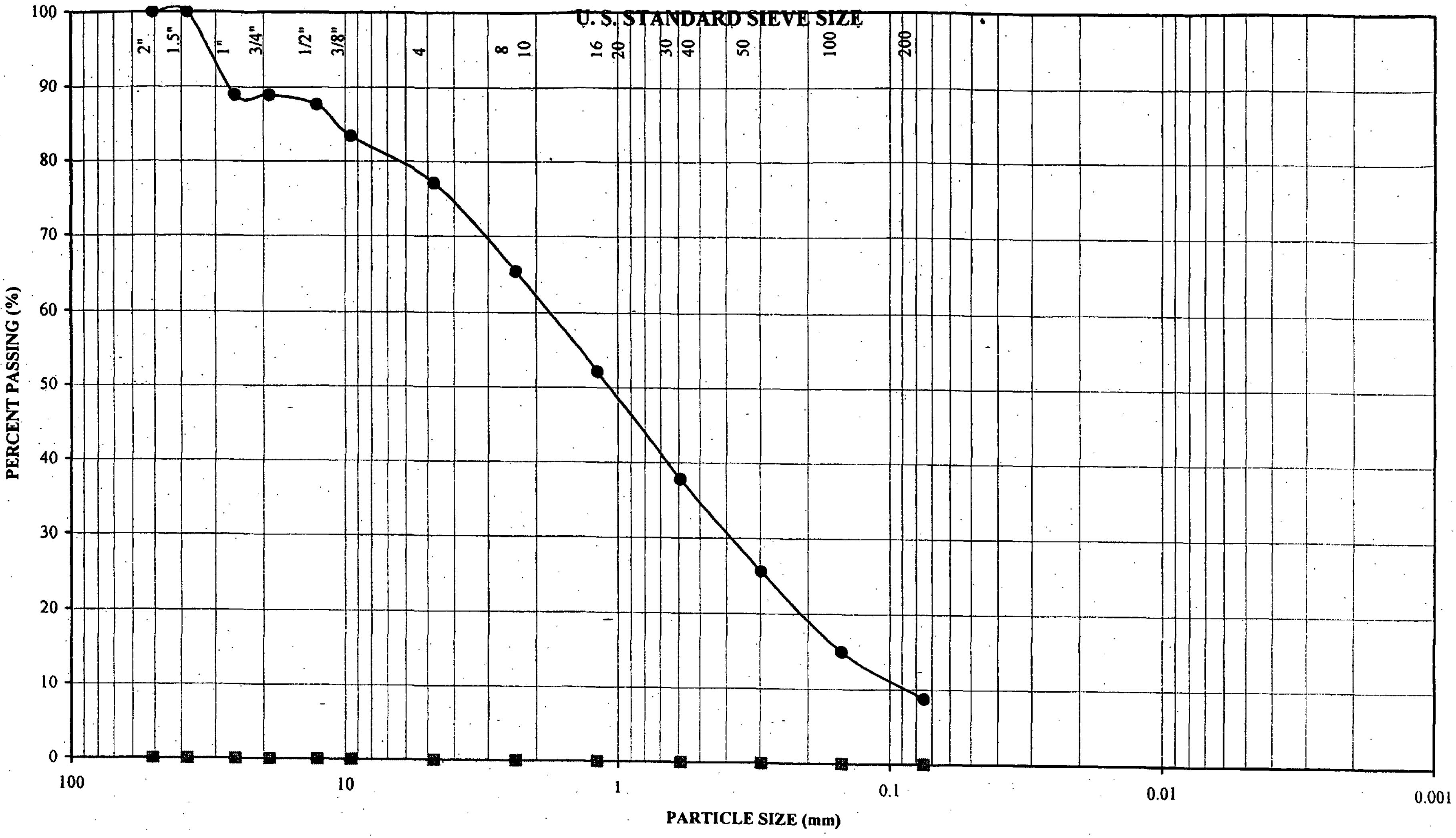
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4186

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-4	24-31"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251



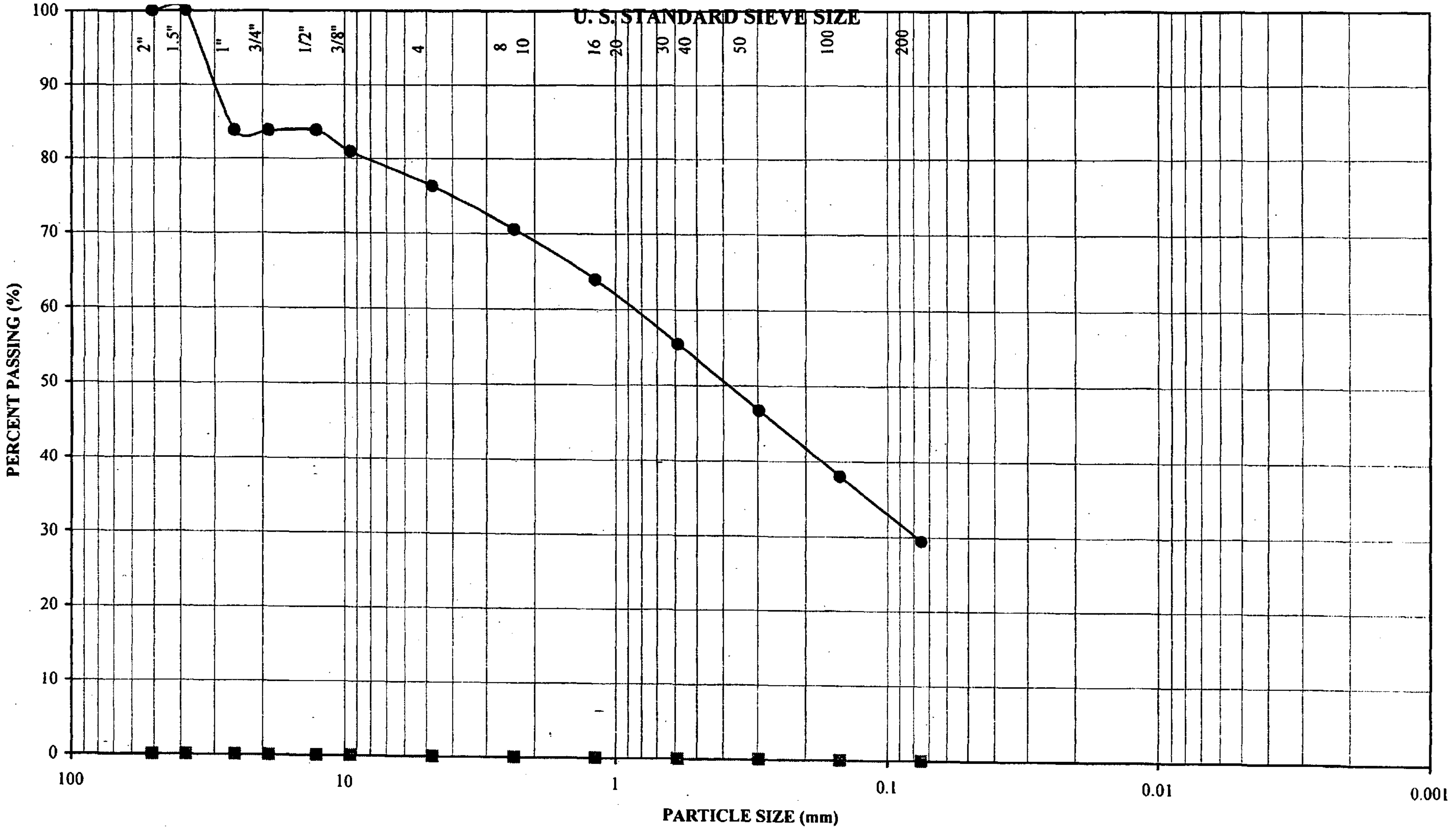
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-4	48-60"	●	NR	NR	SW-SM
		■			

CTE JOB NUMBER: 40-2251

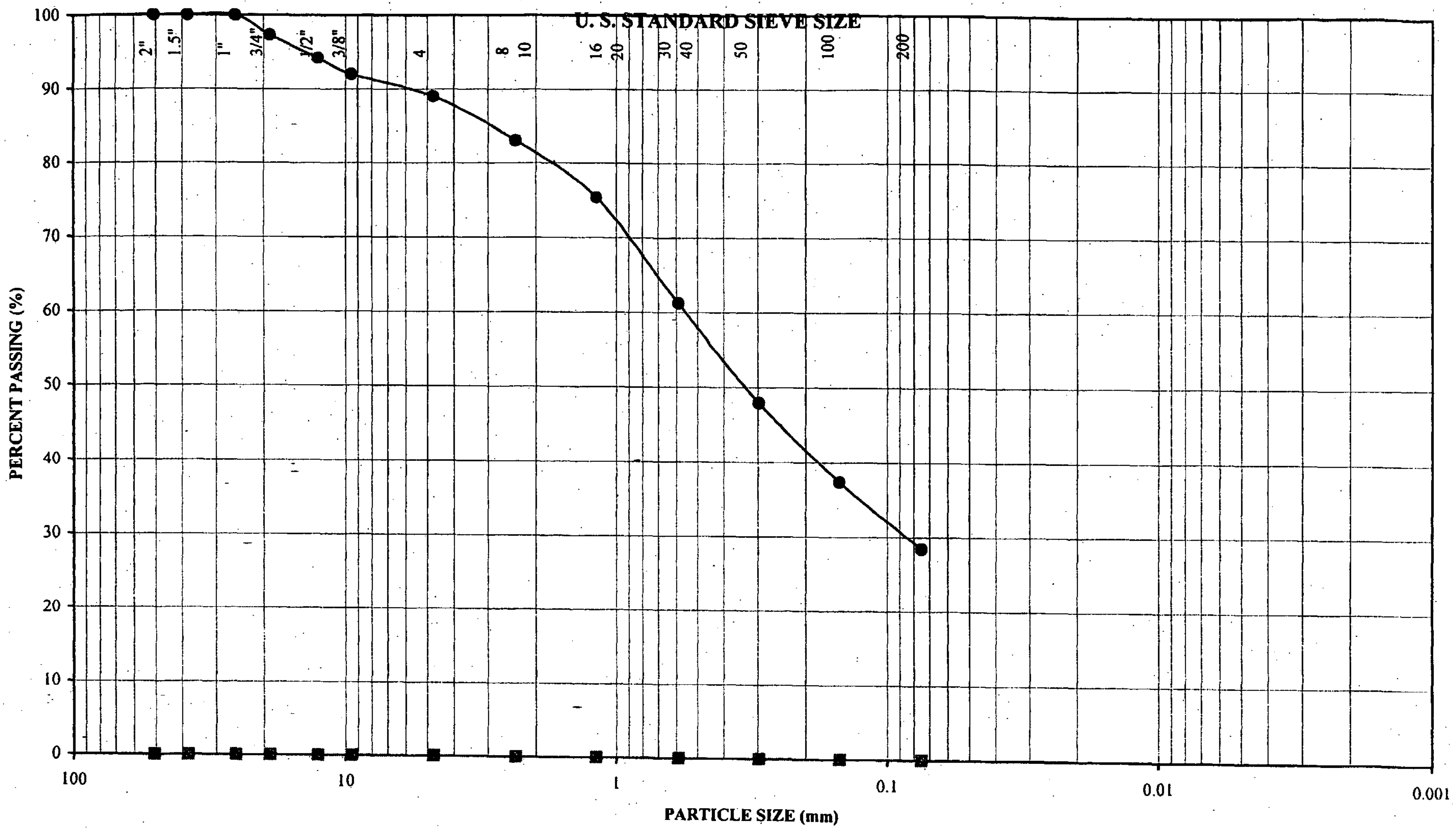


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-5	0-12"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

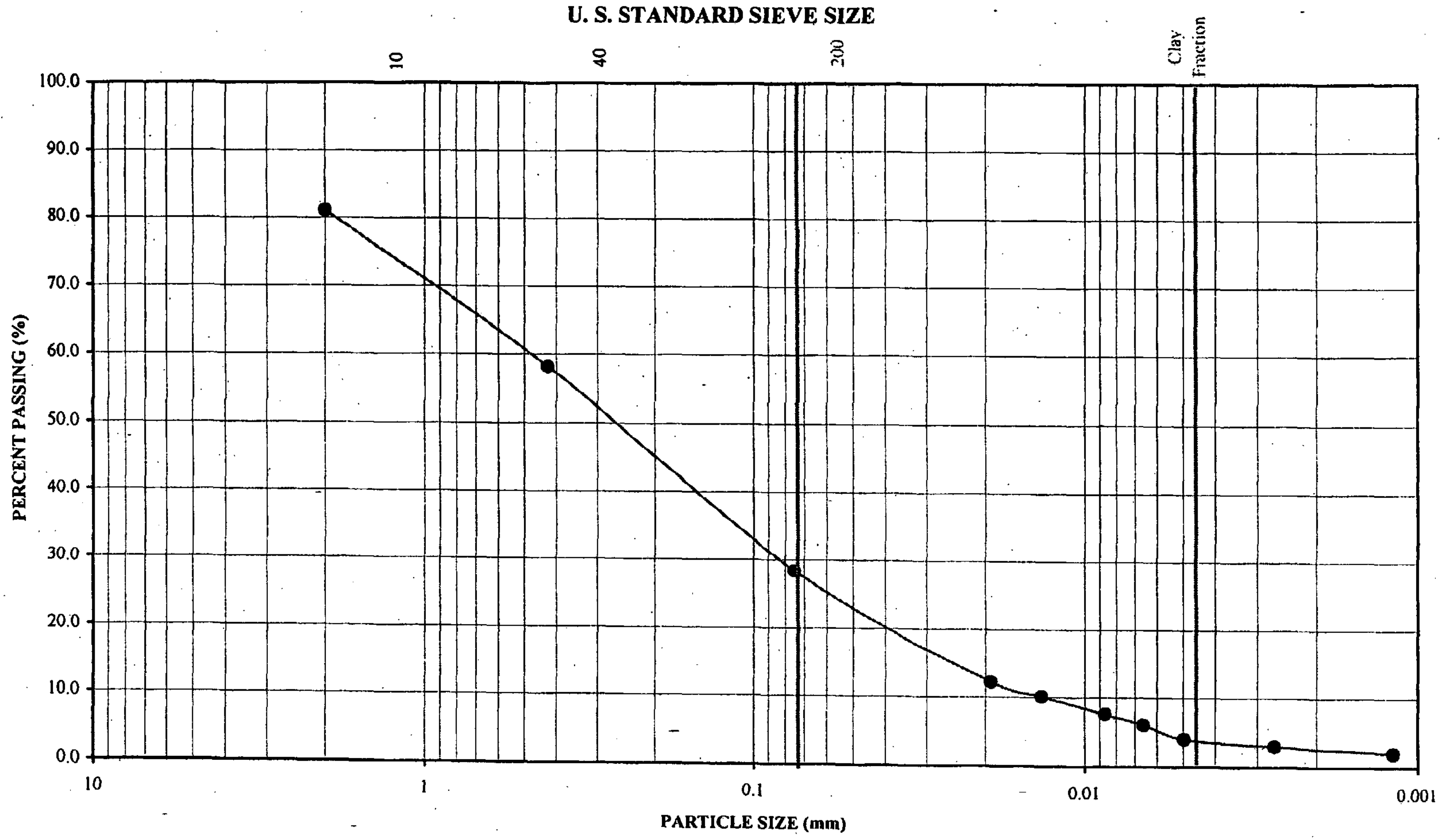


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-5	12-18 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

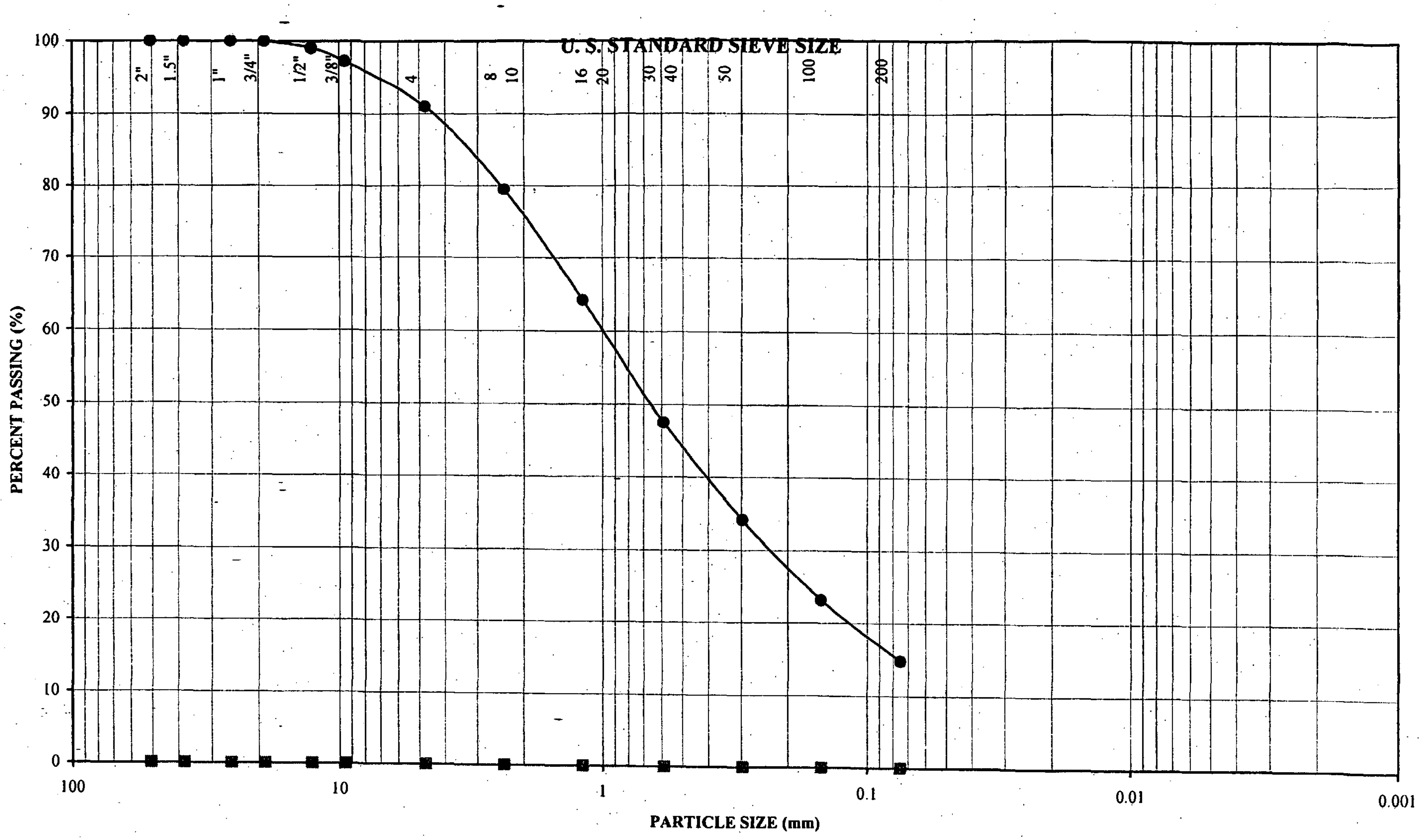


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-5	12-18 inches			SM

CTE JOB NUMBER: 40-2251



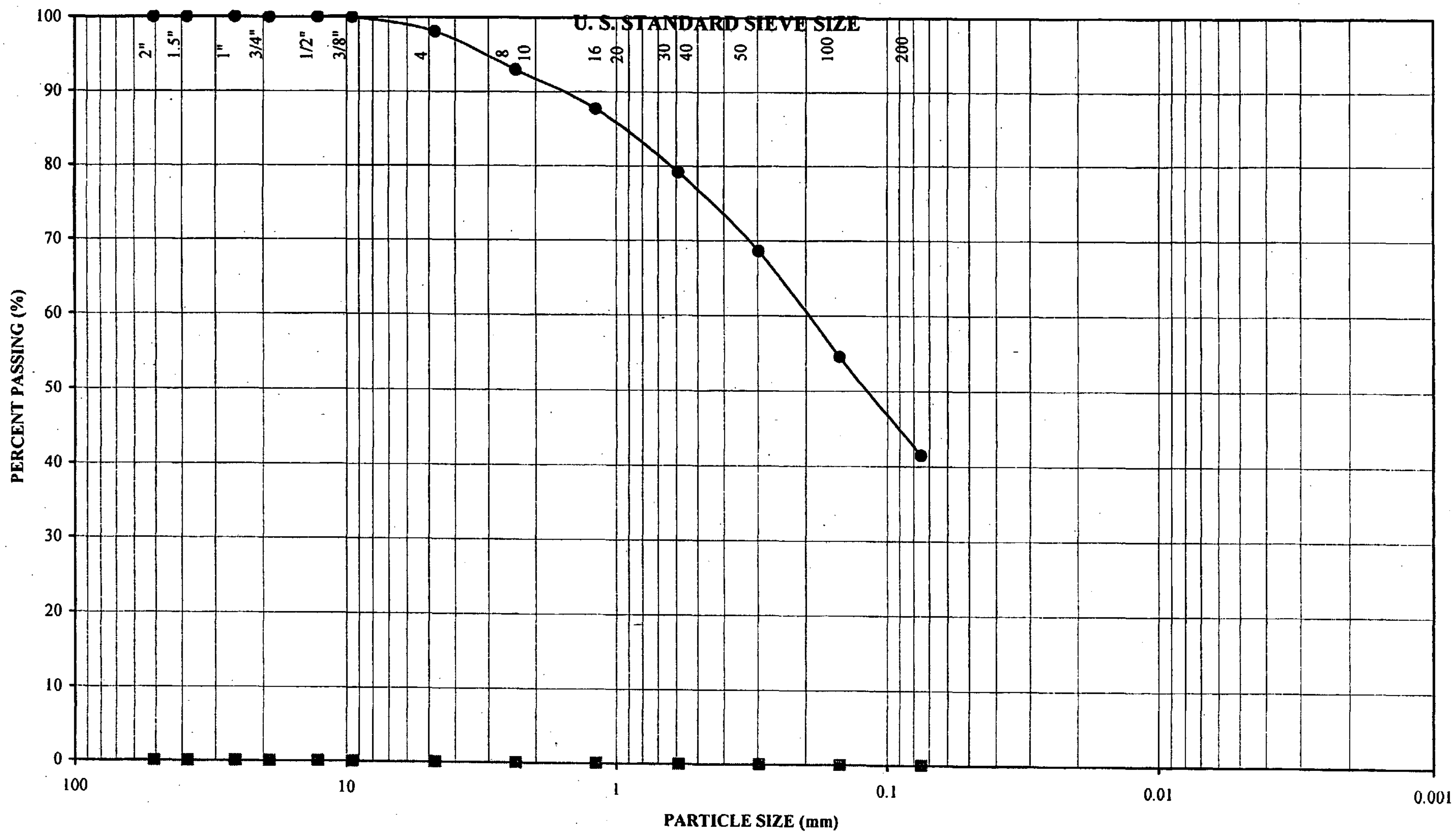
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-5	30-36"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251



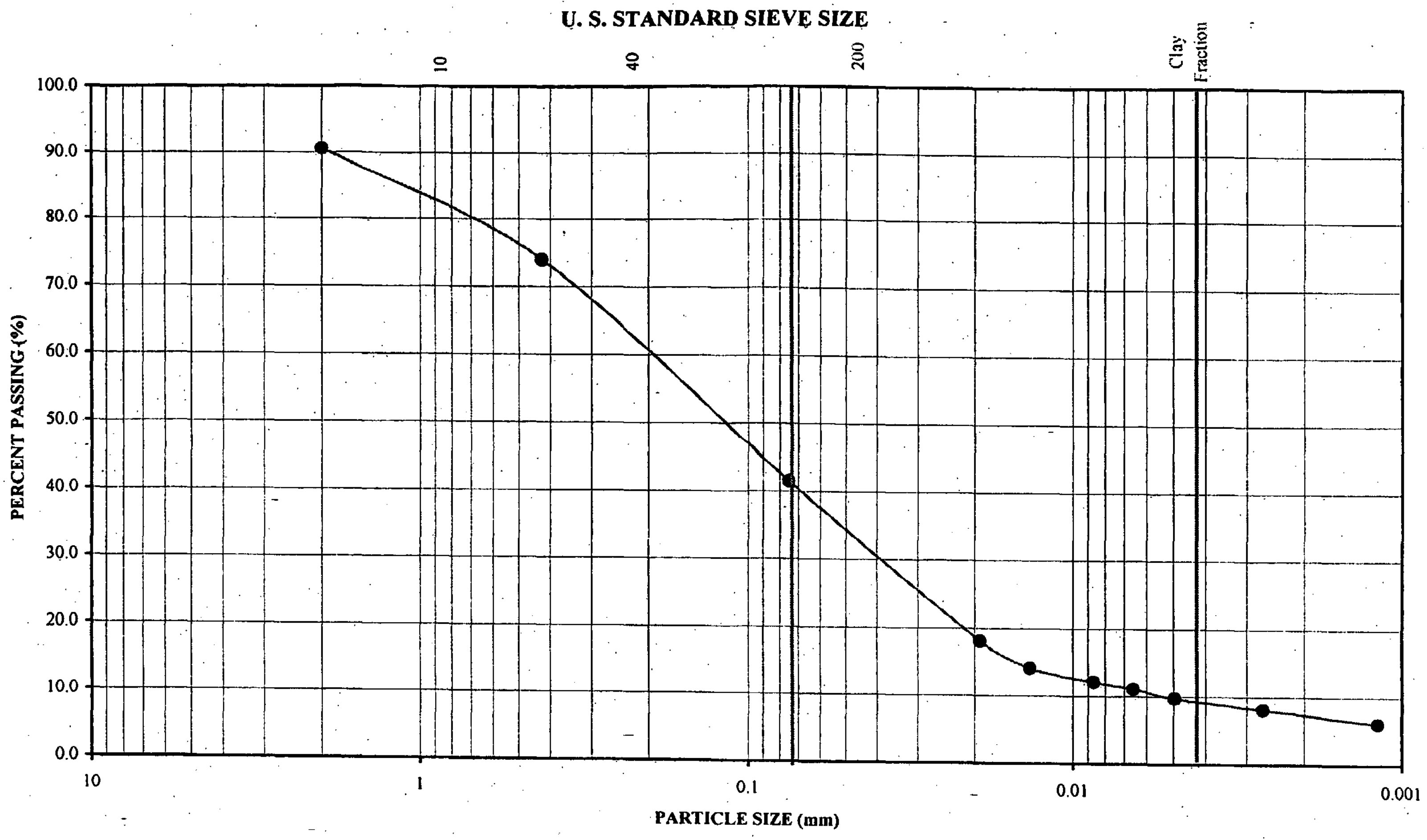
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-6	0-12 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

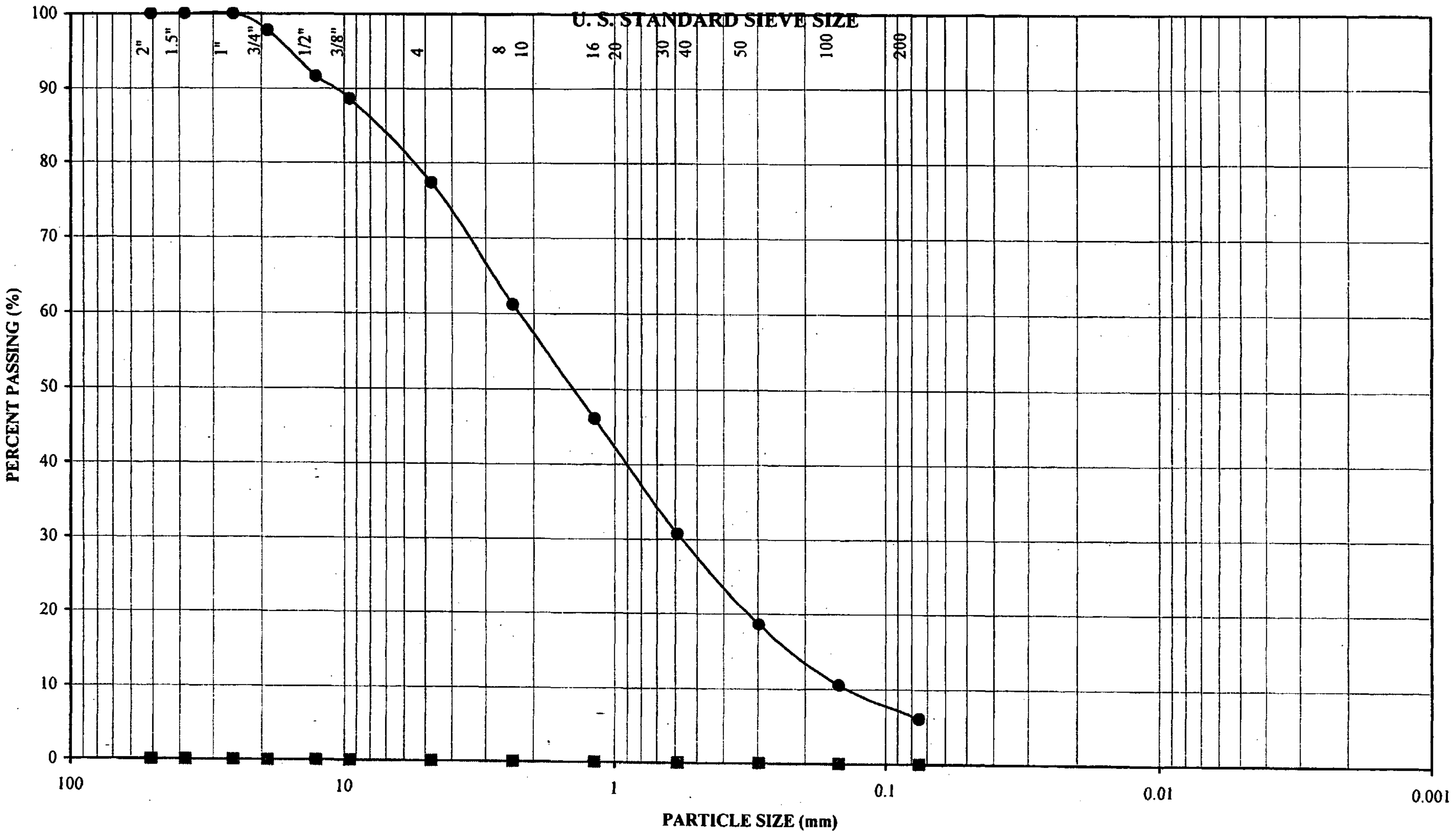


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 Meridian Parkway, Suite A | Riverside, CA 92518 | 951.571.4081 | Fax 951.571.4188

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-6	0-12 inches			SM

CTE JOB NUMBER: 40-2251



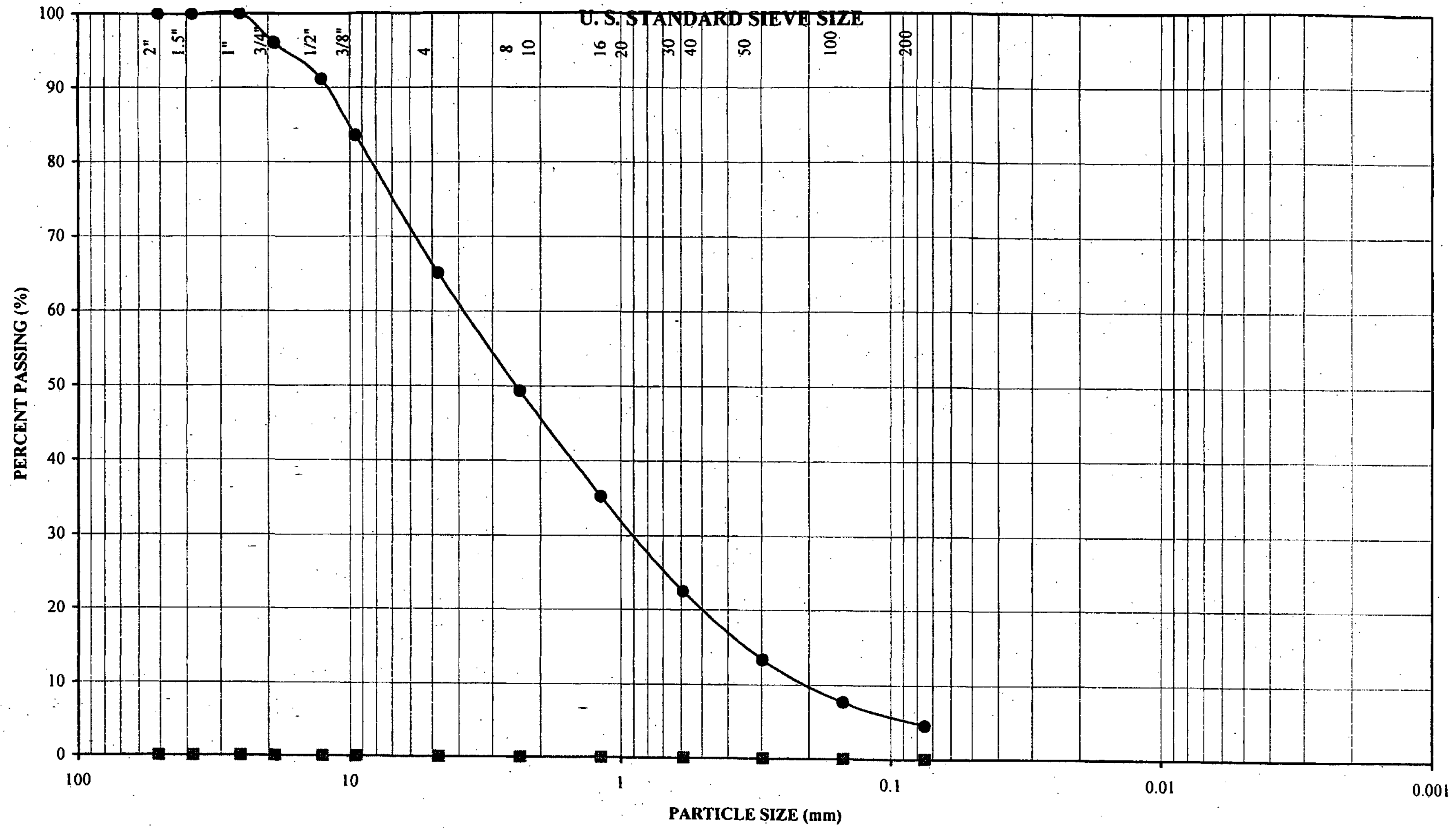
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-6	33-50"	●	NR	NR	SP-SM
		■			

CTE JOB NUMBER: 40-2251

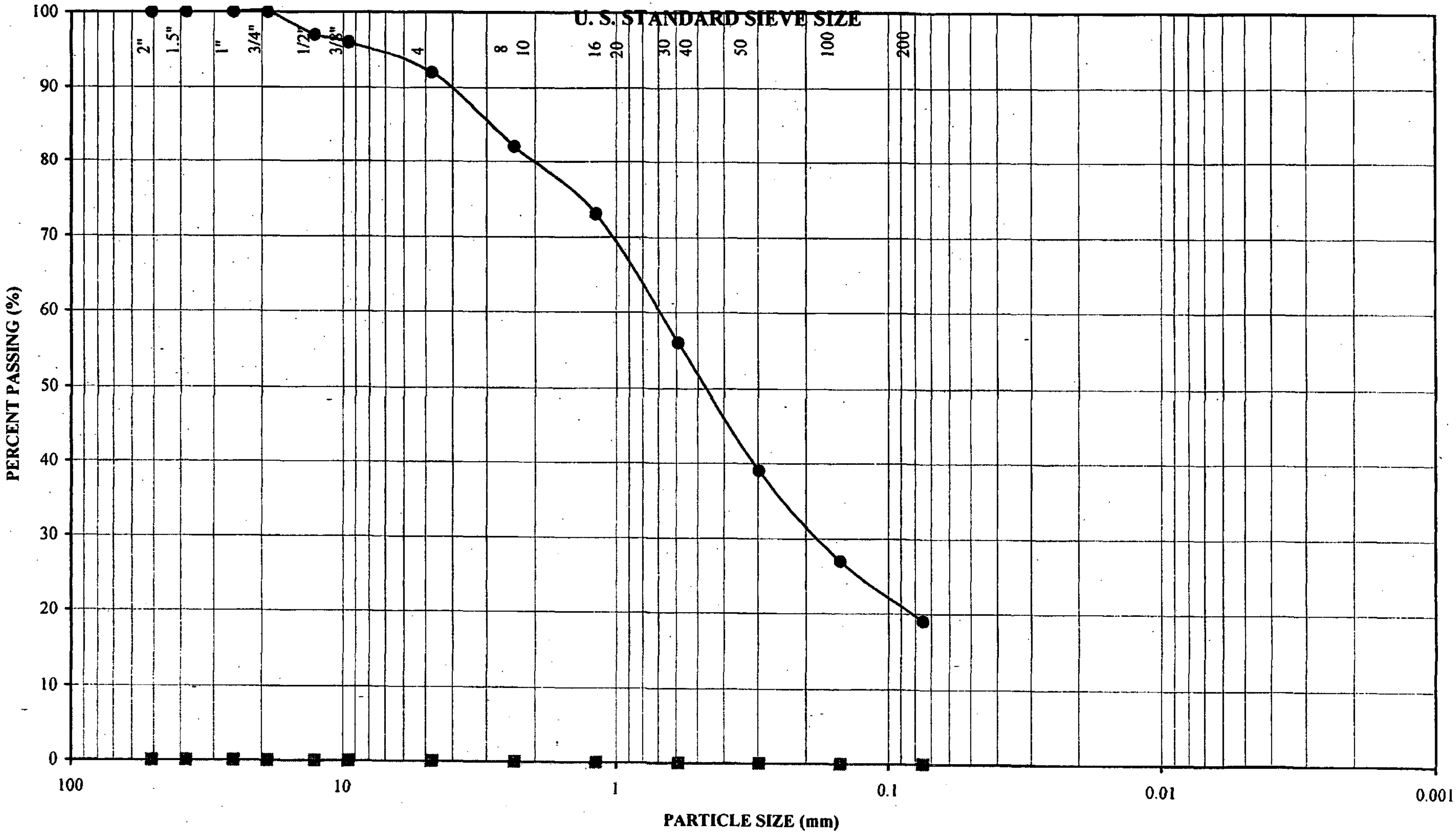


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-6	50-60"	●	NR	NR	SW-SM
		■			

CTE JOB NUMBER: 40-2251

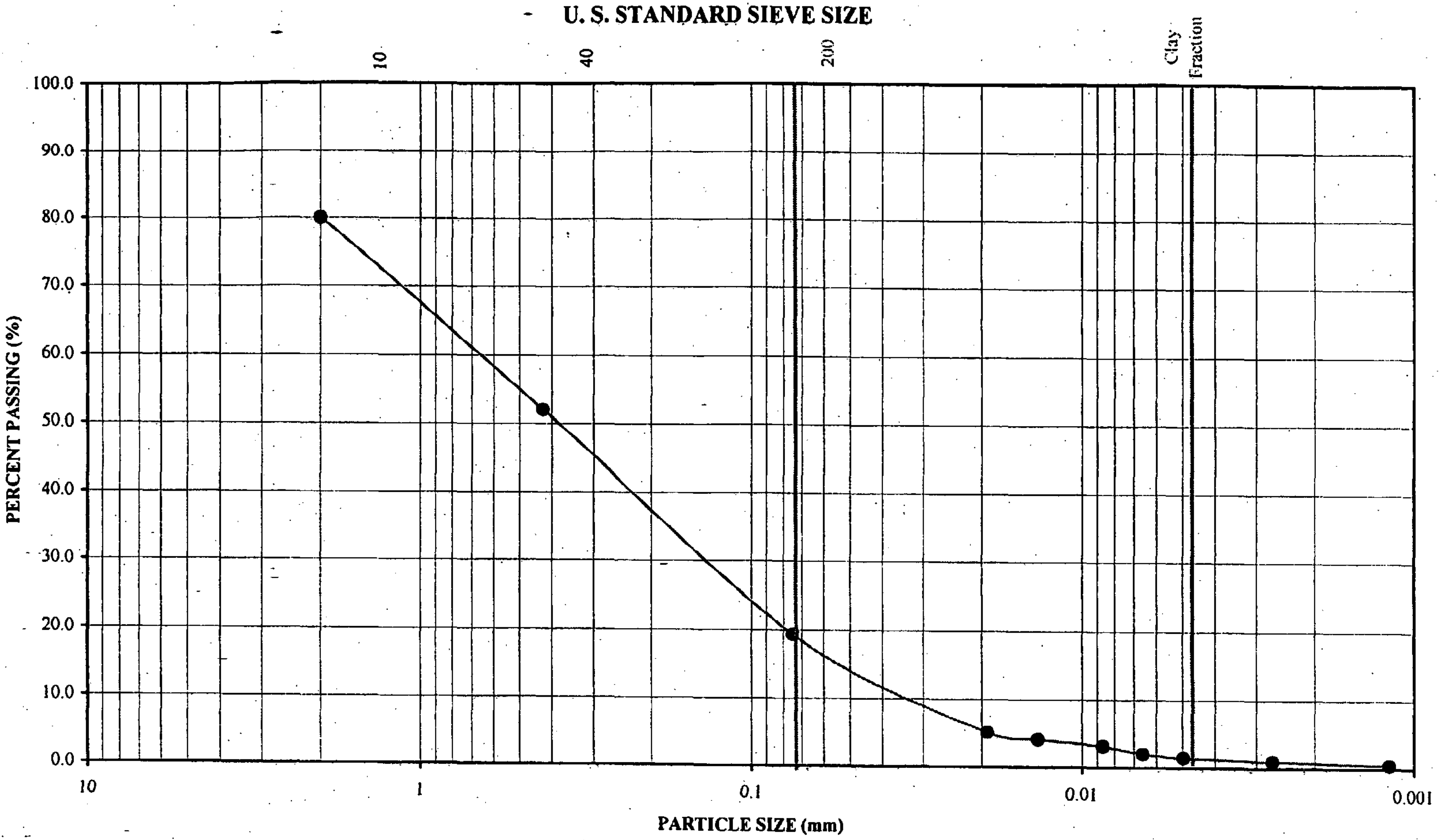


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-7	0-12"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

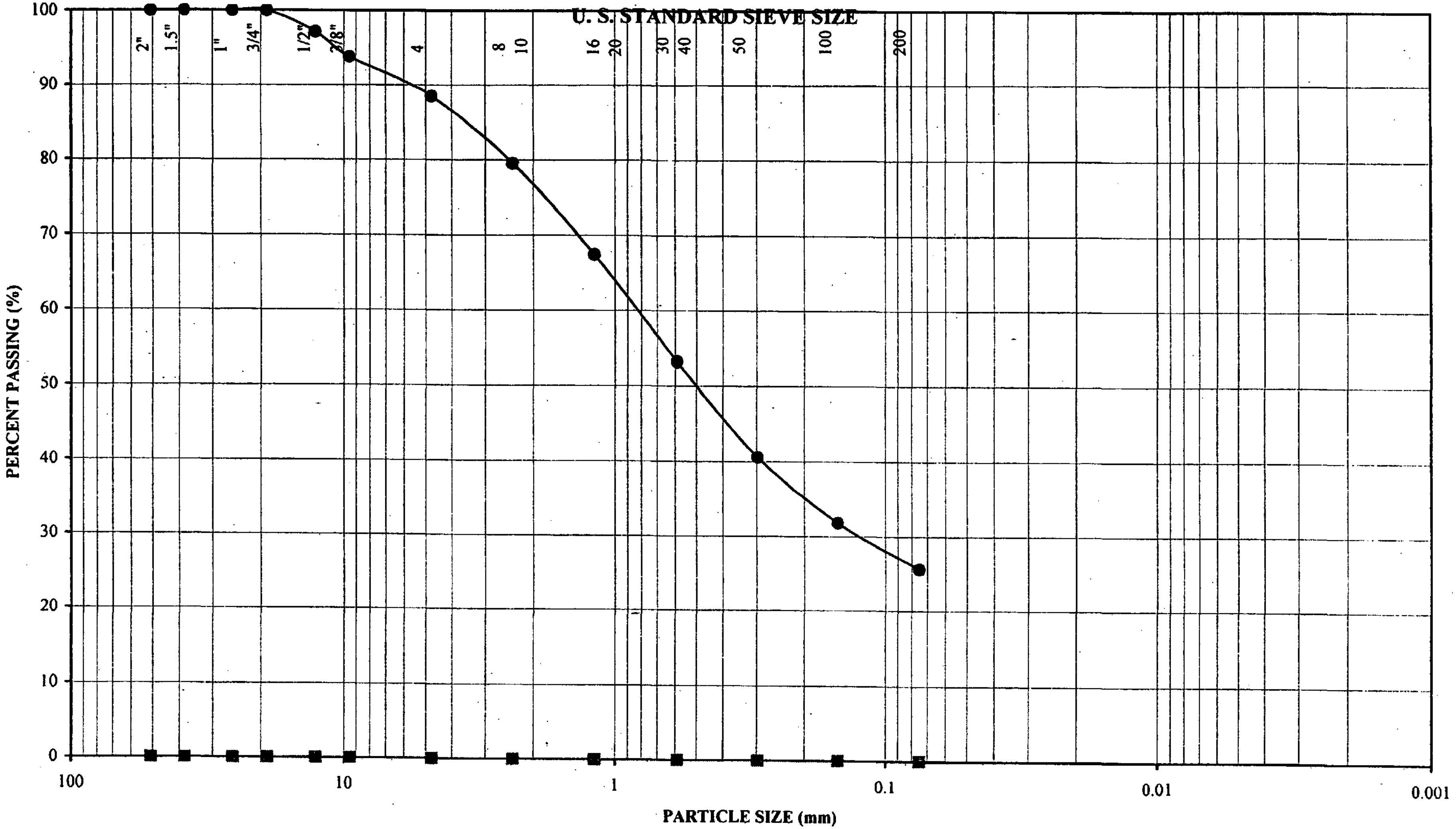


PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-7	0-12 inches			SM

CTE JOB NUMBER: 40-2251



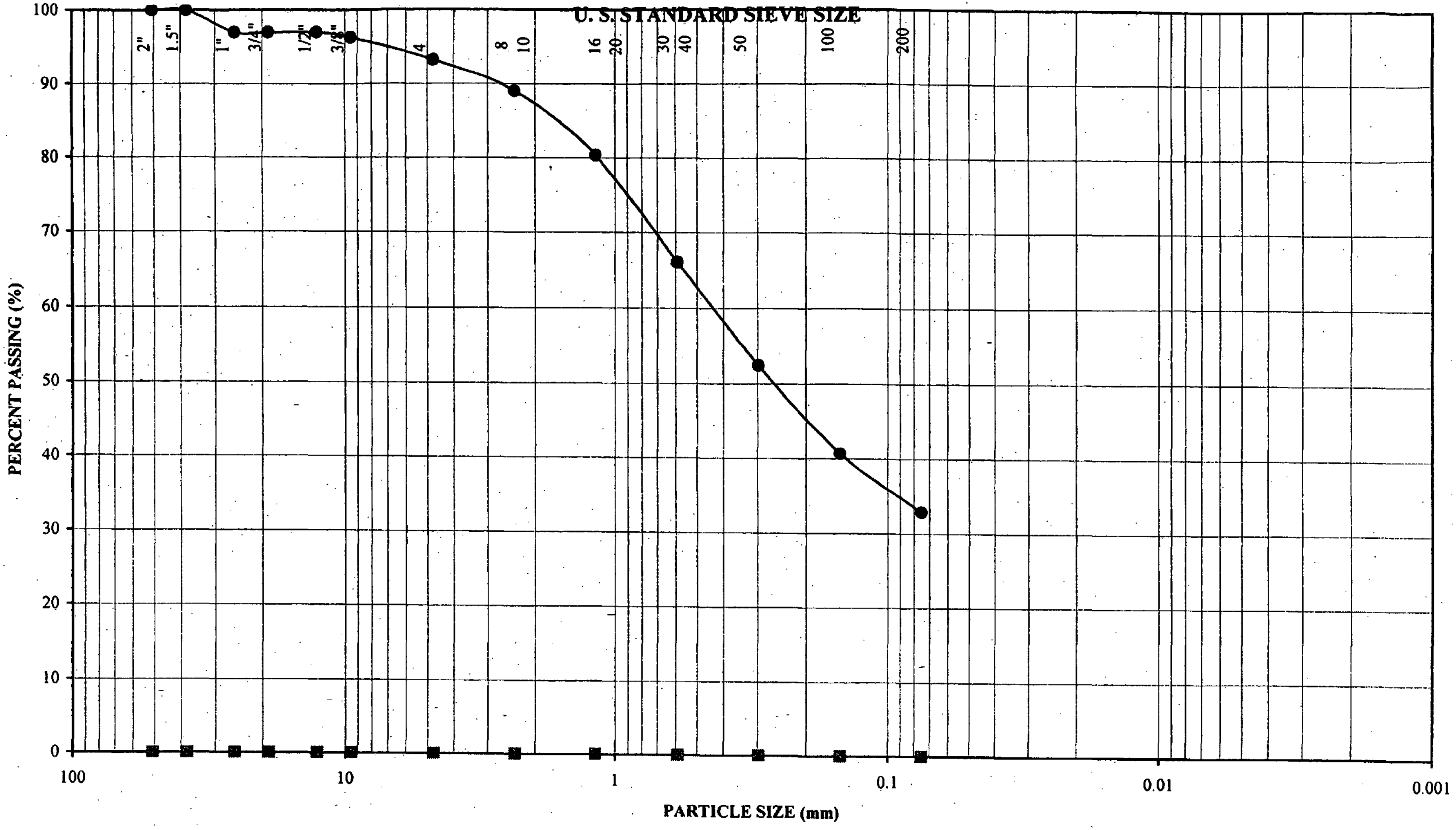
PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-7	12-24"	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251

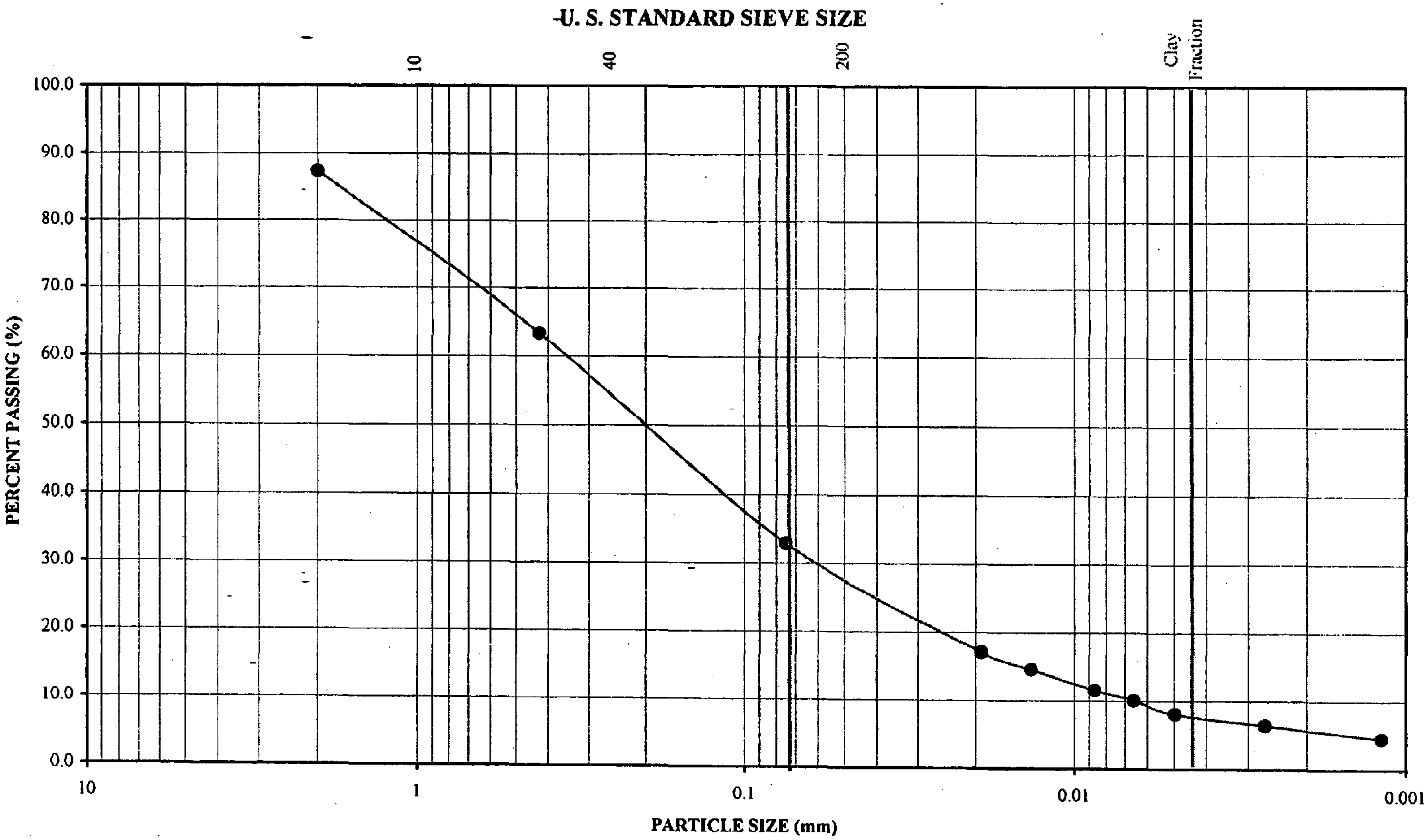


PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A | RIVERSIDE, CA 92518 | 951.571.4081 | FAX 951.571.4188

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-8	6-12 inches	●	NR	NR	SM
		■			

CTE JOB NUMBER: 40-2251



PARTICLE SIZE ANALYSIS (ASTM D 422)

CONSTRUCTION TESTING & ENGINEERING, INC.

Sample Designation	Sample Depth	Symbol	Plasticity Index	Classification
B-8	6-12 inches			SM

CTE JOB NUMBER: 40-2251

LABORATORY TEST RESULTS

BY EARTH SYSTEMS SOUTHWEST
(2007b)

File No.: 11112-02 September 12, 2007

Lab Number: 07-0507

MAXIMUM DENSITY / OPTIMUM MOISTURE ASTM D 1557-02 (Modified)

Job Name: Travertine, La Quinta

Sample ID: 1

Location:

B1 @ 1-4 feet

Description: Yellowish Gray Silty Fine to Coarse Sand w/Gravel (SM)

Procedure Used: A

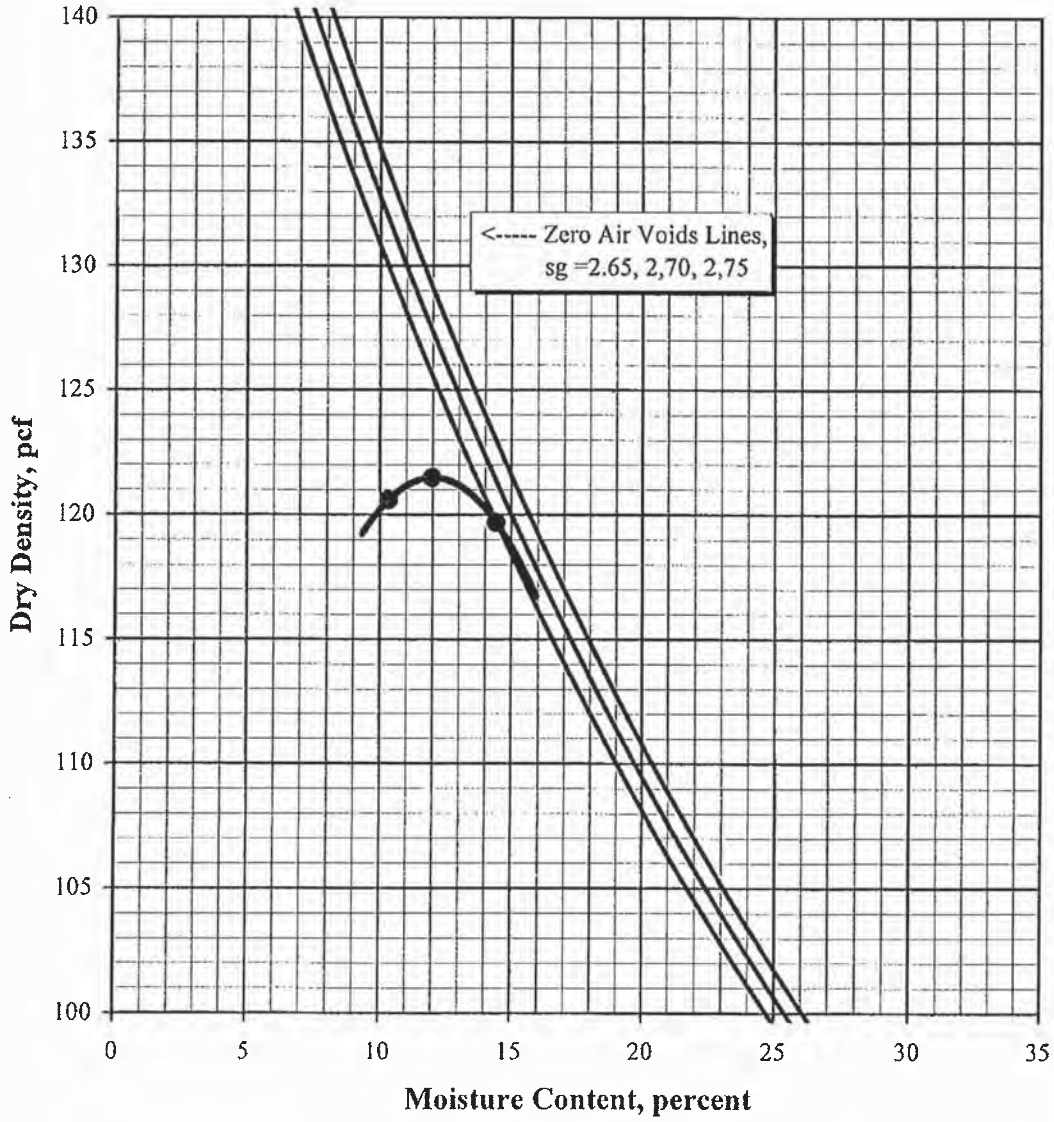
Preparation Method: Moist

Rammer Type: Mechanical

Maximum Density: **121.5 pcf**

Optimum Moisture: **12%**

Sieve Size	% Retained
3/4"	0.6
3/8"	3.3
#4	7.6



LABORATORY TEST RESULTS

BY EARTH SYSTEMS SOUTHWEST
(2007c)

SIEVE ANALYSIS

ASTM C-136

JOB NUMBER: 11112-04

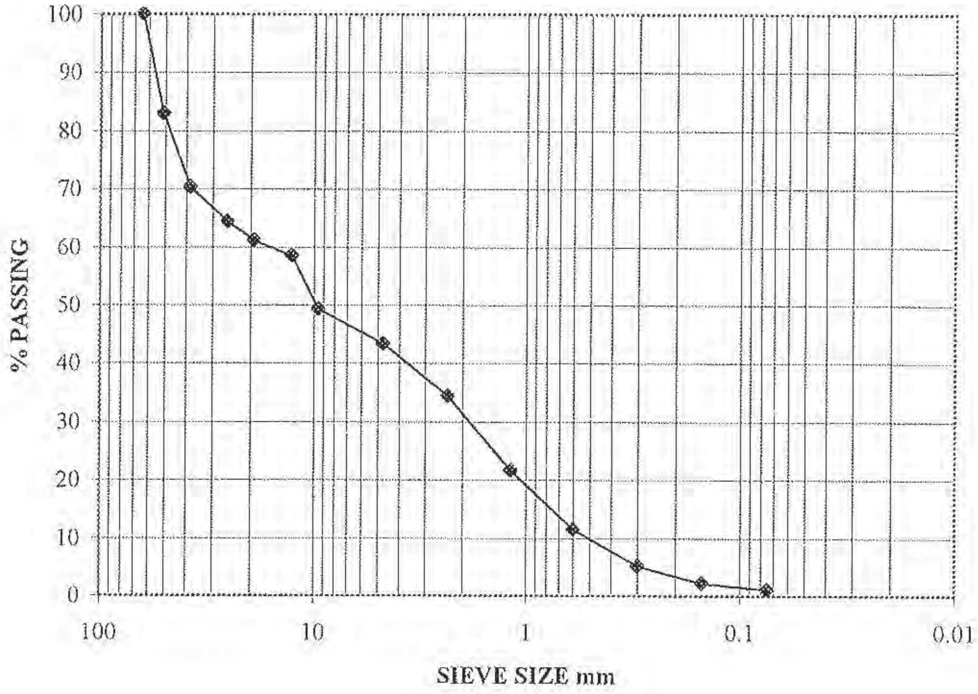
9/24/2007

JOB NAME: Travertine Project, Between Ave 60 & 64, La Quinta

SAMPLE I.D.: Sandy Gravel (GW)

LOCATION: S2 @ 1 feet

SIEVE SIZE	% PASSING
2 1/2"	100
2"	83
1 1/2"	70
1"	64
3/4"	61
1/2"	58
3/8"	49
#4	43
#8	34
#16	22
#30	12
#50	5
#100	2
#200	1.1



SIEVE ANALYSIS

ASTM C-136

JOB NUMBER: 11112-04

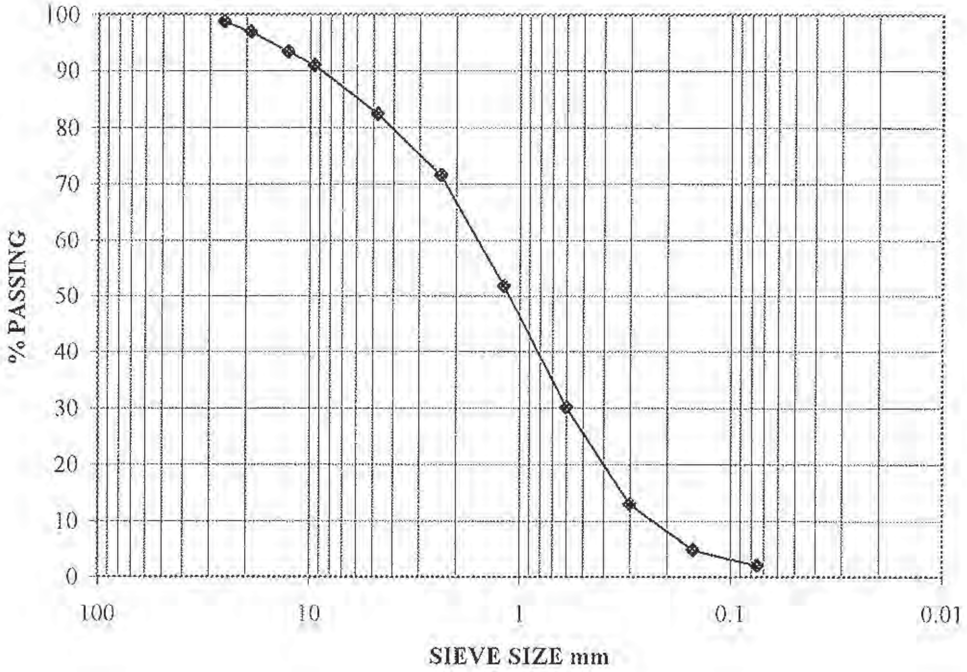
9/24/2007

JOB NAME: Travertine Project, Between Ave 60 & 64, La Quinta

SAMPLE I.D.: Well Graded Sand w/Gravel (SW)

LOCATION: S3 @ 1 feet

SIEVE SIZE	% PASSING
1 1/2"	100.0
1"	98.7
3/4"	96.9
1/2"	93.3
3/8"	91.0
#4	82.3
#8	71.5
#16	51.7
#30	30.1
#50	13.0
#100	4.8
#200	2.1



SIEVE ANALYSIS

ASTM C-136

JOB NUMBER: 11112-04

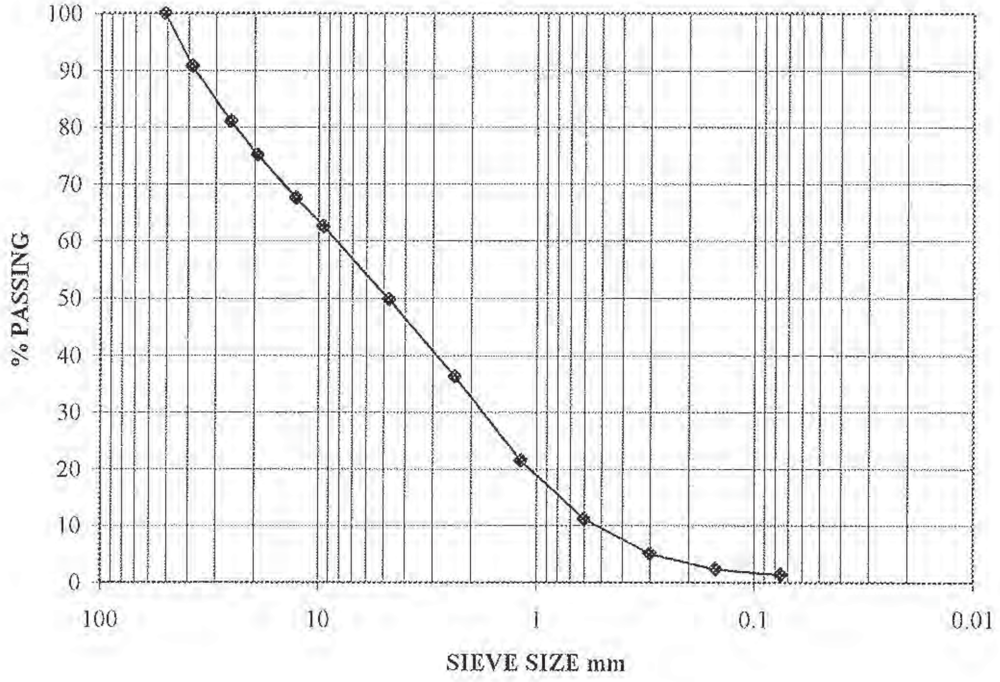
9/24/2007

JOB NAME: Travertine Project, Between Ave 60 & 64, La Quinta

SAMPLE I.D.: Gravelly Sand (GW/SW)

LOCATION: S5 @ 1 feet

SIEVE SIZE	% PASSING
2"	100
1 1/2"	91
1"	81
3/4"	75
1/2"	68
3/8"	62
#4	50
#8	36
#16	21
#30	11
#50	5
#100	2
#200	1.3



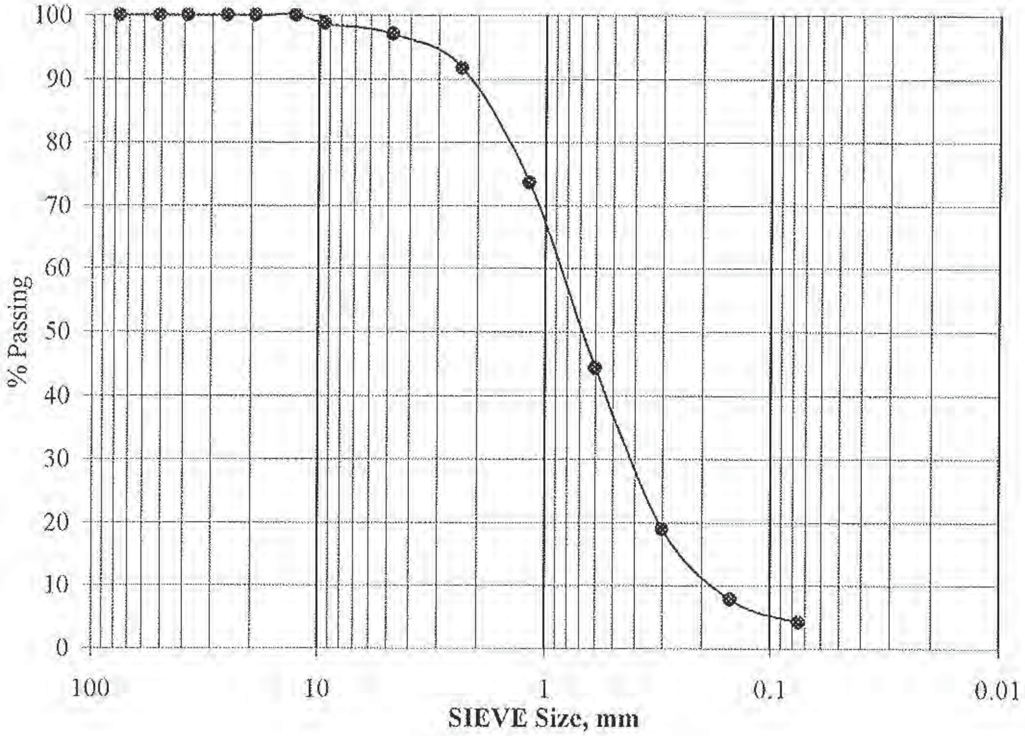
EARTH SYSTEMS CONSULTANTS SOUTHWEST

SIEVE ANALYSIS

ASTM C-136

Job Name: Travertine Project, Between Ave 60 & 64, La Quinta
Sample ID: S6 @ 1 feet
Description: Poorly Graded Sand (SP)

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	99
#4	97
#8	92
#16	74
#30	44
#50	19
#100	8
#200	4



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

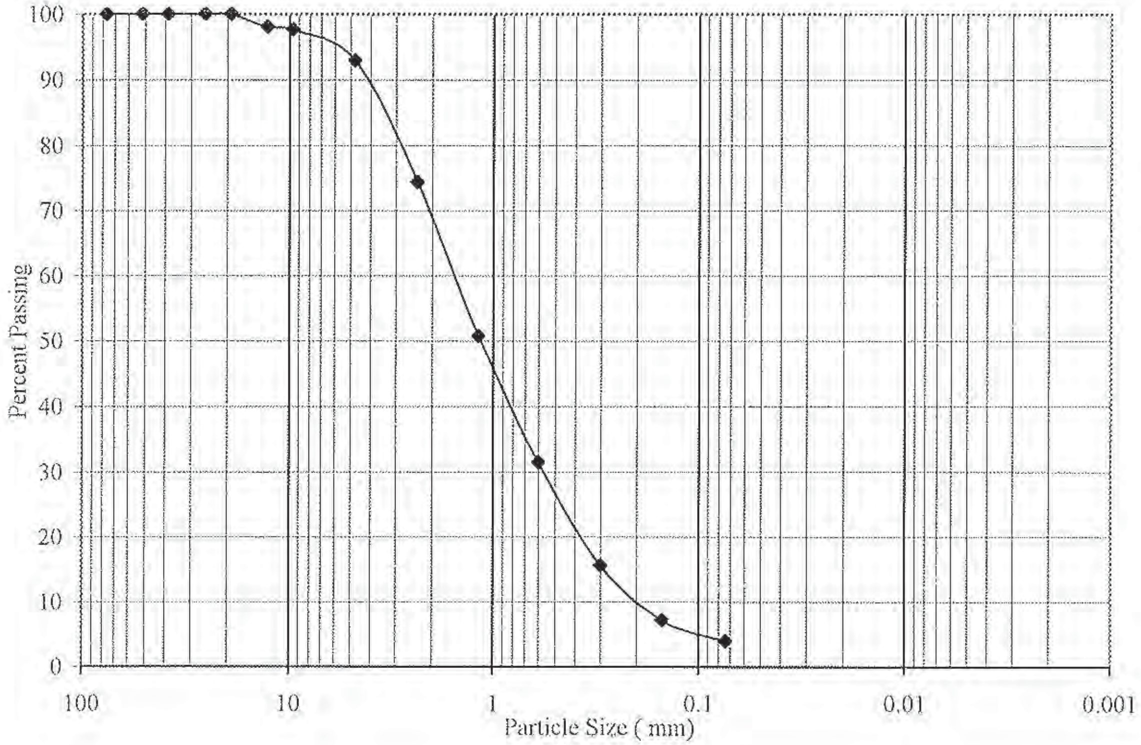
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #4 - 2-4 feet**
Description: **Well Graded Sand w/Gravel (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	98
3/8"	98
#4	93
#8	74
#16	51
#30	31
#50	16
#100	7
#200	4

% Gravel:	**7**
% Sand:	**89**
% Silt:	**1**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

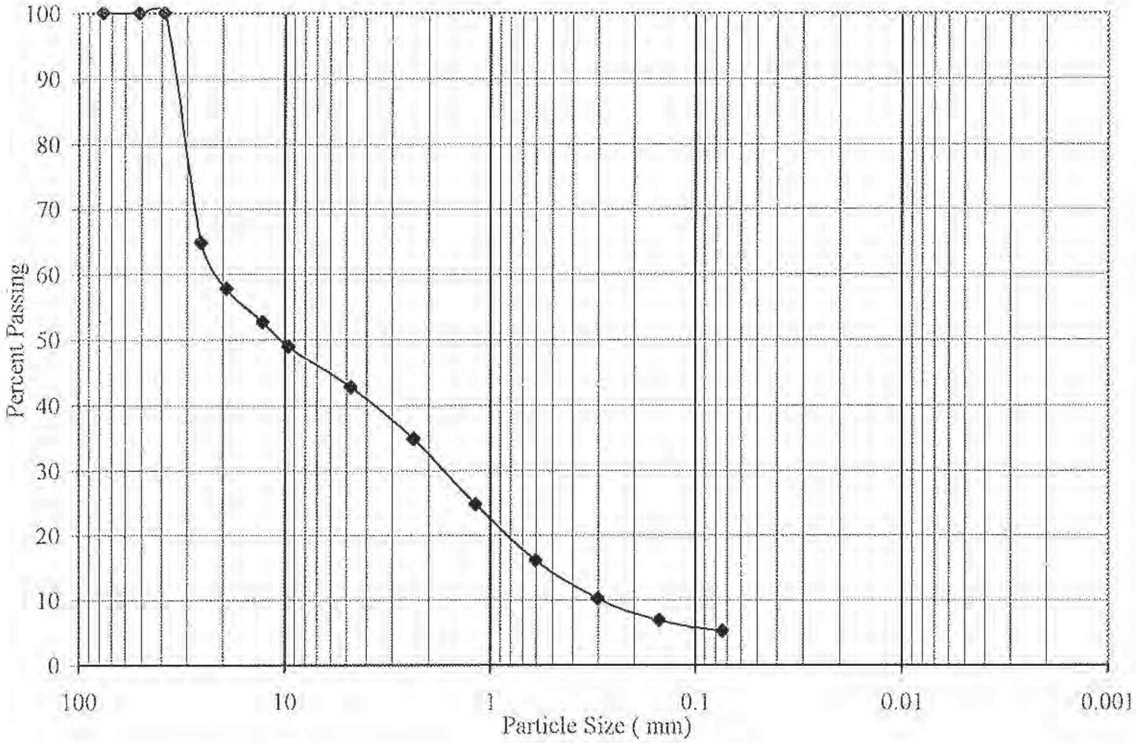
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #14 - 1-3 feet**
Description: **Sandy Gravel (GW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	65
3/4"	58
1/2"	53
3/8"	49
#4	43
#8	35
#16	25
#30	16
#50	10
#100	7
#200	5

% Gravel:	**57**
% Sand:	**38**
% Silt:	**3**
% Clay (3 micron):	**2**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

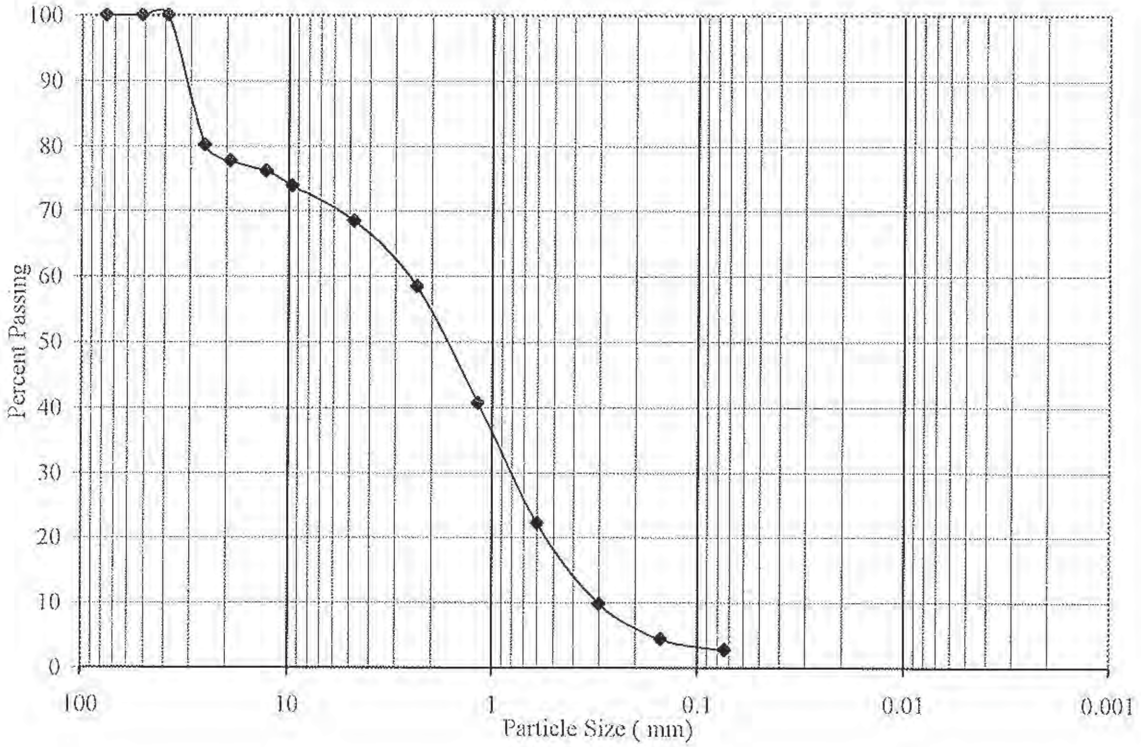
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #17 - 4-5 feet**
Description: **Gravelly Sand (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	80
3/4"	78
1/2"	76
3/8"	74
#4	68
#8	58
#16	41
#30	22
#50	10
#100	4
#200	3

% Gravel:	**32**
% Sand:	**66**
% Silt:	**0**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

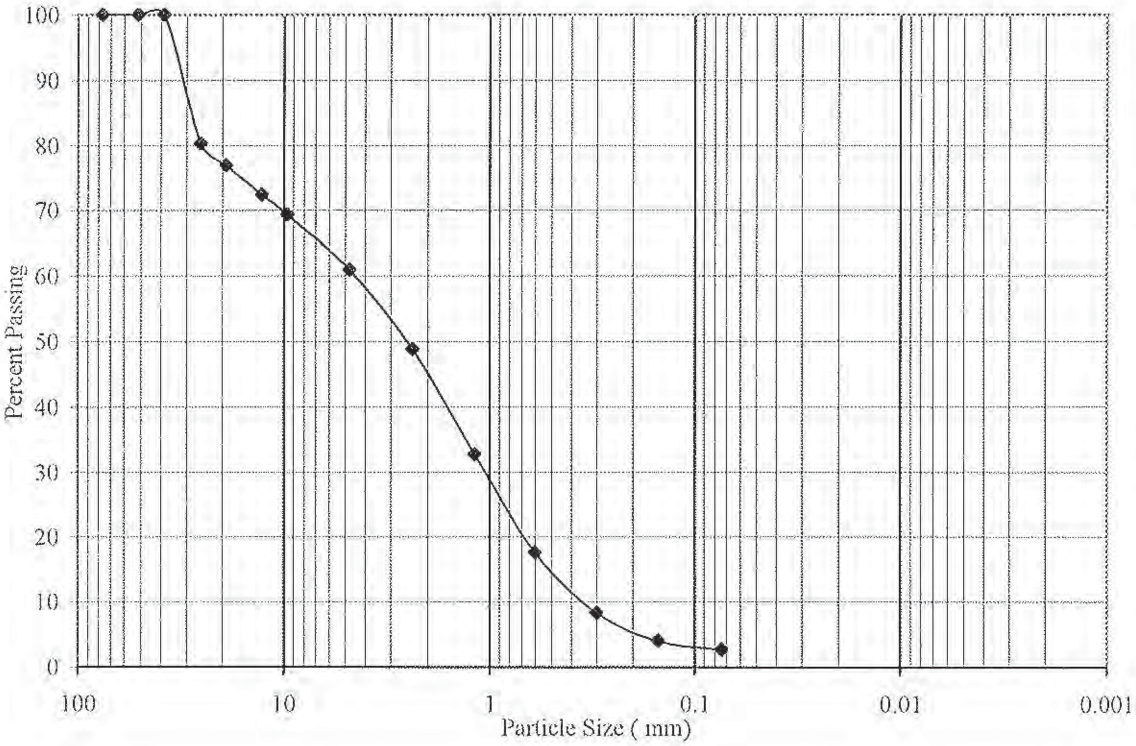
PARTICLE SIZE ANALYSIS

ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #19 - 2.5-4 feet**
Description: **Gravelly Sand (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	80
3/4"	77
1/2"	72
3/8"	69
#4	61
#8	49
#16	33
#30	18
#50	8
#100	4
#200	3

% Gravel: **39**
% Sand: **58**
% Silt: **0**
% Clay (3 micron): **3**
(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

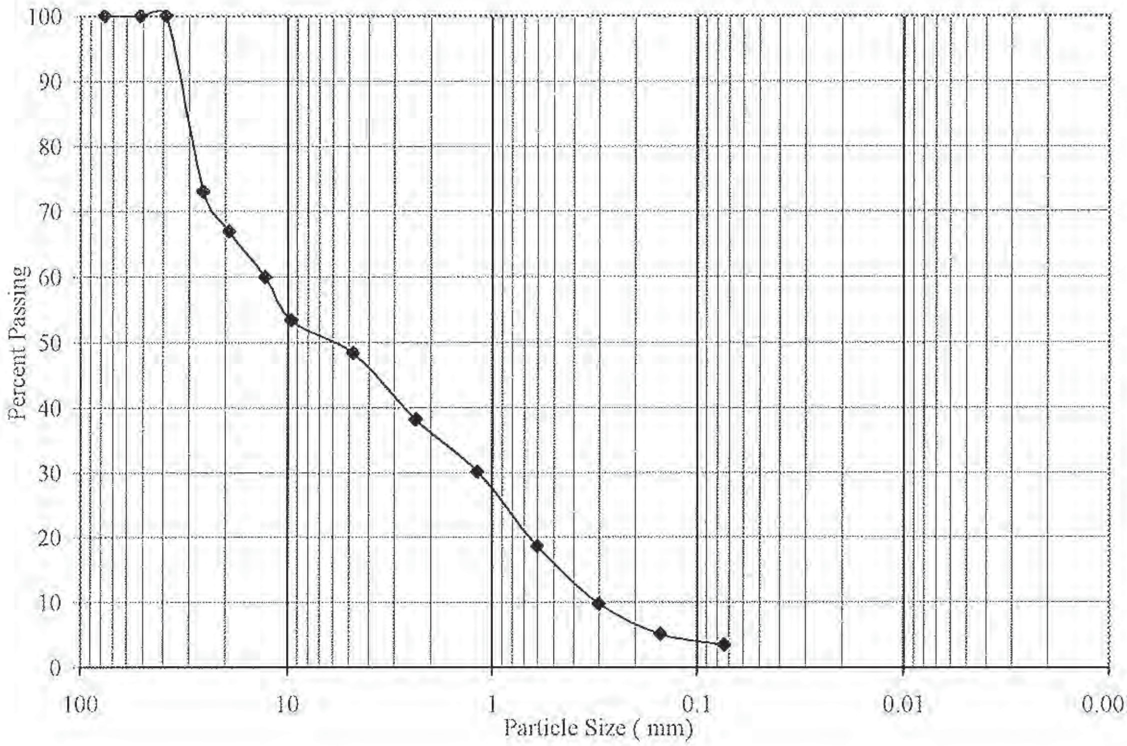
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #26 - 5-6 feet**
Description: **Sandy Gravel (GW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	73
3/4"	67
1/2"	60
3/8"	53
#4	48
#8	38
#16	30
#30	19
#50	10
#100	5
#200	3

% Gravel:	**52**
% Sand:	**45**
% Silt:	**1**
% Clay (3 micron):	**2**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

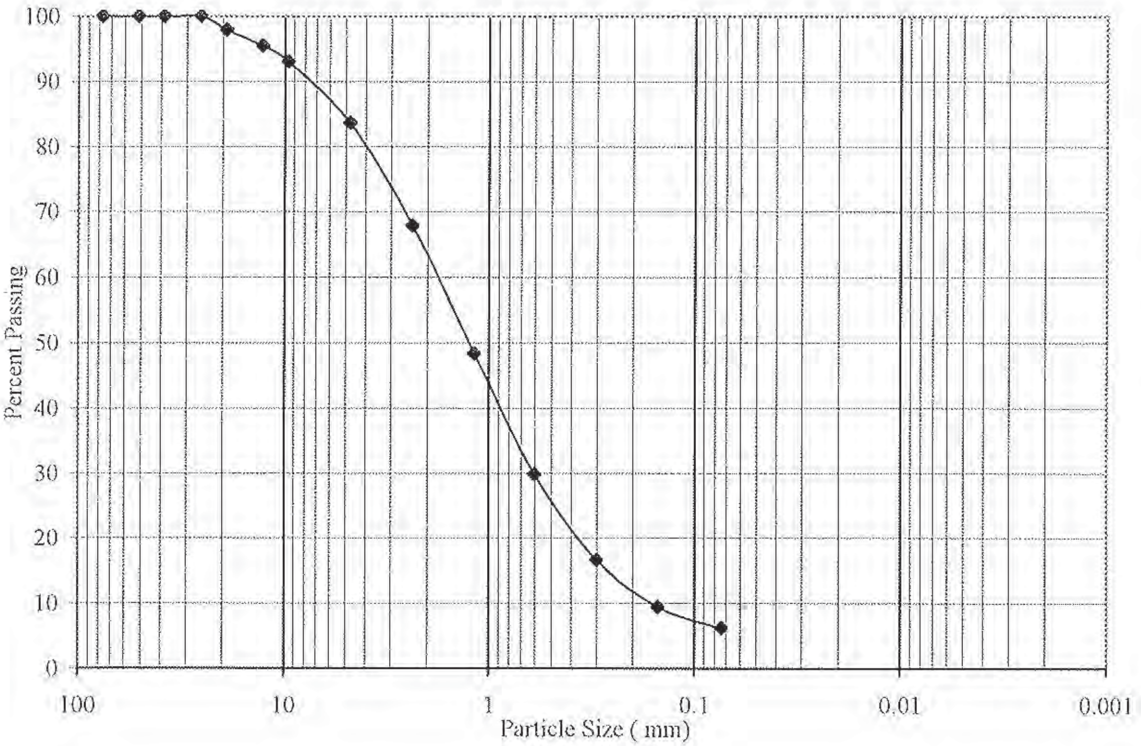
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #29 - 4-6 feet**
Description: **Well Graded Sand w/Silt (SW-SM)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	98
1/2"	95
3/8"	93
#4	84
#8	68
#16	48
#30	30
#50	17
#100	9
#200	6

% Gravel:	**16**
% Sand:	**77**
% Silt:	**2**
% Clay (3 micron):	**4**

(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

ASTM D-422

Job Name: Travertine Project, La Quinta

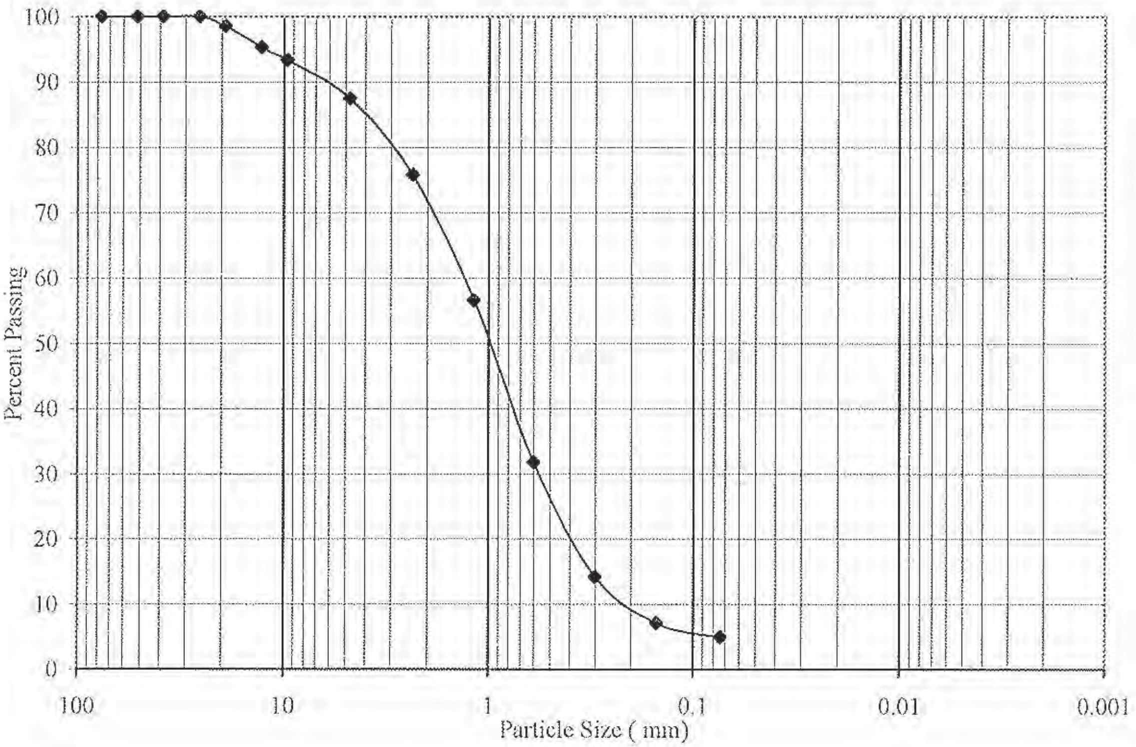
Sample ID: **Test Pit #32 - 3-5 feet**

Description: **Well Graded Sand w/Silt (SW-SM)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	99
1/2"	95
3/8"	93
#4	87
#8	76
#16	57
#30	32
#50	14
#100	7
#200	5

% Gravel:	**13**
% Sand:	**83**
% Silt:	**1**
% Clay (3 micron):	**4**

(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

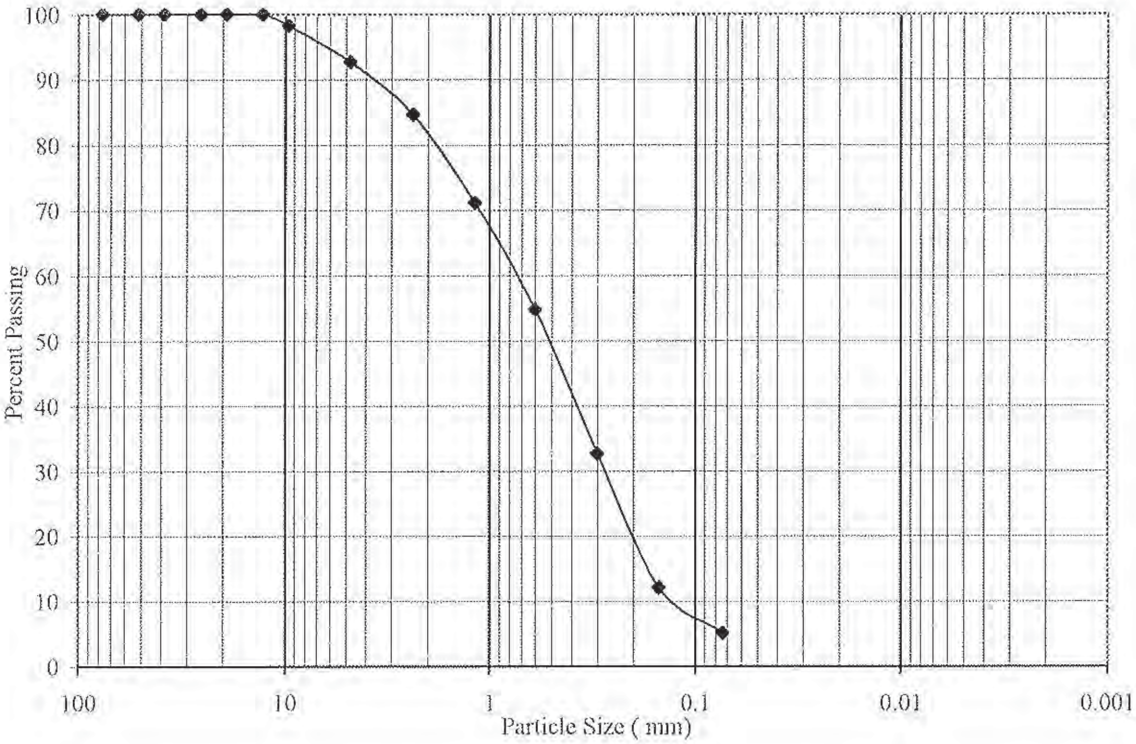
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #35 - 1-3 feet**
Description: **0.0**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	98
#4	93
#8	85
#16	71
#30	55
#50	33
#100	12
#200	5

% Gravel:	**7**
% Sand:	**87**
% Silt:	**2**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

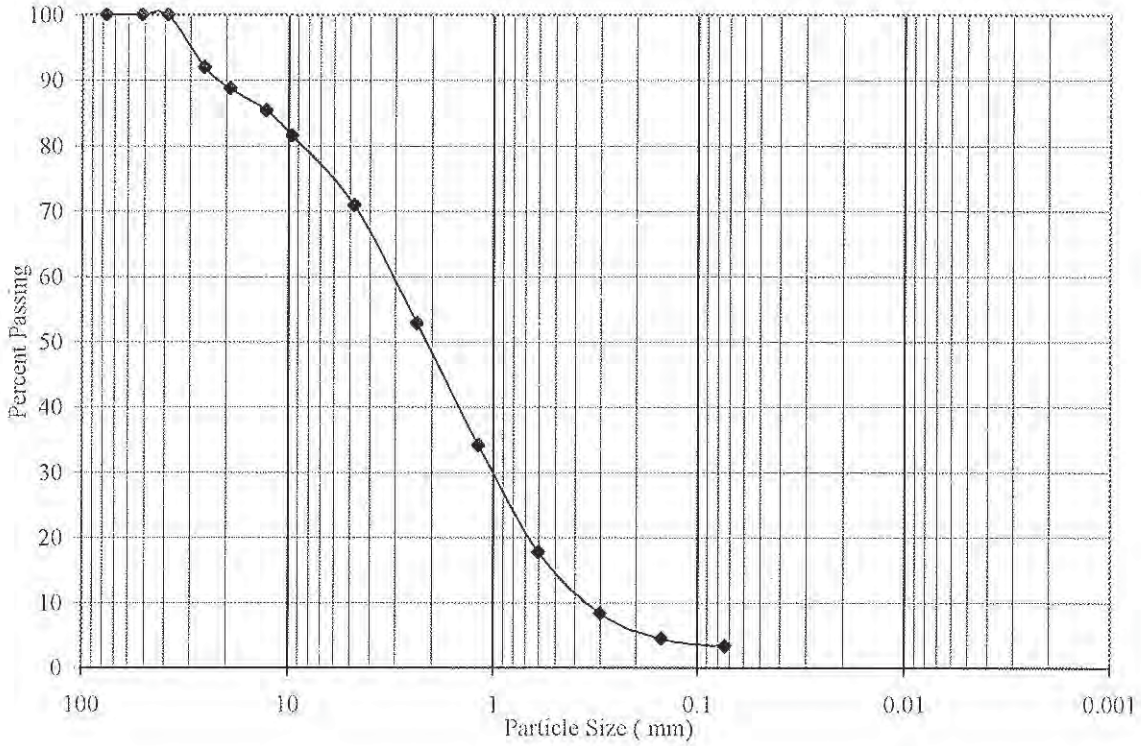
PARTICLE SIZE ANALYSIS

ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #37 - 4-7 feet**
Description: **Gravelly Sand (SW)**

Sieve Size	Percent Passing
1-1/2"	100
1"	92
3/4"	89
1/2"	85
3/8"	82
#4	71
#8	53
#16	34
#30	18
#50	8
#100	5
#200	3

% Gravel: **29**
% Sand: **68**
% Silt: **0**
% Clay (3 micron): **3**
(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

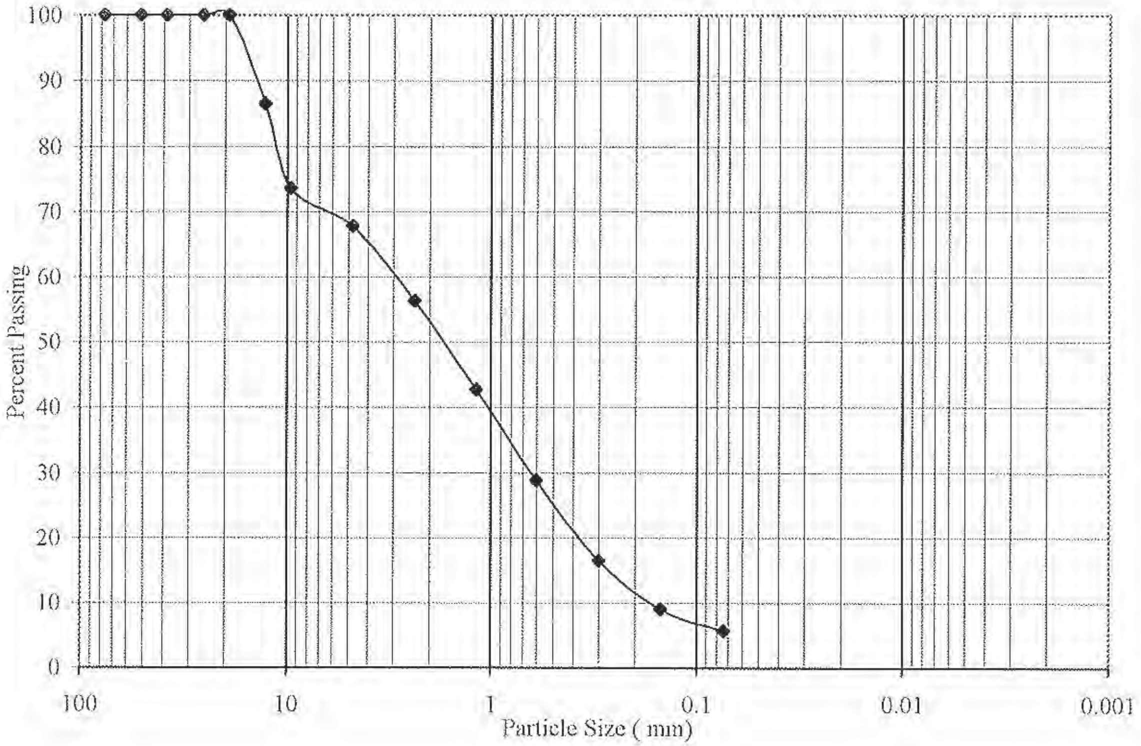
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #41 - 3-5 feet**
Description: **Gravelly Sand w/Silt (SW-SM)**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	86
3/8"	74
#4	68
#8	56
#16	43
#30	29
#50	17
#100	9
#200	6

% Gravel:	**32**
% Sand:	**62**
% Silt:	**2**
% Clay (3 micron):	**4**

(Clay content by short hydrometer method)



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

PARTICLE SIZE ANALYSIS

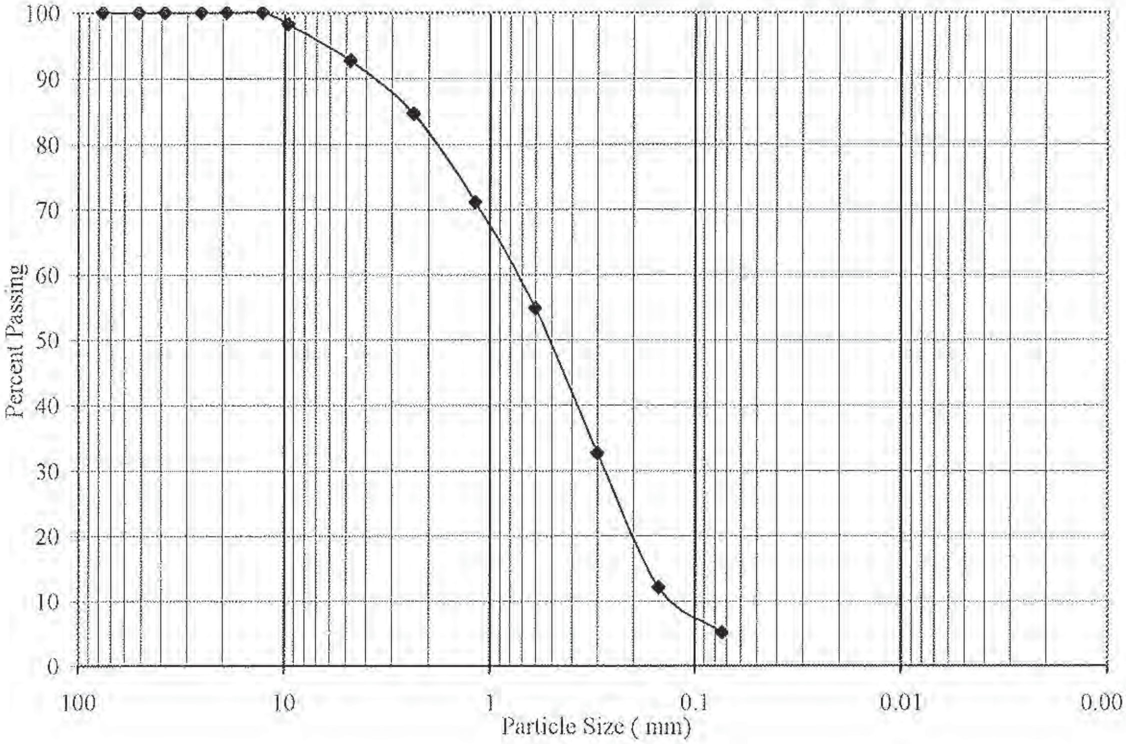
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #45 - 2-4 feet**
Description: **0.0**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	98
#4	93
#8	85
#16	71
#30	55
#50	33
#100	12
#200	5

% Gravel:	7
% Sand:	87
% Silt:	2
% Clay (3 micron):	3

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

PARTICLE SIZE ANALYSIS

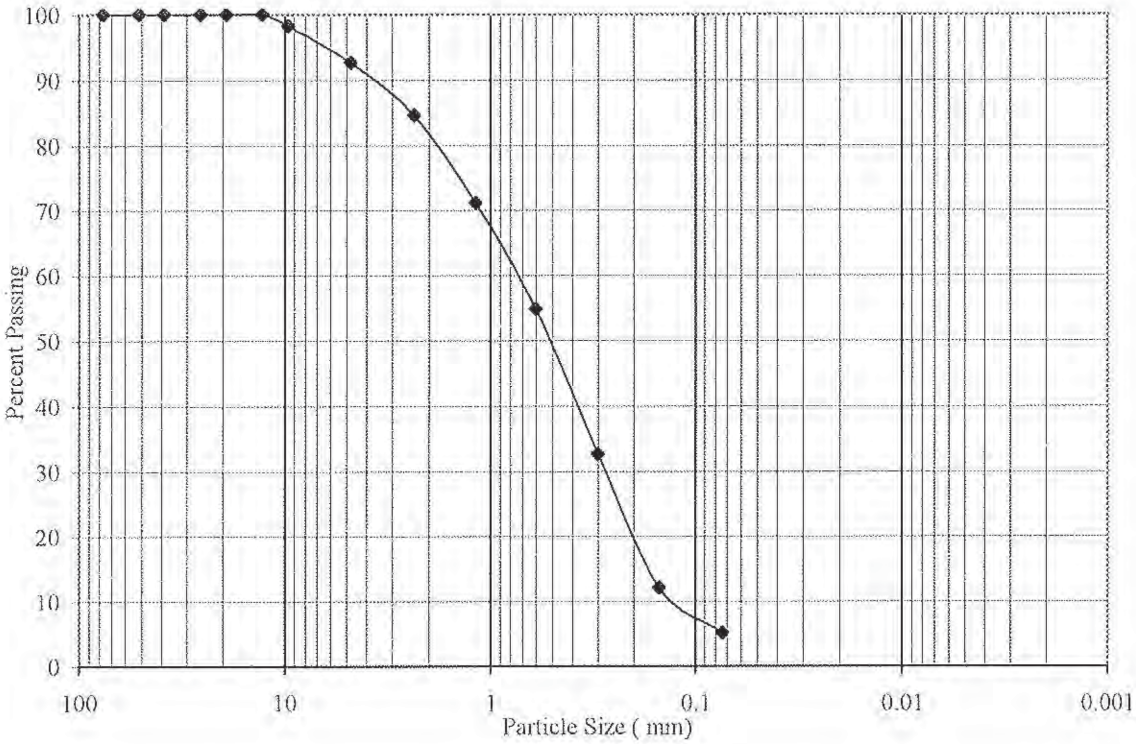
ASTM D-422

Job Name: Travertine Project, La Quinta
Sample ID: **Test Pit #47 - 10-12 feet**
Description: **0.0**

Sieve Size	Percent Passing
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	98
#4	93
#8	85
#16	71
#30	55
#50	33
#100	12
#200	5

% Gravel:	**7**
% Sand:	**87**
% Silt:	**2**
% Clay (3 micron):	**3**

(Clay content by short hydrometer method)



File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

MAXIMUM DENSITY / OPTIMUM MOISTURE

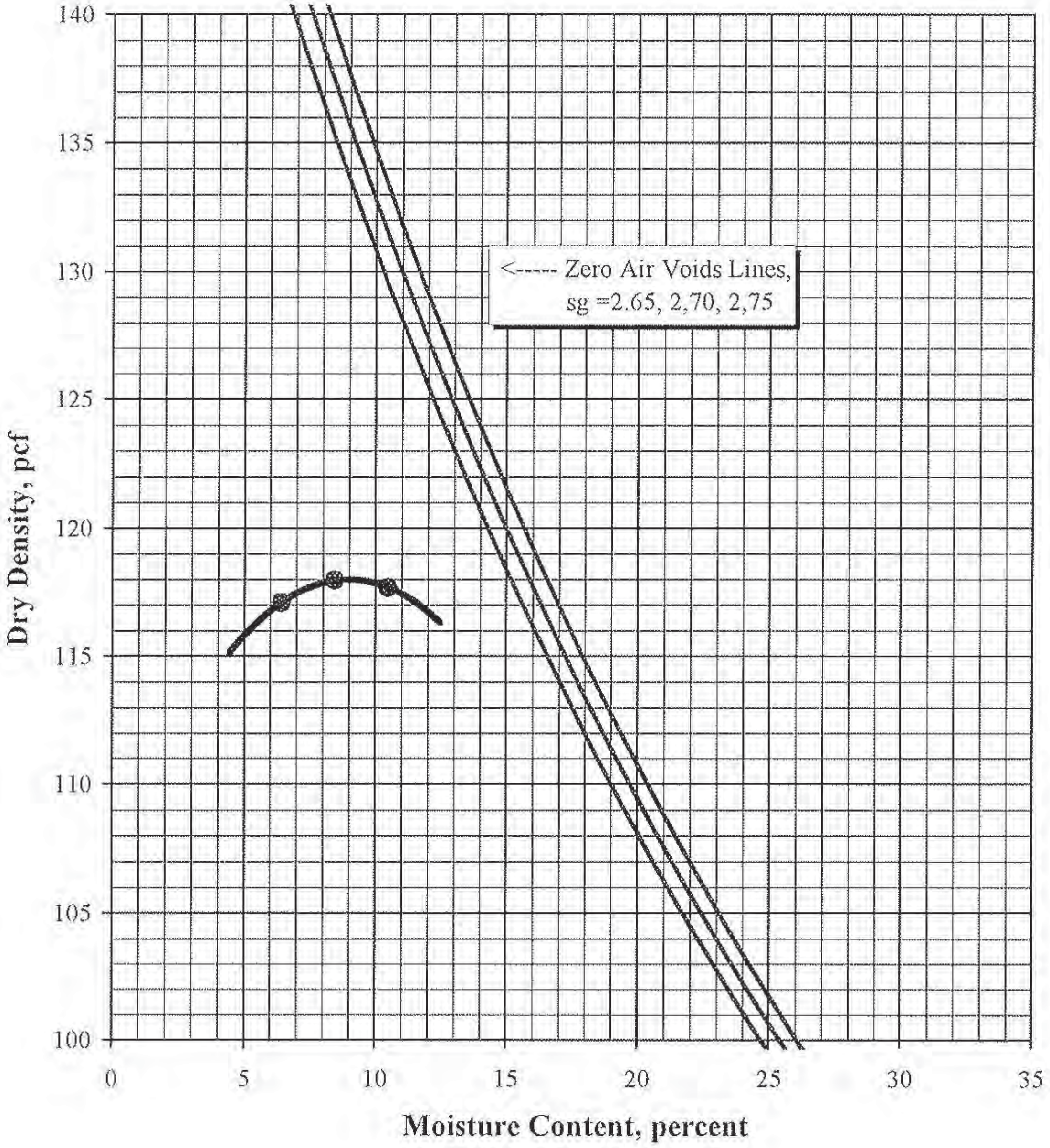
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 1
Location: Test Pit #4 - 2-4 feet
Description: Well Graded Sand w/Gravel (SW)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **118 pcf**
Optimum Moisture: **9%**

Sieve Size	% Retained
3/4"	0.4
3/8"	2.4
#4	9.5



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

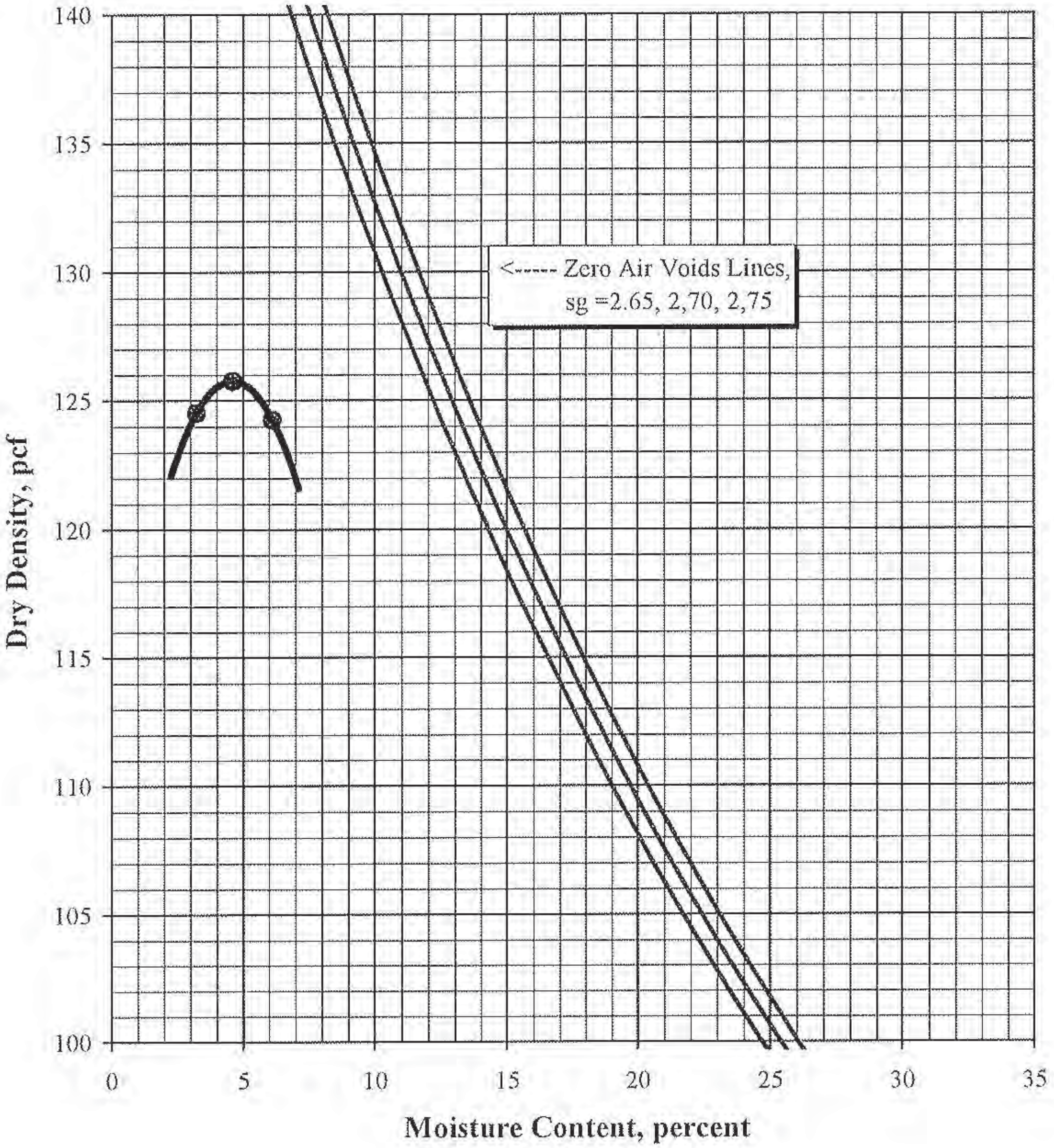
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 2
Location: Test Pit #14 - 1-3 feet
Description: Sandy Gravel (GW)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Sieve Size	% Retained
3/4"	19.7
3/8"	24.3
#4	30.8

Maximum Density: **126 pcf**
Optimum Moisture: **5%**
Corrected for Oversize (ASTM D4718)



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta

Sample ID: 3

Location: Test Pit #17 - 4-5 feet

Description: Gravelly Sand (SW)

Procedure Used: C

Preparation Method: Moist

Rammer Type: Mechanical

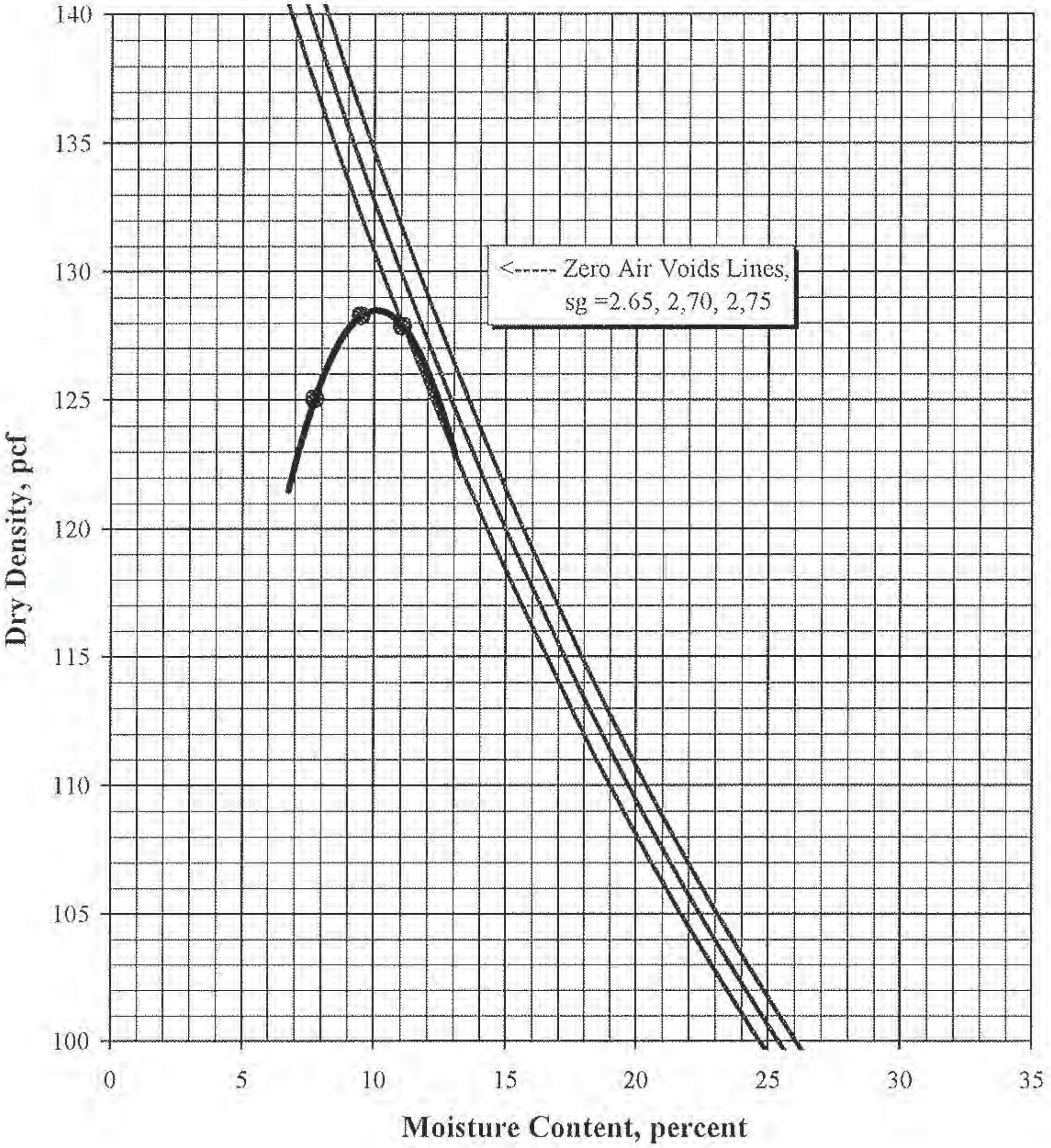
Lab Numbe 07-0682

Maximum Density: **128.5 pcf**

Optimum Moisture: **10%**

Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.3
3/8"	22.9
#4	28.7



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta

Sample ID: 4

Location: Test Pit #19 - 2.5-4 feet

Description: Gravelly Sand (SW)

Procedure Used: C

Preparation Method: Moist

Rammer Type: Mechanical

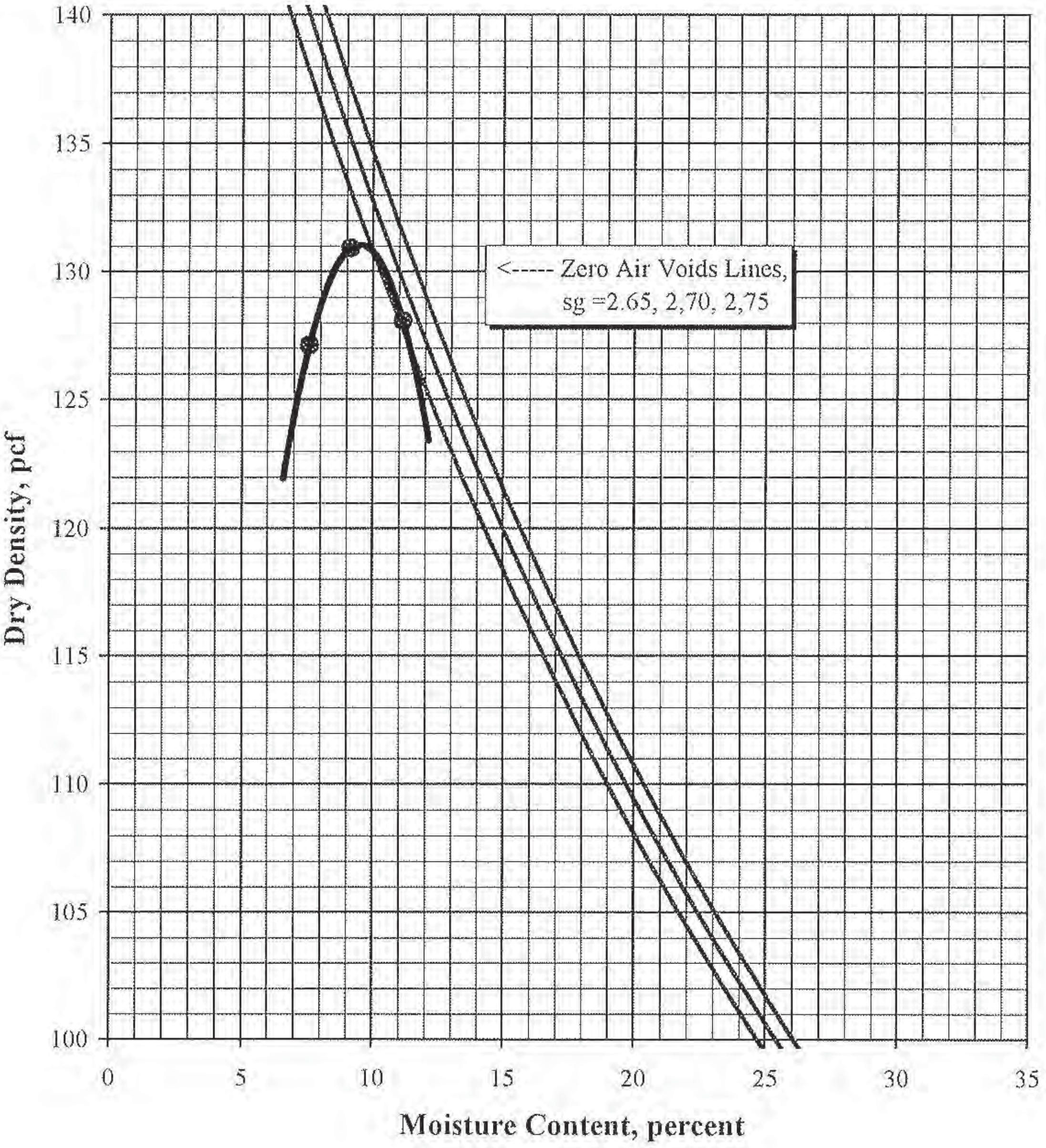
Lab Numbe 07-0682

Maximum Density: **131 pcf**

Optimum Moisture: **9.5%**

Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.7
3/8"	26.8
#4	36.3



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta

Sample ID: 5

Location: Test Pit #26 - 5-6 feet

Description: Sandy Gravel (GW)

Procedure Used: C

Preparation Method: Moist

Rammer Type: Mechanical

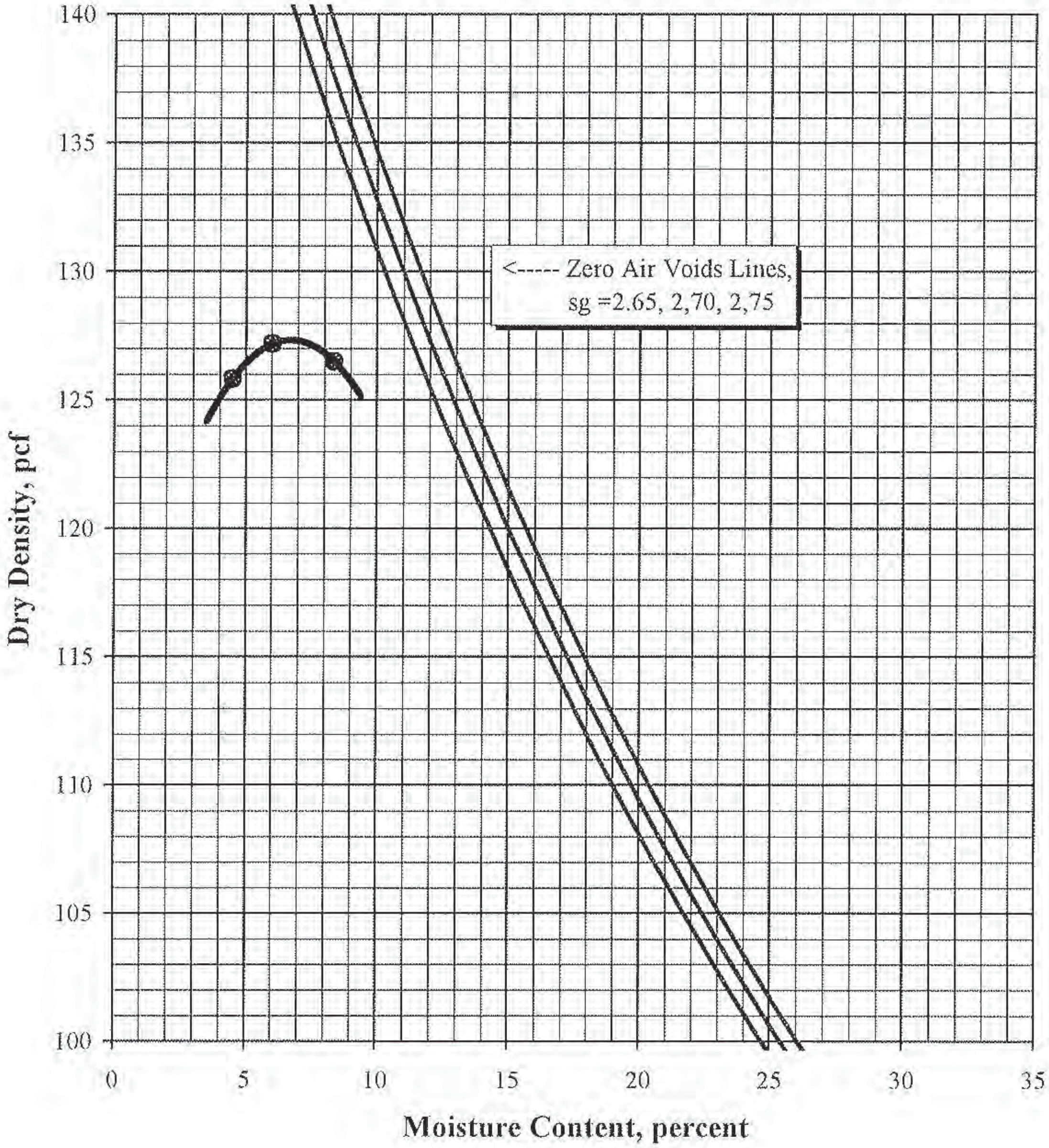
Lab Numbe 07-0682

Maximum Density: **127.5 pcf**

Optimum Moisture: **7%**

Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.8
3/8"	28.8
#4	39.1



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

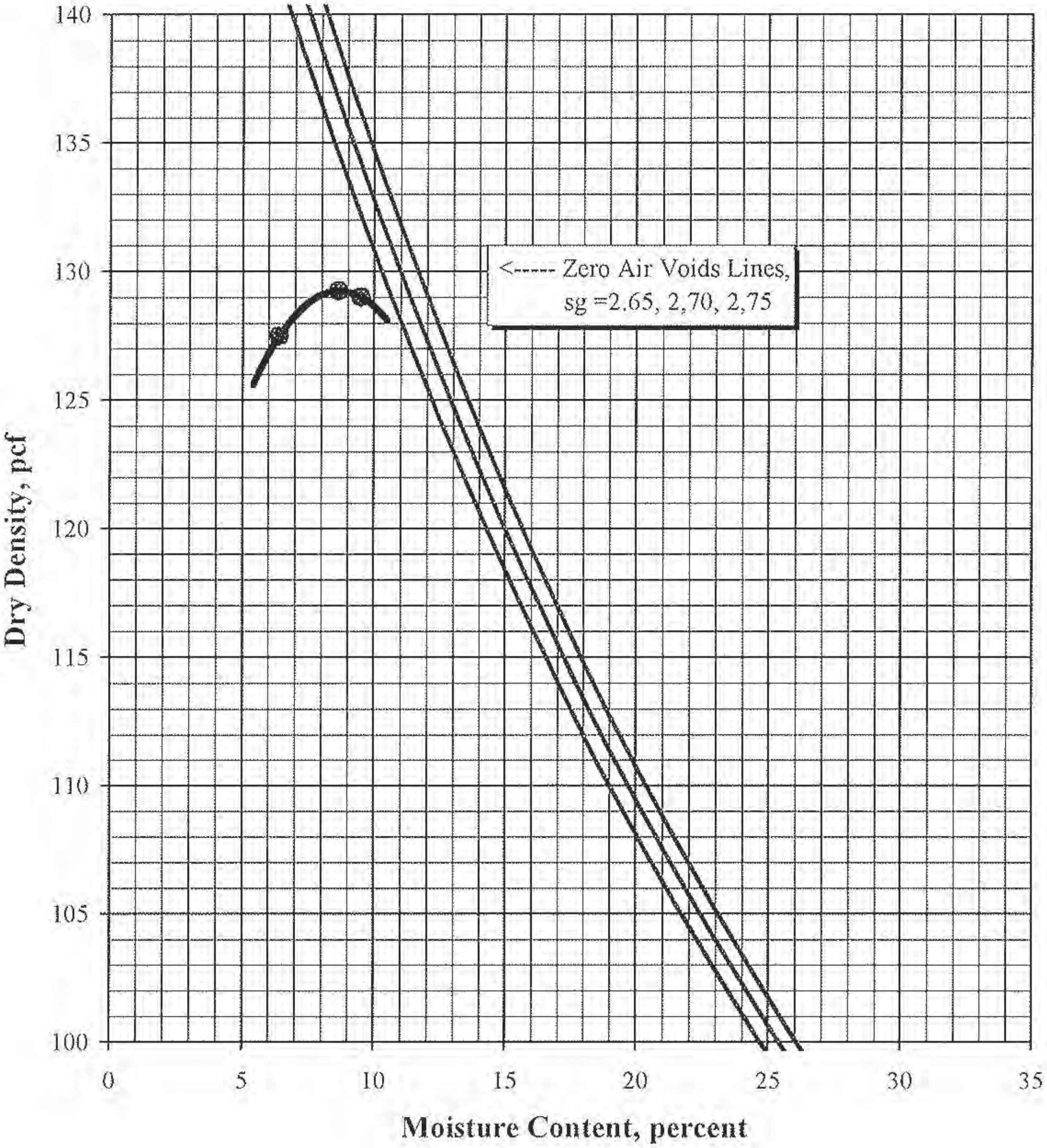
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 6
Location: Test Pit #29 - 4-6 feet
Description: Well Graded Sand w/Silt (SW-SM)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **129 pcf**
Optimum Moisture: **8.5%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	15.2
3/8"	21.1
#4	28.7



EARTH SYSTEMS SOUTHWEST

File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

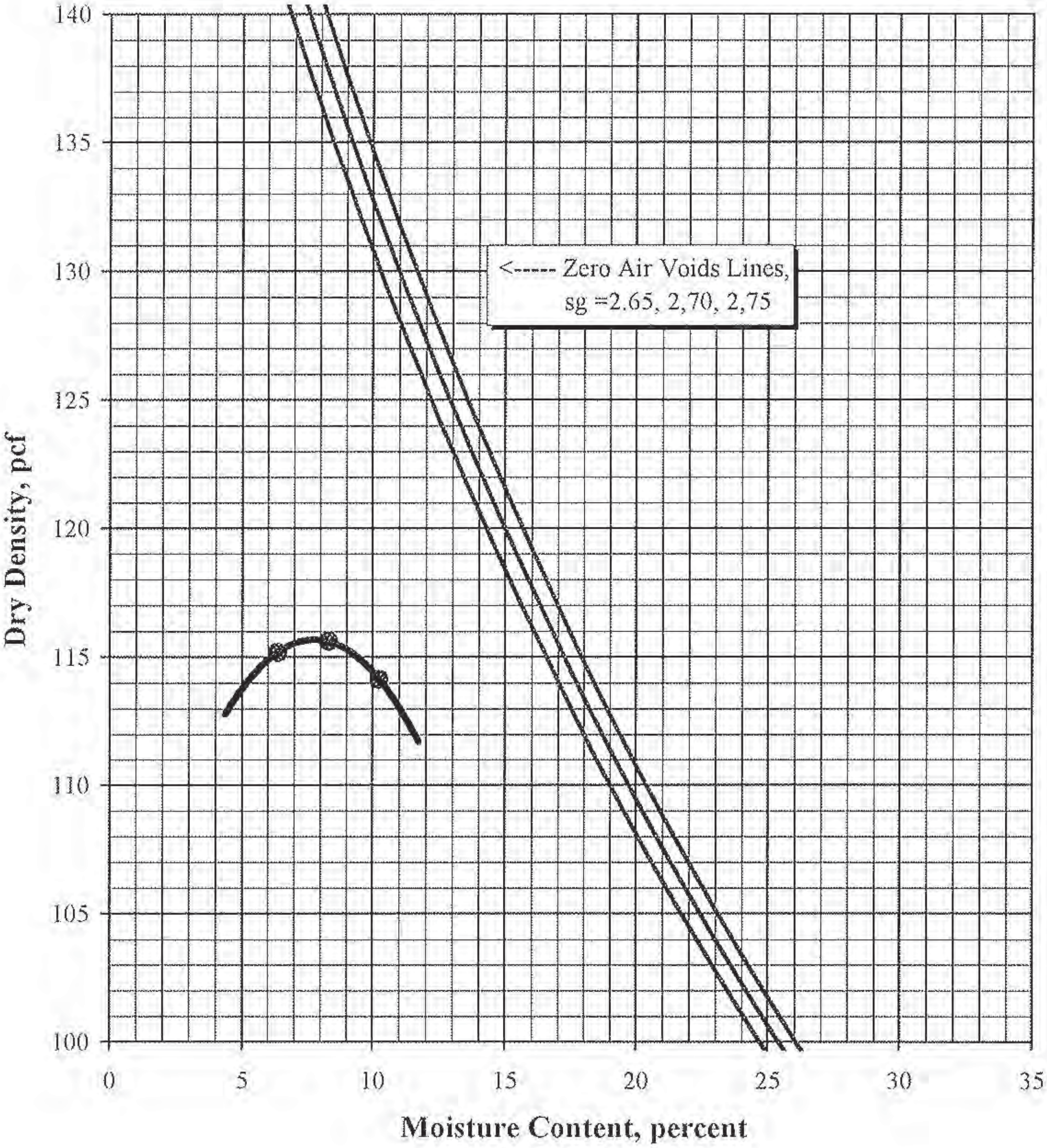
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 7
Location: Test Pit #32 - 3-5 feet
Description: Well Graded Sand w/Silt (SW-SM)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **115.5 pcf**
Optimum Moisture: **8%**

Sieve Size	% Retained
3/4"	3.5
3/8"	7.1
#4	13.2



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta

Sample ID: 8

Location: Test Pit #37 - 4-7 feet

Description: Gravelly Sand (SW)

Procedure Used: B

Preparation Method: Moist

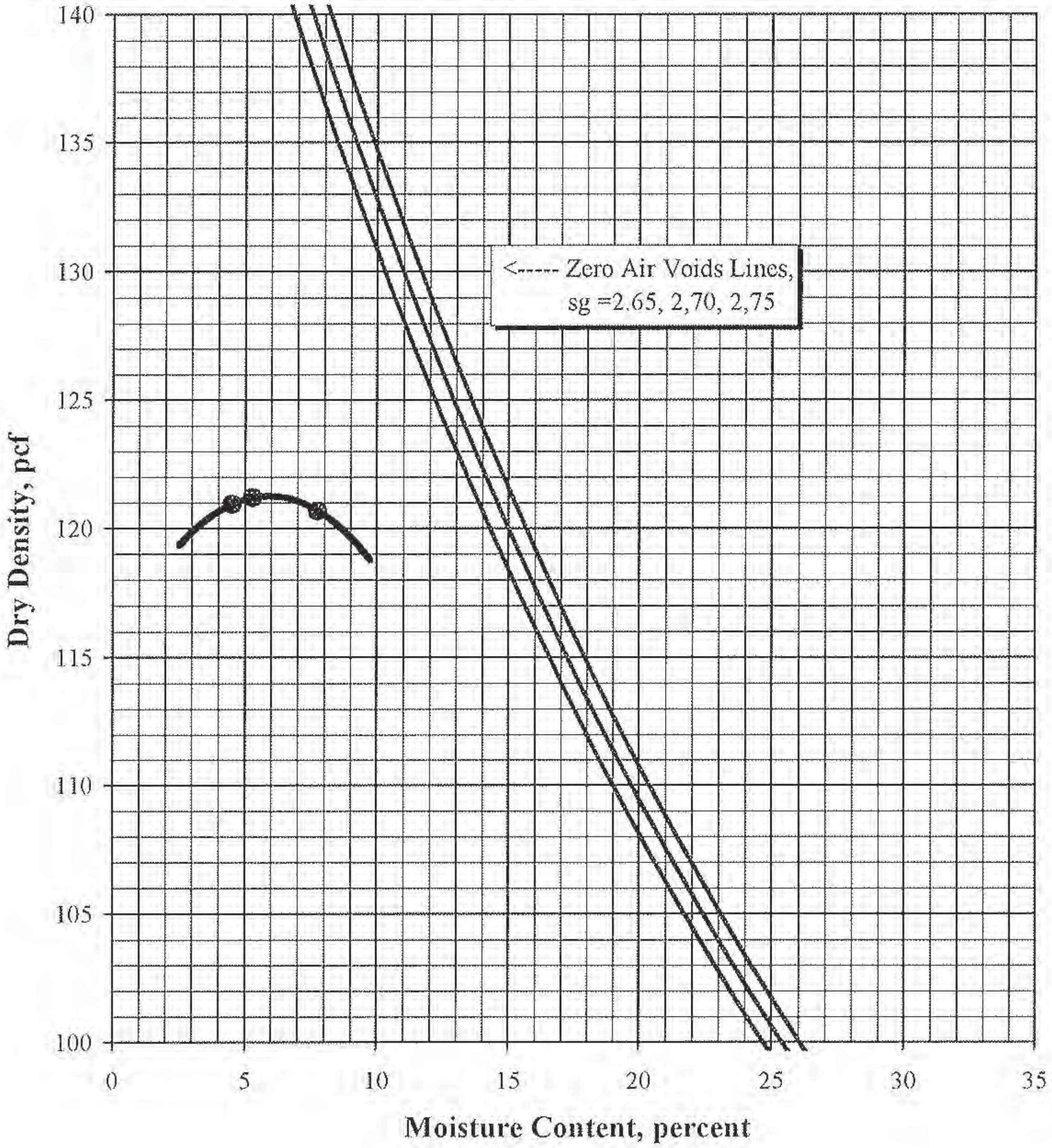
Rammer Type: Mechanical

Lab Numbe 07-0682

Maximum Density: **121.5 pcf**

Optimum Moisture: **6%**

Sieve Size	% Retained
3/4"	5.9
3/8"	10.7
#4	19.8



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

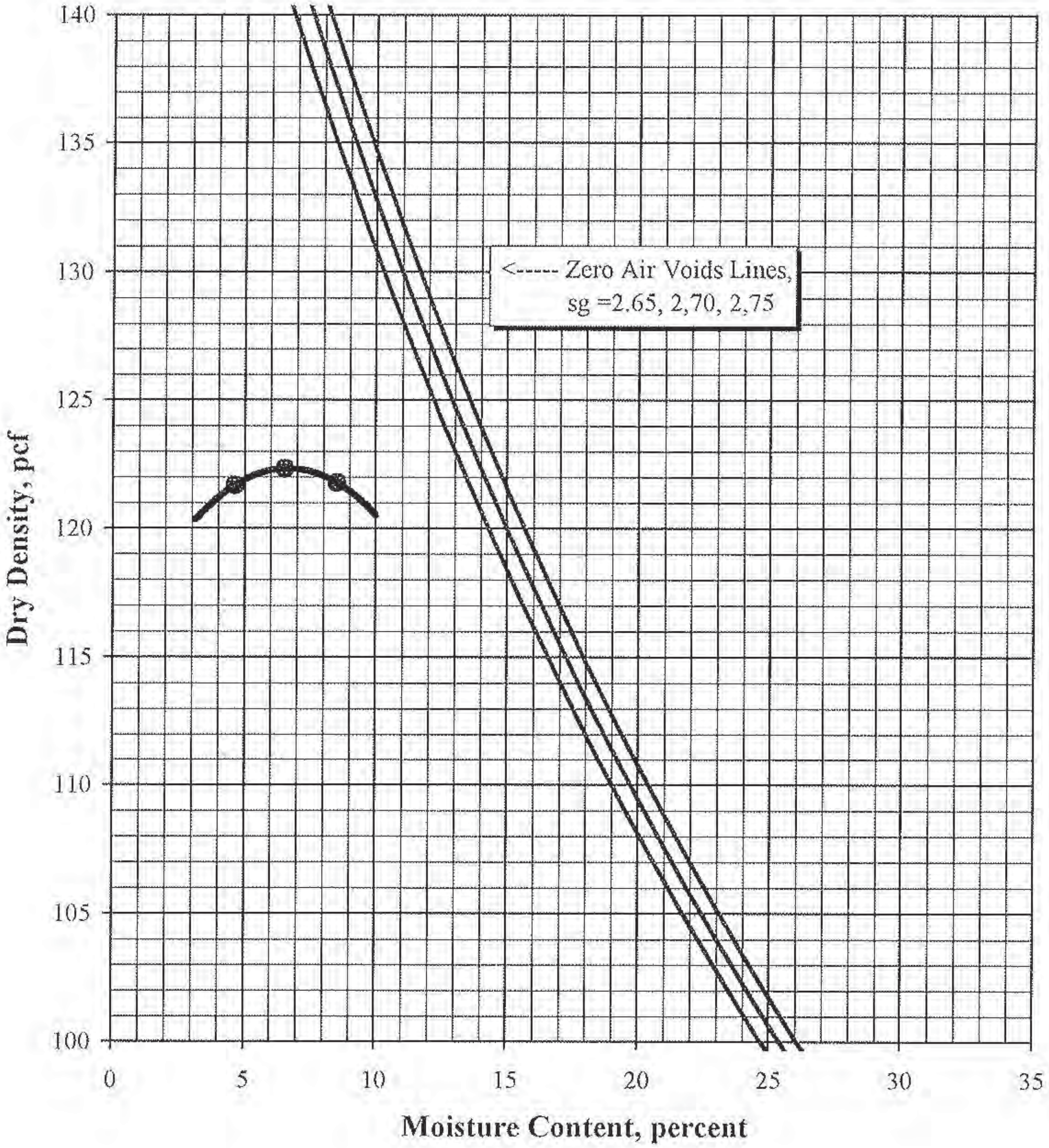
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 9
Location: Test Pit #41 - 3-5 feet
Description: Gravelly Sand w/Silt (SW-SM)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **122.5 pcf**
Optimum Moisture: **6.5%**

Sieve Size	% Retained
3/4"	0.3
3/8"	2.1
#4	5.8



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

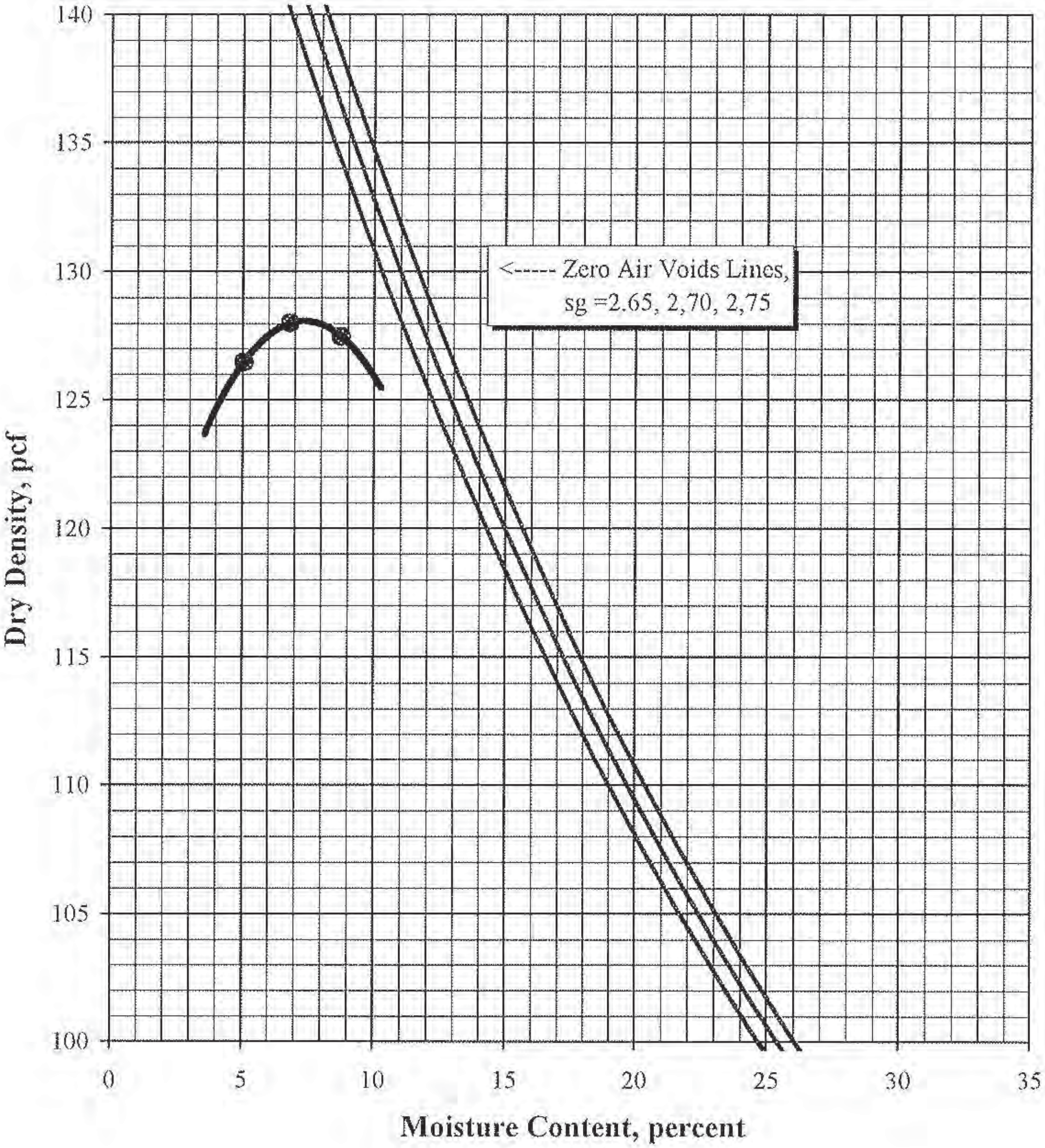
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 10
Location: Test Pit #45 - 2-4 feet
Description: Well Graded Sand w/Gravel (SW)

Procedure Used: C
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **128 pcf**
Optimum Moisture: **7.5%**
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	19.0
3/8"	24.3
#4	29.5



File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

MAXIMUM DENSITY / OPTIMUM MOISTURE

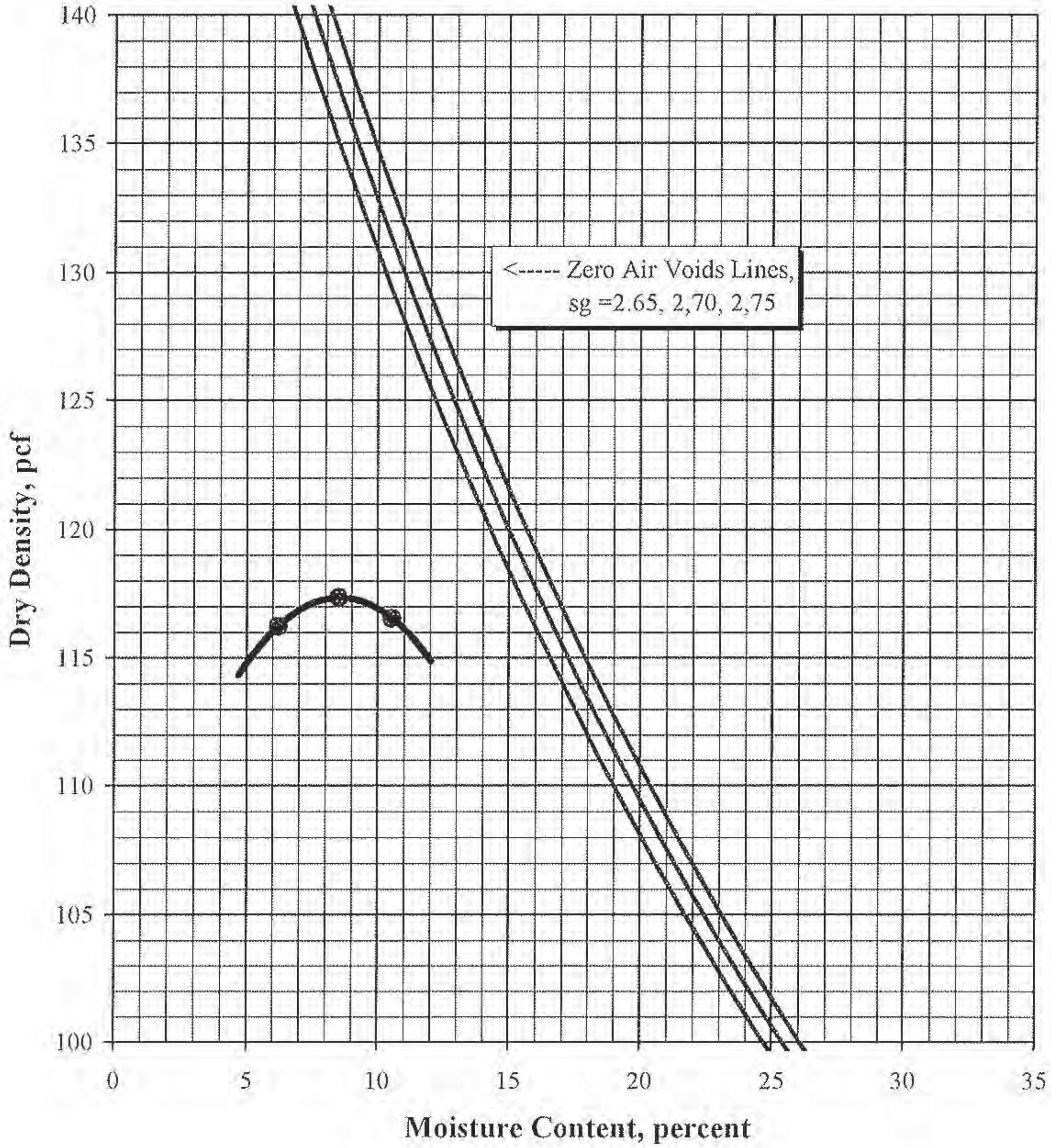
ASTM D 1557-91 (Modified)

Job Name: Travertine Project, La Quinta
Sample ID: 11
Location: Test Pit #47 - 10-12 feet
Description: Well Graded Sand w/Gravel (SW)

Procedure Used: A
Preparation Method: Moist
Rammer Type: Mechanical
Lab Numbe 07-0682

Maximum Density: **117.5 pcf**
Optimum Moisture: **8.5%**

Sieve Size	% Retained
3/4"	7.6
3/8"	11.0
#4	14.5



File No.: 11112-04 November 21, 2007

Lab No.: 07-0682

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta

Job No.: 11112-04

Sample ID:	#4	#14	#17		
Sample Depth, feet:	2-4	1-3	4-5	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**8.40**	**7.40**	**8.10**	1	0.41
Resistivity, (ohm-cm):	**2,700**	**750**	**5,200**	N/A	N/A
Conductivity, (μmhos-cm):				1	2.00

Note: Tests performed by Subcontract Laboratory:

Surabian AG Laboratory
105 Tesori Drive
Palm Desert, California 92211 Tel: (760) 200-4498

DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

Chemical Agent	Amount in Soil	Degree of Corrosivity
Soluble Sulfates	0 -1000 mg/Kg (ppm) [0-.1%]	Low
	1000 - 2000 mg/Kg (ppm) [0.1-0.2%]	Moderate
	2000 - 20,000 mg/Kg (ppm) [0.2-2.0%]	Severe
	> 20,000 mg/Kg (ppm) [>2.0%]	Very Severe
Resistivity	1-1000 ohm-cm	Very Severe
	1000-2000 ohm-cm	Severe
	2000-10,000 ohm-cm	Moderate
	10,000+ ohm-cm	Low

File No.: 11112-04
Lab No.: 07-0682

November 21, 2007

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta
Job No.: 11112-04

Sample ID:	#19	#26	#29		
Sample Depth, feet:	2.5-4	5-6	4-6	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**8.05**	**7.70**	**8.60**	1	0.41
Resistivity, (ohm-cm):	**3,650**	**980**	**5,300**	N/A	N/A
Conductivity, (µmhos-cm):				1	2.00

Note: Tests performed by Subcontract Laboratory:
Surabian AG Laboratory
105 Tesori Drive
Palm Desert, California 92211 Tel: (760) 200-4498

DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

Chemical Agent	Amount in Soil	Degree of Corrosivity
Soluble Sulfates	0 -1000 mg/Kg (ppm) [0-.1%]	Low
	1000 - 2000 mg/Kg (ppm) [0.1-0.2%]	Moderate
	2000 - 20,000 mg/Kg (ppm) [0.2-2.0%]	Severe
	> 20,000 mg/Kg (ppm) [>2.0%]	Very Severe
Resistivity	1-1000 ohm-cm	Very Severe
	1000-2000 ohm-cm	Severe
	2000-10,000 ohm-cm	Moderate
	10,000+ ohm-cm	Low

File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta
Job No.: 11112-04

Sample ID:	#32	#35	#37		
Sample Depth, feet:	3-5	1-3	4-7	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**8.60**	**8.15**	**7.90**	1	0.41
Resistivity, (ohm-cm):	**2,350**	**790**	**1,440**	N/A	N/A
Conductivity, (µmhos-cm):				1	2.00

Note: Tests performed by Subcontract Laboratory:
Surabian AG Laboratory
105 Tesori Drive
Palm Desert, California 92211 Tel: (760) 200-4498

DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

Chemical Agent	Amount in Soil	Degree of Corrosivity
Soluble Sulfates	0 -1000 mg/Kg (ppm) [0-.1%]	Low
	1000 - 2000 mg/Kg (ppm) [0.1-0.2%]	Moderate
	2000 - 20,000 mg/Kg (ppm) [0.2-2.0%]	Severe
	> 20,000 mg/Kg (ppm) [>2.0%]	Very Severe
Resistivity	1-1000 ohm-cm	Very Severe
	1000-2000 ohm-cm	Severe
	2000-10,000 ohm-cm	Moderate
	10,000+ ohm-cm	Low

File No.: 11112-04 November 21, 2007
Lab No.: 07-0682

SOIL CHEMICAL ANALYSES

Job Name: Travertine Project, La Quinta
Job No.: 11112-04

Sample ID:	#41	#45	#47		
Sample Depth, feet:	3-5	2-4	10-12	DF	RL
Sulfate, mg/Kg (ppm):				1	0.50
Chloride, mg/Kg (ppm):				1	0.20
pH, (pH Units):	**7.70**	**7.95**	**8.00**	1	0.41
Resistivity, (ohm-cm):	**280**	**3,150**	**1,950**	N/A	N/A
Conductivity, (μmhos-cm):				1	2.00

Note: Tests performed by Subcontract Laboratory:
Surabian AG Laboratory
105 Tesori Drive
Palm Desert, California 92211 Tel: (760) 200-4498

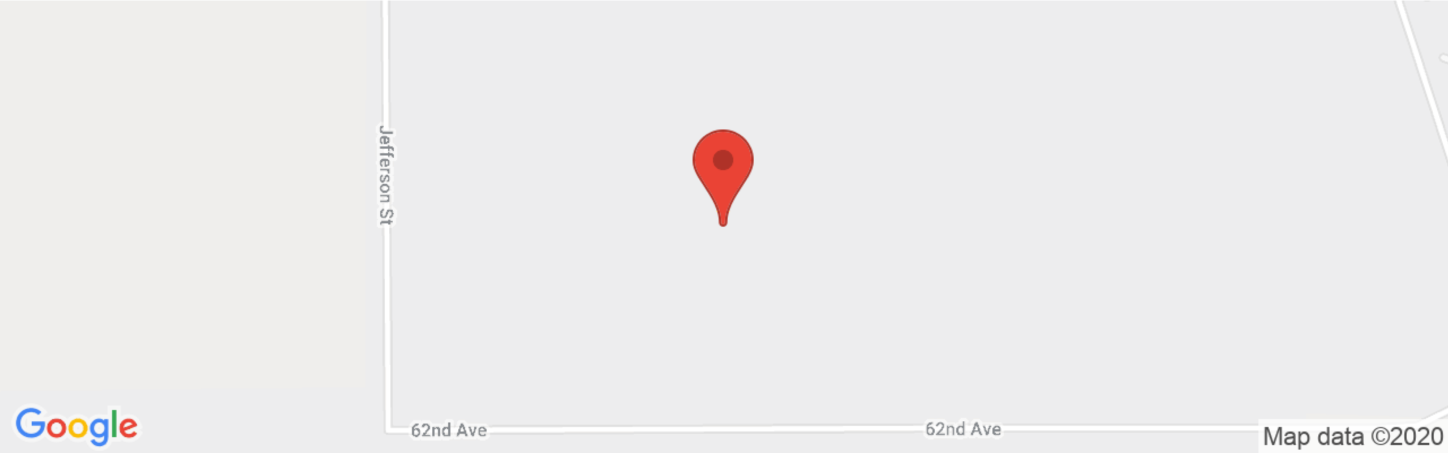
DF: Dilution Factor
RL: Reporting Limit

General Guidelines for Soil Corrosivity

Chemical Agent	Amount in Soil	Degree of Corrosivity
Soluble Sulfates	0 -1000 mg/Kg (ppm) [0-.1%]	Low
	1000 - 2000 mg/Kg (ppm) [0.1-0.2%]	Moderate
	2000 - 20,000 mg/Kg (ppm) [0.2-2.0%]	Severe
	> 20,000 mg/Kg (ppm) [>2.0%]	Very Severe
Resistivity	1-1000 ohm-cm	Very Severe
	1000-2000 ohm-cm	Severe
	2000-10,000 ohm-cm	Moderate
	10,000+ ohm-cm	Low

APPENDIX D

Latitude, Longitude: 33.60143, -116.26159



Date	1/7/2020, 3:56:01 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.584	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.522	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.575	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.553	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.688	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.584	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.652	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.522	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.92	Mapped value of the risk coefficient at short periods
C_{R1}	0.897	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (upd

Latitude

Decimal degrees

33.60143

Longitude

Decimal degrees, negative values for western longitudes

-116.26159

Site Class

259 m/s (Site class D)

Spectral Period

Peak Ground Acceleration

Time Horizon

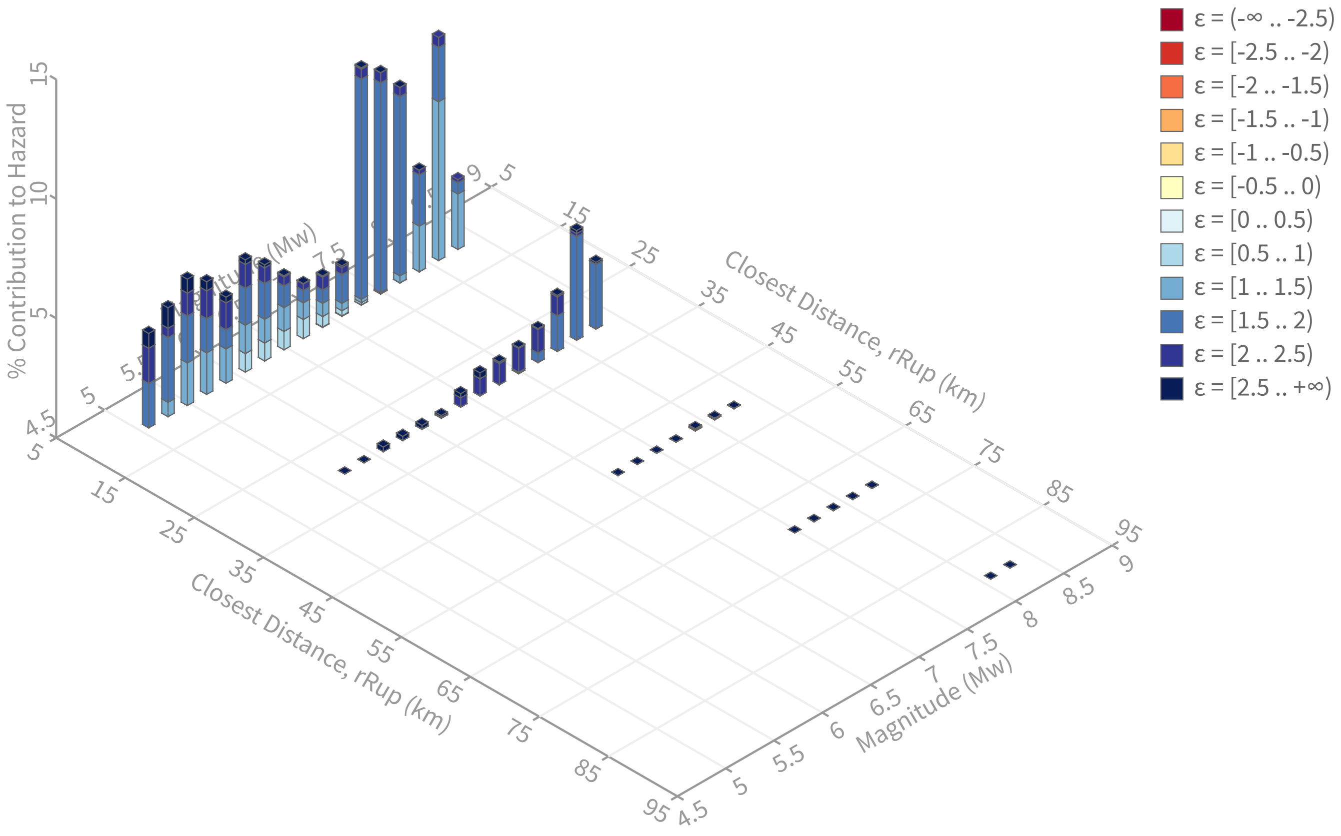
Return period in years

2475

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr⁻¹
PGA ground motion: 0.75141644 g

Recovered targets

Return period: 3071.2487 yrs
Exceedance rate: 0.00032560046 yr⁻¹

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.1 %

Mean (over all sources)

m: 7.01
r: 14.58 km
ε₀: 1.73 σ

Mode (largest m-r bin)

m: 7.34
r: 15.62 km
ε₀: 1.81 σ
Contribution: 9.93 %

Mode (largest m-r-ε₀ bin)

m: 7.34
r: 15.83 km
ε₀: 1.8 σ
Contribution: 9.21 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							30.73
San Andreas (Coachella) rev [2]		15.84	7.68	1.66	116.143°W	33.704°N	43.80	22.64
San Jacinto (Anza) rev [5]		26.44	8.01	1.93	116.513°W	33.490°N	242.00	3.26
San Jacinto (Clark) rev [2]		23.82	7.78	1.97	116.366°W	33.406°N	203.99	3.10
UC33brAvg_FM32	System							30.54
San Andreas (Coachella) rev [2]		15.84	7.68	1.67	116.143°W	33.704°N	43.80	22.44
San Jacinto (Anza) rev [5]		26.44	7.99	1.94	116.513°W	33.490°N	242.00	3.31
San Jacinto (Clark) rev [2]		23.82	7.78	1.97	116.366°W	33.406°N	203.99	3.00
UC33brAvg_FM31 (opt)	Grid							19.37
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.10
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.07
PointSourceFinite: -116.262, 33.651		7.25	5.74	1.62	116.262°W	33.651°N	0.00	1.90
PointSourceFinite: -116.262, 33.651		7.25	5.74	1.62	116.262°W	33.651°N	0.00	1.88
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.41
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.40
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.40
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.39
UC33brAvg_FM32 (opt)	Grid							19.36
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.09
PointSourceFinite: -116.262, 33.633		5.98	5.78	1.40	116.262°W	33.633°N	0.00	4.07
PointSourceFinite: -116.262, 33.651		7.25	5.73	1.62	116.262°W	33.651°N	0.00	1.90
PointSourceFinite: -116.262, 33.651		7.25	5.73	1.62	116.262°W	33.651°N	0.00	1.88
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.41
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.40
PointSourceFinite: -116.262, 33.714		11.58	6.11	2.00	116.262°W	33.714°N	0.00	1.39
PointSourceFinite: -116.262, 33.705		11.16	5.99	2.01	116.262°W	33.705°N	0.00	1.38

APPENDIX E

REPORT
SEISMIC REFRACTION SURVEY

Jefferson Street and 62nd Avenue
La Quinta, CA

GEO*Vision* Project No. 19201

Prepared for

NMG Geotechnical, Inc.
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Prepared by

GEO*Vision* Geophysical Services, Inc.
1124 Olympic Drive
Corona, CA 92881
(951) 549-1234

May 31, 2019

Report 19201

TABLE OF CONTENTS

1 INTRODUCTION 2
2 EQUIPMENT AND FIELD PROCEDURES 3
3 METHODOLOGY 4
4 DATA REDUCTION AND MODELING 6
5 DISCUSSION OF RESULTS 7
6 REFERENCES 8
7 CERTIFICATION 9

LIST OF TABLES

Table 1 Seismic Line Geometry

LIST OF FIGURES

Figure 1 Site Map
Figure 2 Line 1: P-wave Seismic Tomography Model
Figure 3 Line 2: P-wave Seismic Tomography Model
Figure 4 Line 3: P-wave Seismic Tomography Model

APPENDICES

Appendix A Technical Note - Seismic Refraction Method

1 INTRODUCTION

A P-wave seismic refraction survey was conducted near Jefferson St and 62nd Avenue La Quinta, California, on May 10th, 2019. The survey was conducted along three P-wave seismic refraction lines, designated as Lines 1 through 3 (Figure 1). The purpose of this investigation was to determine rock rippability and subsurface velocity variability for planning future construction activities.

The locations of the lines were placed by **GEO***Vision* personnel to gather the highest quality data in the areas of greatest interest as directed by NMG Geotechnical Inc. The endpoints of each refraction line were surveyed by **GEO***Vision* personnel using a Spectra SP60 with Centerpoint RTX submeter differential corrections (Table 1) and plotted on a site map (Figure 1).

The rippability of alluvium is not presented in the Caterpillar Handbook of Ripping; therefore other sedimentary rocks will be used, such as sandstone and conglomerate, for comparison. Sandstone is considered rippable by a Caterpillar D8R Ripper to a P-wave velocity of 6,500 ft/s and marginally rippable to a velocity of 8,250 ft/s, providing the rock is sufficiently jointed and fractured. Sandstone is considered rippable by a Caterpillar D9R Ripper to a velocity of 7,250 ft/s and marginally rippable to a velocity of 9,500 ft/s providing the rock is sufficiently jointed and fractured. Conglomerate is considered rippable by a Caterpillar D8R Ripper to a P-wave velocity of 6,300 ft/s and marginally rippable to a velocity of 8,000 ft/s, providing the rock is sufficiently jointed and fractured. Conglomerate is considered rippable by a Caterpillar D9R Ripper to a velocity of 7,500 ft/s and marginally rippable to a velocity of 9,250 ft/s providing the rock is sufficiently jointed and fractured. It should be noted that blasting may be more cost-effective in marginally rippable rock due to time and equipment wear considerations. Published data are not available for the ripping characteristics of excavators, but we typically assume that excavators have about half the ripping ability of a D8R.

The following sections include a discussion of equipment and field procedures, methodology, data processing, and results of the geophysical survey.

2 EQUIPMENT AND FIELD PROCEDURES

Seismic refraction equipment used during this investigation consisted of two Geometrics Geode 24-channel signal enhancement seismographs, 10 Hz vertical geophones, seismic cables with 10-foot takeouts, a 240-lb accelerated weight drop (AWD), a 10-lb sledgehammer, and an aluminum strike plate.

Each line consisted of one spread of 48 geophones aligned in a linear array. The geophone spacing and total lengths per line are outlined in Table 1. Elevations along the refraction lines were surveyed using a combination of a Nikon AP-8 automatic level and a Spectra SP60 with Centerpoint RTX submeter, real-time corrections. All geophone locations were measured using a 300-foot tape measure.

A typical seismic refraction survey field layout is shown in Appendix A. Up to seventeen (17) shot point locations were occupied on each P-wave line: off-end shots (where possible), end shots, and multiple interior shot points located between every fourth geophone. Space, access, and topography limited or prohibited the placement of some off-end shots. A 240-lb accelerated weight drop was used as the energy source where there was appropriate vehicle access; the remaining shots were done using a 10-lb sledgehammer as the energy source.

A 3D Geophysics or Geometrics hammer switch attached to the sledgehammer or inserted within the strike plate and coupled to the Geode via a trigger extension was used to trigger the seismograph upon impact. The final seismic record at each shot point was the result of stacking 6 to 10 shots to increase the signal to noise ratio. All seismic records were stored on a laptop computer. Data files were named with the sequential line, spread, and shot number and a ".dat" extension (e.g., data file 1105.dat is the seismic record from line 1, spread 1, shot 5). Data acquisition parameters, file names, and leveling data were recorded on a field form, which is retained in project files.

3 METHODOLOGY

Detailed discussions of the seismic refraction method can be found in Telford et al. (1990), Dobrin and Savit (1988), and Redpath (1973).

When conducting a seismic survey, acoustic energy is input to the subsurface by an energy source such as a sledgehammer impacting a metallic plate, weight drop, vibratory source, or explosive charge. The acoustic waves propagate into the subsurface at a velocity dependent upon the elastic properties of the material through which they travel. When the waves reach an interface where the density or velocity changes significantly, a portion of the energy is reflected back to the surface and the remainder is transmitted into the lower layer. Where the velocity of the lower layer is higher than that of the upper layer, a portion of the energy is also critically refracted along with the interface. Critically refracted waves travel along with the interface at the velocity of the lower layer and continually refract energy back to the surface. Receivers (geophones) laid out in linear array on the surface, record the incoming refracted, and reflected waves. The seismic refraction method involves analysis of the travel times of the first energy to arrive at the geophones. These first-arrivals are from either the direct wave (at geophones close to the source) or critically refracted waves (at geophones further from the source).

Analysis of seismic refraction data depends upon the complexity of the subsurface velocity structure. If the subsurface target is planar in nature then the slope-intercept method (Telford et al. [1990]) can be used to model multiple horizontal or dipping planar layers. A minimum of one end shot is required to model horizontal layers, and reverse end shots are required to model dipping planar layers. If the subsurface target is undulating (i.e. bedrock valley) then layer-based analysis routines such as the generalized reciprocal method (Palmer [1980 and 1981], Lankston and Lankston [1986], and Lankston [1990]), reciprocal method (Hawkins, 1961) also referred to as the ABC method, Hales' method (Hales, 1958), delay time method (Wyrobek [1956] and Gardner [1967]), time-term inversion (Scheidegger and Willmore, 1957), plus-minus method (Hagedoorn, 1959), and wavefront method (Rockwell, 1967) are required to model subsurface velocity structure. These methods generally require a minimum of 5 shot points per spread (end shots, off-end shots, and a center shot). If subsurface velocity structure is complex and cannot be adequately modeled using layer-based modeling techniques (i.e., complex weathering profile in bedrock, numerous lateral velocity variations), then Monte Carlo or tomographic inversion techniques (Zhang and Toksoz [1998], Schuster and Quintus-Bosz [1993]) are required to model the seismic refraction data. These techniques require a high shot density; typically every 2 to 6 stations/geophones. Generally, these techniques cannot effectively take advantage of off-end shots to extend the depth of investigation, so longer profiles are required.

Errors in seismic refraction models can be caused by velocity inversions, hidden layers, or lateral velocity variations. At sites with steeply dipping or highly irregular bedrock surfaces, out of plane refractions (refractions from structures to the side of the line rather than from beneath the line) may severely complicate modeling. A velocity inversion is a geologic layer with a lower seismic velocity than an overlying layer. Critical refraction does not occur along with such a layer because velocity has to increase with depth for critical refraction to occur. This type of layer, therefore, cannot be recognized or modeled, and depths to underlying layers would be overestimated. A hidden layer is a layer with a velocity increase, but of sufficiently small thickness relative to the velocities of overlying and underlying layers, that refracted arrivals do not arrive at the geophones before those from the deeper, higher velocity layer. Because the seismic refraction method generally only involves the interpretation of first arrivals, a hidden layer cannot be recognized or modeled, and depths to underlying layers would be underestimated. Saturated sediments, overlying high-velocity bedrock can be a hidden layer under many field conditions. However, saturated sediments generally have a much higher velocity than unsaturated sediments, typically in the 5,000 to 7,000 ft/s range, and can occasionally be interpreted as a second arrival when the layer does not give rise to a first arrival. A subsurface velocity structure that increases as a function of depth rather than as discrete layers will also cause depths to subsurface refractors to be underestimated, in a manner very similar to that of the hidden layer problem. Lateral velocity variations that are not adequately addressed in the seismic models will also lead to depth errors. Tomographic imaging techniques can often resolve the complex velocity structures associated with hidden layers, velocity gradients, and lateral velocity variations. However, in the event of an abrupt increase in velocity at a geologic horizon, the velocity model generated using tomographic inversion routines will smooth the horizon with velocity being underestimated at the interface and possibly overestimated at depth.

4 DATA REDUCTION AND MODELING

The first step in data processing consisted of picking the arrival time of the first energy received at each geophone (first-arrival) for each shot point. The first-arrivals on each seismic record are either a direct arrival from a compressional (P) wave traveling in the uppermost layer or a refracted arrival from a subsurface interface where there is a velocity increase. First-arrival times were selected using the automatic and manual picking routines in the software package SeisImager™ (Oyo Corporation). These first-arrival times were saved in an ASCII file containing shot location, geophone locations, and associated first-arrival time. Errors in the first-arrival times were variable with error generally increasing with distance from the shot point.

Relative elevations for each geophone location were calculated from the leveling data using a spreadsheet and converted to approximate elevations using GPS data collected at the end of each line.

Data quality was affected by factors such as topography, geologic conditions, and cultural noise, including nearby traffic noise.

Seismic refraction data were then modeled using the tomographic analysis technique available in the SeisImager™ Plotrefa software package, developed by Oyo Corporation. Refraction tomography techniques are often able to resolve complex velocity structure (e.g., velocity gradients) that can be observed in bedrock weathering profiles. Layer-based modeling techniques such as GRM are not able to accurately model the velocity gradients that can be observed in weathered or transitional zones.

The tomographic analysis was conducted in several steps. First, an initial model was generated using a smooth starting model. The initial model was then converted to 25 layers with the top of the bottom layer at a depth related to the imaged depth of the model. Velocity ranges were also set to values outside of the starting model minimum and maximum. A minimum of 30 iterations of non-linear raypath inversion was then implemented to improve the fits of the travel time curves to near-surface sediments/rock. After each set of inversions were completed, the initial parameters were adjusted, and the model run again in an iterative process. These steps were repeated until acceptable fits and RMS error was achieved. The final tomographic velocity models for the seismic line were exported as ASCII files and imported into the Geosoft Oasis montaj® v9 mapping system where the velocity model was gridded, contoured, and annotated for presentation.

5 DISCUSSION OF RESULTS

The smooth starting, P-wave seismic tomography models for Lines 1 through 3 are presented as Figures 2 through 4, respectively. The color scheme used on the tomography images consists of blue-green, yellow-orange, and red-pink representing low, intermediate, and high velocities, respectively. The transition from blue to cyan occurs at a P-wave seismic velocity of 1,000 ft/s and the transition from green to yellow occurs at a velocity of 2,500 ft/s. The transition from orange to red occurs at 3,500 ft/s.

Tomographic inversion techniques will typically model a gradual increase in velocity with depth even if an abrupt velocity contact is present. Therefore, if velocity gradients are not present, tomographic inversion routines will overestimate and underestimate velocity above and below a layer contact, respectively. Velocity gradients can, however, be very common in geologic environments with weathering zones and sedimentary rock, such as the project site. In tomographic images, layer contacts are not clearly defined, and thus, ranges of velocities are used to interpret possible rock conditions and competency. Groundwater was not expected to be encountered on any of the seismic lines.

Line 1 was located in the northern portion of the site and aligned south to north (Figure 1). The P-wave seismic tomography color contour model for Line 1 is presented in Figure 2. The line is imaged with velocities of up to about 3,500 ft/s within 100 ft bgs. Likely, this material consists of alluvial material and soil with an increase in velocity with depth over the entire model. Higher velocities are imaged at shallower depths beneath the southern portion of the model. This zone may be the result of the presence of a coarser material on the southern portion of the profile or an edge effect of the model. Modeled data indicates that the material is rippable to a depth of at least 100 ft beneath the line using a Caterpillar D8R. Marginally rippable and non-rippable material using a Caterpillar D8R was not imaged in the tomography model beneath the seismic line.

Line 2 was located in the central portion of the site and aligned south to north (Figure 1). The P-wave seismic tomography color contour model for Line 2 is presented in Figure 3. The line is imaged with velocities of up to about 3,500 ft/s within 100 ft bgs. Likely, this material consists of alluvial material and soil with an increase in velocity with depth over the entire model. Modeled data indicates that the material is rippable to a depth of 100 ft beneath the line using a Caterpillar D8R. Marginally rippable and non-rippable material using a Caterpillar D8R was not imaged in the tomography model for the seismic line.

Line 3 was located in the southern portion of the site and aligned roughly southeast to northwest (Figure 1). The P-wave seismic tomography color contour model for Line 3 is presented in Figure 4. The line is imaged with velocities of up to about 3,700 ft/s within 60 ft bgs. Likely, this material consists of alluvial material with an increase in velocity with depth over the entire model. Modeled velocities beneath this profile are higher than Line 1 and 2. The increase in the velocities may be related to coarser or more compacted/cemented material. Modeled data indicates that the material is rippable to a depth of at least 70 ft beneath the line using a Caterpillar D8R. Marginally rippable and non-rippable material using a Caterpillar D8R was not imaged in the tomography model for the seismic line.

6 REFERENCES

Dobrin, M.S., and Savit, J., 1988, Introduction to Geophysical Prospecting, McGraw-Hill Co., New York.

Gardner, L.W., 1967, Refraction seismograph profile interpretation, in Musgrave, A.W., ed., Seismic Refraction Prospecting: Society of Exploration Geophysicists, p. 338-347.

Hales, F. W., 1958, An accurate graphical method for interpreting seismic refraction lines: Geophysical Prospecting, v. 6, p 285-294.

Hagedoorn, J.G., 1959, The plus-minus method of interpreting seismic refraction sections, Geophysical Prospecting, v. 7, p 158-182.

Hawkins, L. V., 1961, The reciprocal method of routine shallow seismic refraction investigation: Geophysics, v. 26, p. 806-819.

Lankston, R. W., 1990, High-resolution refraction seismic data acquisition and interpretation, in Ward, S. H., ed., Geotechnical and Environmental Geophysics, Volume I: Review and Tutorial: Society of Exploration Geophysicists, Tulsa, Oklahoma, p. 45-74.

Lankston, R. W., and Lankston, M. M., 1986, Obtaining multilayer reciprocal times through phantoming, Geophysics, v. 51, p. 45-49.

Palmer, D., 1980, The generalized reciprocal method of seismic refraction interpretation: Society of Exploration Geophysics, Tulsa, Oklahoma, 104 p.

Palmer, D., 1981, An introduction to the field of seismic refraction interpretation: Geophysics, v. 46, p. 1508-1518.

Redpath, B. B., 1973, Seismic refraction exploration for engineering site investigations: U. S. Army Engineer Waterway Experiment Station Explosive Excavation Research Laboratory, Livermore, California, Technical Report E-73-4, 51 p.

Rockwell, D.W. 1967. A general wavefront method. In Seismic Refraction Prospecting, A.W. Musgrave, ed., pp 363-415. Tulsa: Society of Exploration Geophysicists.

Scheidegger, A., and Willmore, P.L., 1957, The use of a least square method for the interpretation of data from seismic surveys, Geophysics, v. 22, p. 9-22.

Schuster, G. T. and Quintus-Bosz, A., 1993, Wavepath eikonal traveltime inversion: Theory: Geophysics, v. 58, no. 9, p. 1314-1323.

Telford, W. M., Geldart, L.P., Sheriff, R.E., 1990, Applied Geophysics, Second Edition, Cambridge University Press.

Wyrobek, S.M., 1956, Application of delay and intercept times in the interpretation of multilayer time distance curves, Geophysical Prospecting, v. 4, p 112-130.

Zhang, J. and Toksoz, M. N., 1998, Nonlinear refraction traveltime tomography, Geophysics, V. 63, p. 1726-1737.

7 CERTIFICATION

All geophysical data, analysis, interpretations, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a **GEO***Vision* California Professional Geophysicist.

This geophysical investigation was conducted under the supervision of a California by

Prepared by:

J Jordan

5/31/2019

Jonathan Jordan
Senior Staff Geophysicist
GEO*Vision* Geophysical Services

Reviewed and Approved by:

DAVID M. CARPENTER
P.Gp. 1088

5/31/2019

David Carpenter
California Professinal Geophysicist, PGp 1088
GEO*Vision* Geophysical Services

∗ This geophysical investigation was conducted under the supervision of a California Professional Geophysicist using industry standard methods and equipment. A high degree of professionalism was maintained during all aspects of the project from the field investigation and data acquisition, through data processing, interpretation, and reporting. All original field data files, field notes, and observations, and other pertinent information are maintained in the project files and are available for the client to review for a period of at least one year.

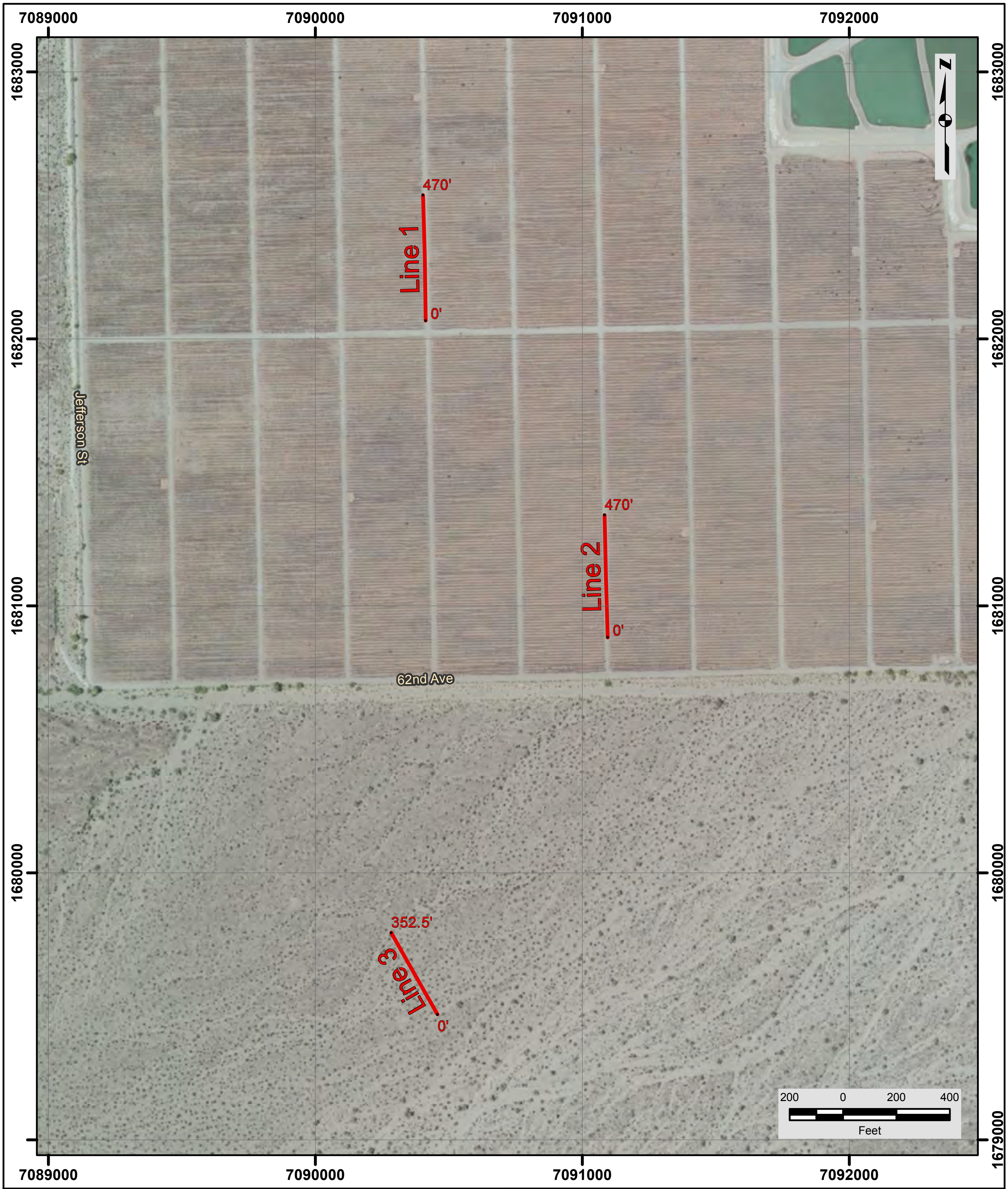
A professional geophysicist's certification of interpreted geophysical conditions comprises a declaration of his/her professional judgment. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations, or ordinances.

Table 1 Seismic Line Geometry

Name	**Spacing (ft)**	**Location (ft)**	**Northing (US Feet)**	**Easting (US Feet)**
Line 1	10	0	1,682,068	7,090,413
		470	1,682,538	7,090,403
Line 2	10	0	1,680,881	7,091,095
		470	1,681,340	7,091,084
Line 3	7.5	0	1,679,470	7,090,458
		352.5	1,679,776	7,090,284

Notes:

1. Plane coordinates in CA State Plane, Zone VI (0406), NAD83 (Conus), US Survey Feet.
3. Coordinates taken with a Spectra SP60 with Centerpoint RTX submeter corrections.



— P-Wave Seismic Refraction Line

NOTES:
1. Coordinate System: California State Plane, NAD83, Zone V (0405), US Survey Feet
2. Base map source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

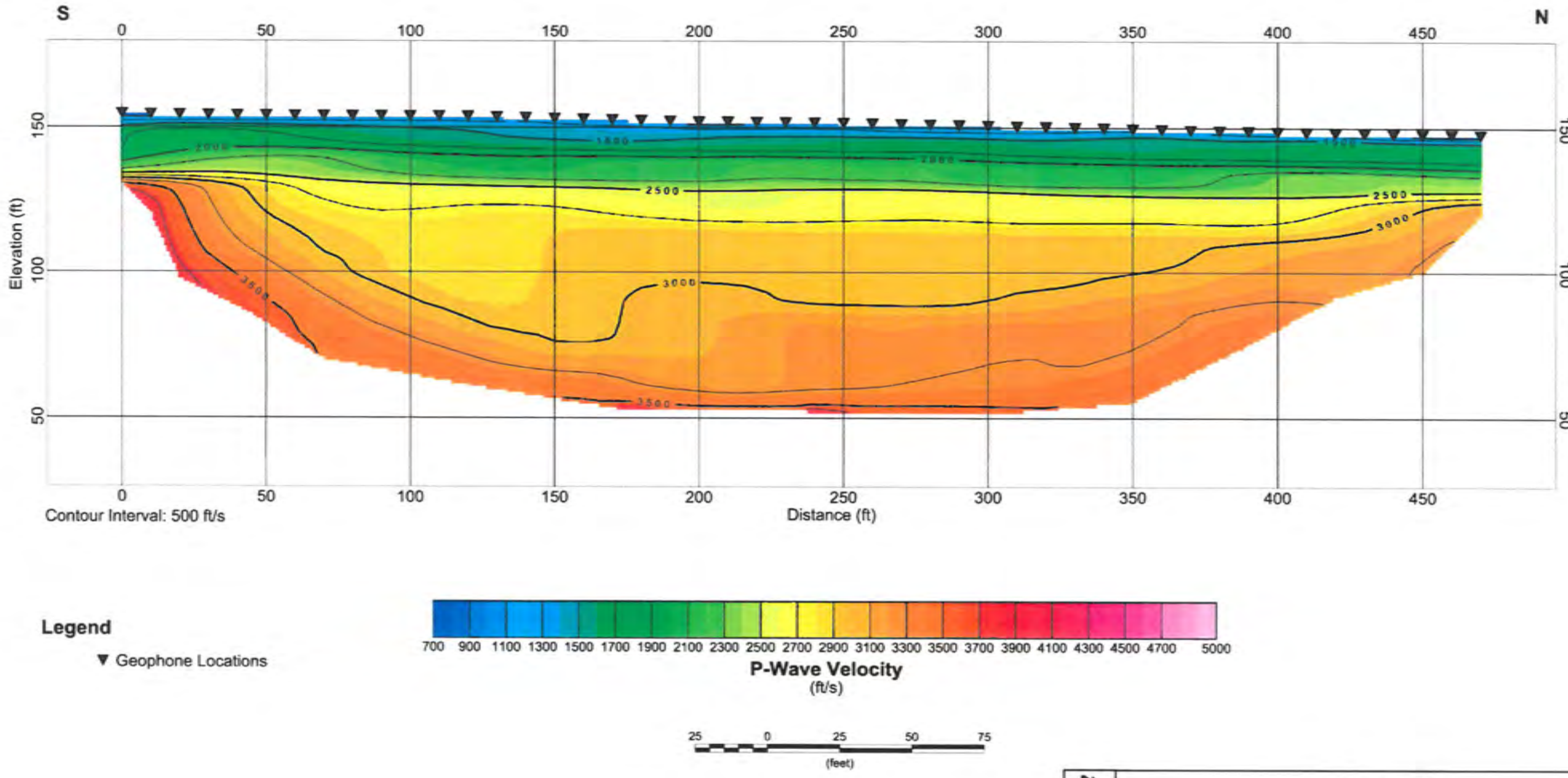
GEOVision
geophysical services

Date:	5/23/2019
GV Project:	19096
Developed by:	D Levy
Drawn by:	T Rodriguez
Approved by:	J Jordan
File Name:	19201-1.MXD

FIGURE 1
SITE MAP

SITE LOCATED NEAR
JEFFERSON ST AND 62nd AVE
LA QUINTA, CALIFORNIA

PREPARED FOR
NMG GEOTECHNICAL, INC.



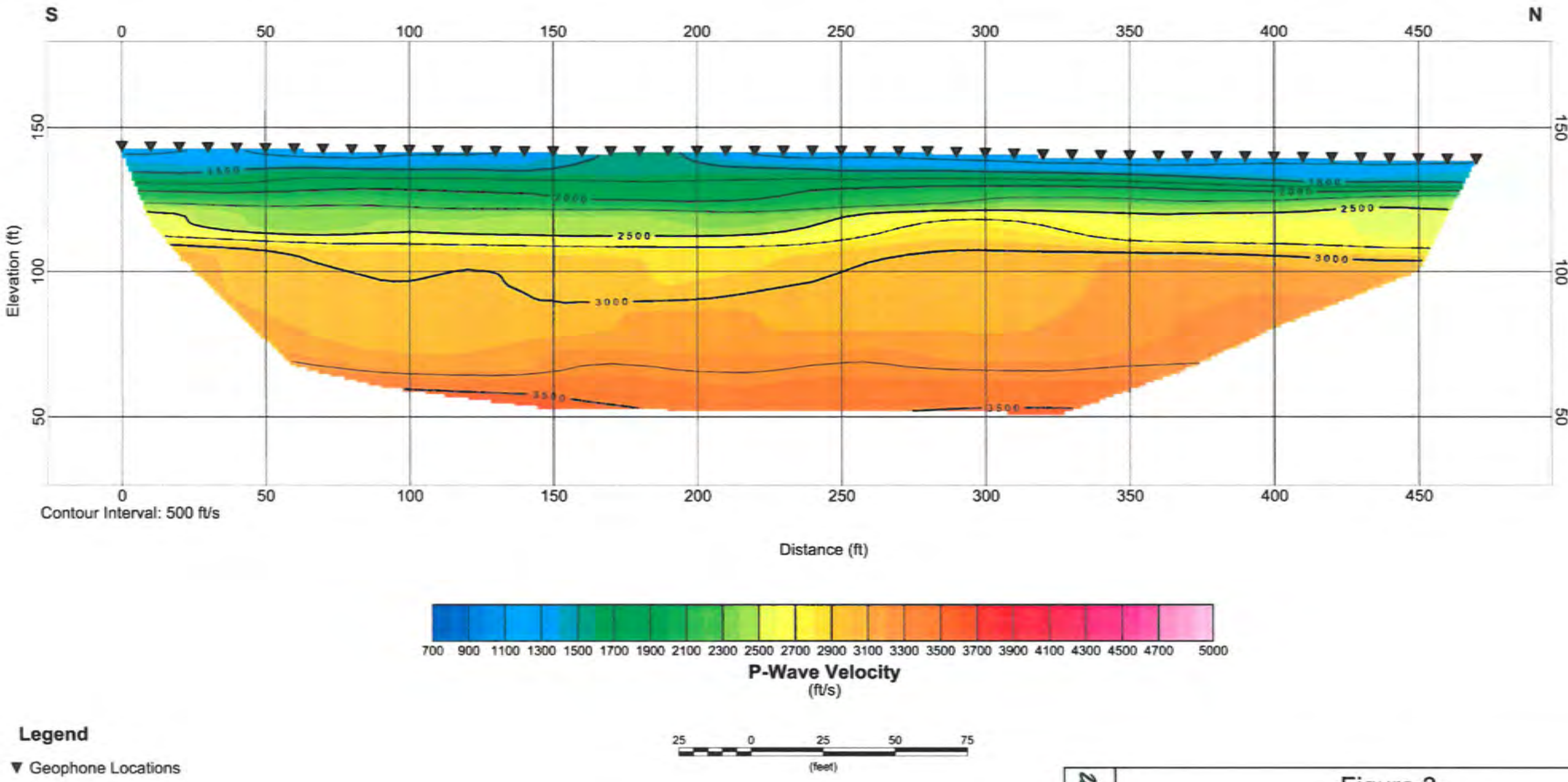
GEOVision
geophysical services

Figure 2

Line 1 P-Wave Seismic Tomography Model
GV Project Number 19201

Jefferson Street and 62nd Avenue
La Quinta, California

Prepared for NMG Geotechnical Inc.



GEOVision geophysical services

Figure 3

Line 2 P-Wave Seismic Tomography Model
GV Project Number 19201

Jefferson Street and 62nd Avenue
La Quinta, California

Prepared for NMG Geotechnical Inc.

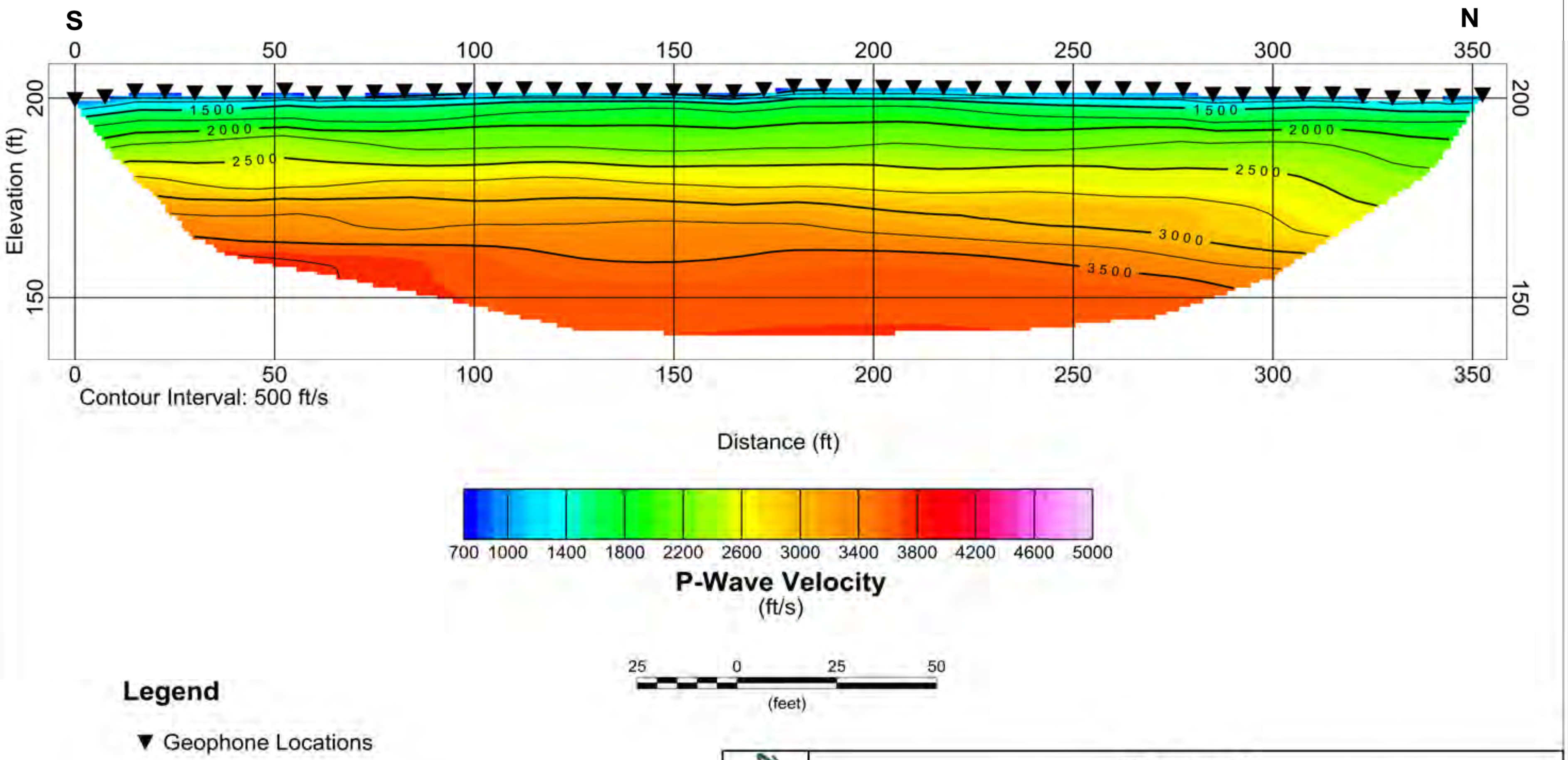


Figure 4

Line 3 P-Wave Seismic Tomography Model
GV Project Number 19201

Jefferson Street and 62nd Avenue
La Quinta, California

Prepared for NMG Geotechnical Inc.

APPENDIX F

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-1
Depth (in): 279.6 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/9/2021
Date Presoak: 8/10/2021
Date Tested: 8/10/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
6:57 6:59	2	2	253.8	266.4	12.6	378.0
7:02 7:04	2	7	258.0	267.0	9.0	270.0
7:05 7:07	2	10	267.0	272.8	5.8	174.0
7:10 7:15	5	18	254.4	273.6	19.2	230.4
7:18 7:23	5	26	253.2	272.4	19.2	230.4
7:25 7:30	5	33	254.4	271.6	17.2	206.4
7:34 7:39	5	42	252.6	271.2	18.6	223.2
7:42 7:47	5	50	253.2	270.0	16.8	201.6
7:50 7:55	5	58	252.6	271.2	18.6	223.2
7:58 8:03	5	66	252.6	270.6	18.0	216.0
8:06 8:11	5	74	253.2	271.2	18.0	216.0
8:14 8:19	5	82	253.8	269.4	15.6	187.2
8:22 8:27	5	90	252.6	269.4	16.8	201.6
8:30 8:35	5	98	252.0	268.8	16.8	201.6
8:39 8:44	5	107	252.6	268.4	15.8	189.6

Initial Height of Water (Ho) = 27

Final Height of Water (Hf) = 11.2

Change in Height Over Time (ΔH) = 15.8

Average Head Over Time (Havg) = 19.1

I_t= ΔH(60r)/Δt(r+2Havg)

I_t= 18.0 in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-2
Depth (in): 279.6 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/9/2021
Date Presoak: 8/10/2021
Date Tested: 8/10/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
10:13 10:18	5	5	229.2	268.4	39.2	470.4
10:22 10:27	5	14	229.8	268.2	38.4	460.8
10:30 10:35	5	22	231.6	268.8	37.2	446.4
10:38 10:43	5	30	232.2	268.2	36.0	432.0
10:46 10:51	5	38	230.4	266.8	36.4	436.8
10:55 11:00	5	47	231.0	267.0	36.0	432.0
11:03 11:08	5	55	230.4	266.4	36.0	432.0
11:12 11:17	5	64	243.6	267.0	23.4	280.8
11:21 11:26	5	73	232.8	269.4	36.6	439.2
11:29 11:34	5	81	238.8	265.8	27.0	324.0
11:36 11:41	5	88	237.0	268.8	31.8	381.6
11:45 11:50	5	97	232.8	267.6	34.8	417.6
11:53 11:58	5	105	230.4	267.0	36.6	439.2

Initial Height of Water (Ho) = 49.2
Final Height of Water (Hf) = 12.6
Change in Height Over Time (ΔH) = 36.6
Average Head Over Time (Havg) = 30.9

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 26.7 in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-3
Depth (in): 236.4 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/10/2021
Date Presoak: 8/12/2021
Date Tested: 8/12/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
11:28 11:33	5	5	187.2	222.0	34.8	417.6
11:35 11:40	5	12	189.0	224.0	35.0	420.0
11:42 11:47	5	19	187.2	224.2	37.0	444.0
11:50 11:55	5	27	187.2	224.3	37.1	445.2
11:57 12:02	5	34	186.0	224.4	38.4	460.8
12:04 12:09	5	41	187.2	224.0	36.8	441.6
12:12 12:17	5	49	187.2	225.5	38.3	459.6
12:19 12:24	5	56	187.2	224.0	36.8	441.6
12:27 12:32	5	64	187.2	224.3	37.1	445.2
12:34 12:39	5	71	187.2	224.0	36.8	441.6
12:42 12:47	5	79	187.2	224.2	37.0	444.0
12:50 12:55	5	87	187.2	223.7	36.5	438.0

Initial Height of Water (Ho) = 49.2
Final Height of Water (Hf) = 12.7
Change in Height Over Time (ΔH) = 36.5
Average Head Over Time (Havg) = 30.95

$I_t = \Delta H(60r)/\Delta t(r+2Havg)$
$I_t = 26.6$ in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine
Test Hole Number: P-4
Depth (in): 295.2 Radius (in.): 4
Tested By: AZ

Project Number: 18186-01
Date Excavated: 8/10/2021
Date Presoak: 8/12/2021
Date Tested: 8/12/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
6:21 6:24	3	3	264.0	287.6	23.6	472.0
6:27 6:30	3	9	260.4	287.4	27.0	540.0
6:33 6:36	3	15	259.8	288.0	28.2	564.0
6:39 6:42	3	21	260.4	287.4	27.0	540.0
6:45 6:48	3	27	262.2	288.0	25.8	516.0
7:00 7:03	3	42	265.2	288.0	22.8	456.0
7:06 7:09	3	48	262.2	287.4	25.2	504.0
7:14 7:17	3	56	263.4	287.0	23.6	472.0
7:20 7:23	3	62	261.0	286.8	25.8	516.0
7:26 7:29	3	68	262.8	287.5	24.7	494.0
7:33 7:36	3	75	264.0	287.4	23.4	468.0
7:39 7:42	3	81	263.4	288.0	24.6	492.0
7:45 7:48	3	87	264.0	287.8	23.8	476.0
7:51 7:54	3	93	263.4	288.6	25.2	504.0
7:57 8:00	3	99	264.6	288.6	24.0	480.0
8:04 8:07	3	106	266.4	288.5	22.1	442.0
8:10 8:13	3	112	270.0	288.0	18.0	360.0
8:16 8:19	3	118	262.2	286.8	24.6	492.0
8:22 8:25	3	124	261.6	286.2	24.6	492.0
8:28 8:31	3	130	260.4	286.4	26.0	520.0

Initial Height of Water (Ho) = 34.8
Final Height of Water (Hf) = 8.8
Change in Height Over Time (ΔH) = 26
Average Head Over Time (Havg) = 21.8

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 43.7 in./hr.

Percolation Data Sheet

Project Name: Hofmann/Travertine

Project Number: 18186-01

Test Hole Number: P-5

Date Excavated: 8/10/2021

Depth (in): 355.8 Radius (in.): 4

Date Presoak: 8/12/2021

Tested By: AZ

Date Tested: 8/12/2021

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
9:16 9:19	3	3	331.2	349.8	18.6	372.0
9:22 9:25	3	9	327.6	348.5	20.9	418.0
9:28 9:31	3	15	326.4	348.6	22.2	444.0
9:33 9:36	3	20	327.6	348.6	21.0	420.0
9:39 9:42	3	26	331.2	349.8	18.6	372.0
9:45 9:48	3	32	328.8	349.8	21.0	420.0
9:52 9:55	3	39	333.6	348.0	14.4	288.0
9:58 10:01	3	45	326.4	348.8	22.4	448.0
10:04 10:07	3	51	324.0	334.8	10.8	216.0
10:10 10:15	5	59	318.0	338.6	20.6	247.2
10:18 10:23	5	67	318.0	337.6	19.6	235.2
10:27 10:32	5	76	318.0	336.4	18.4	220.8
10:35 10:40	5	84	318.0	337.0	19.0	228.0
10:43 10:48	5	92	318.0	338.4	20.4	244.8
10:50 10:55	5	99	318.0	339.8	21.8	261.6
10:58 11:03	5	107	318.0	340.8	22.8	273.6

Initial Height of Water (Ho) = 37.8

Final Height of Water (Hf) = 15

Change in Height Over Time (ΔH) = 22.8

Average Head Over Time (Havg) = 26.4

I_t= ΔH(60r)/Δt(r+2Havg)

I_t= 19.3 in./hr.

APPENDIX G

APPENDIX G

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 Geotechnical Consultant: Prior to commencement of work, the owner shall employ a geotechnical consultant. The geotechnical consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

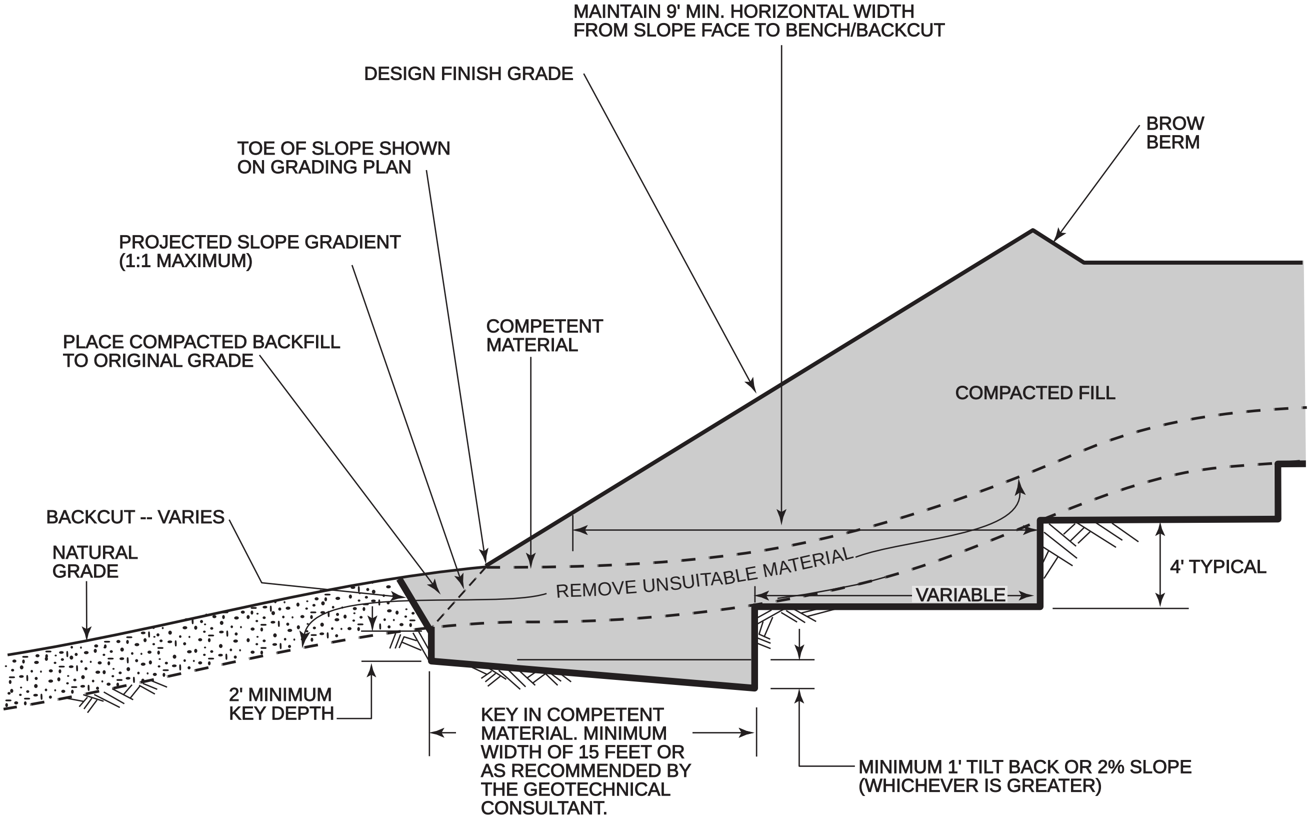
7.2 Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum 90 percent of maximum from 1 foot above the top of the conduit to the surface, except in traveled ways (see Section 7.6 below).

7.3 Jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.6 Trench backfill in the upper foot measured from finish grade within existing or future traveled way, shoulder, and other paved areas (or areas to receive pavement) should be placed to a minimum 95 percent relative compaction.

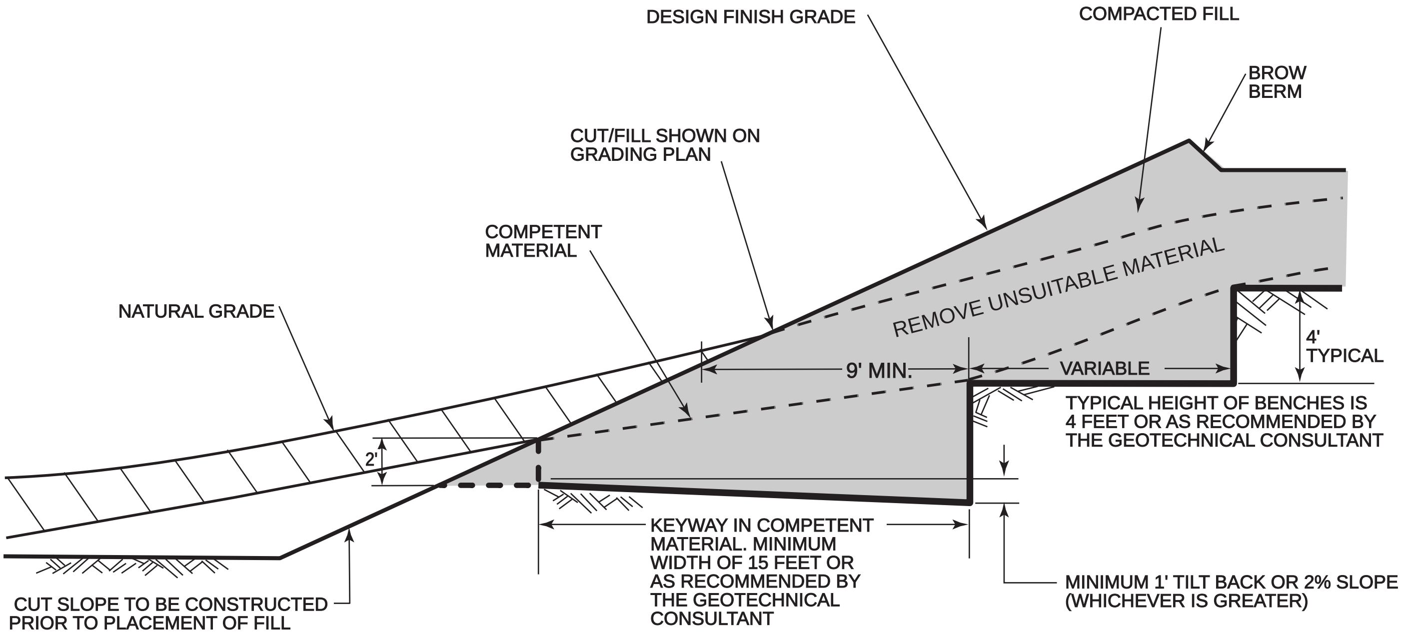


NOTE: BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE SOIL ENGINEER. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.

FIGURE 1

TYPICAL FILL KEY ABOVE NATURAL SLOPE
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.



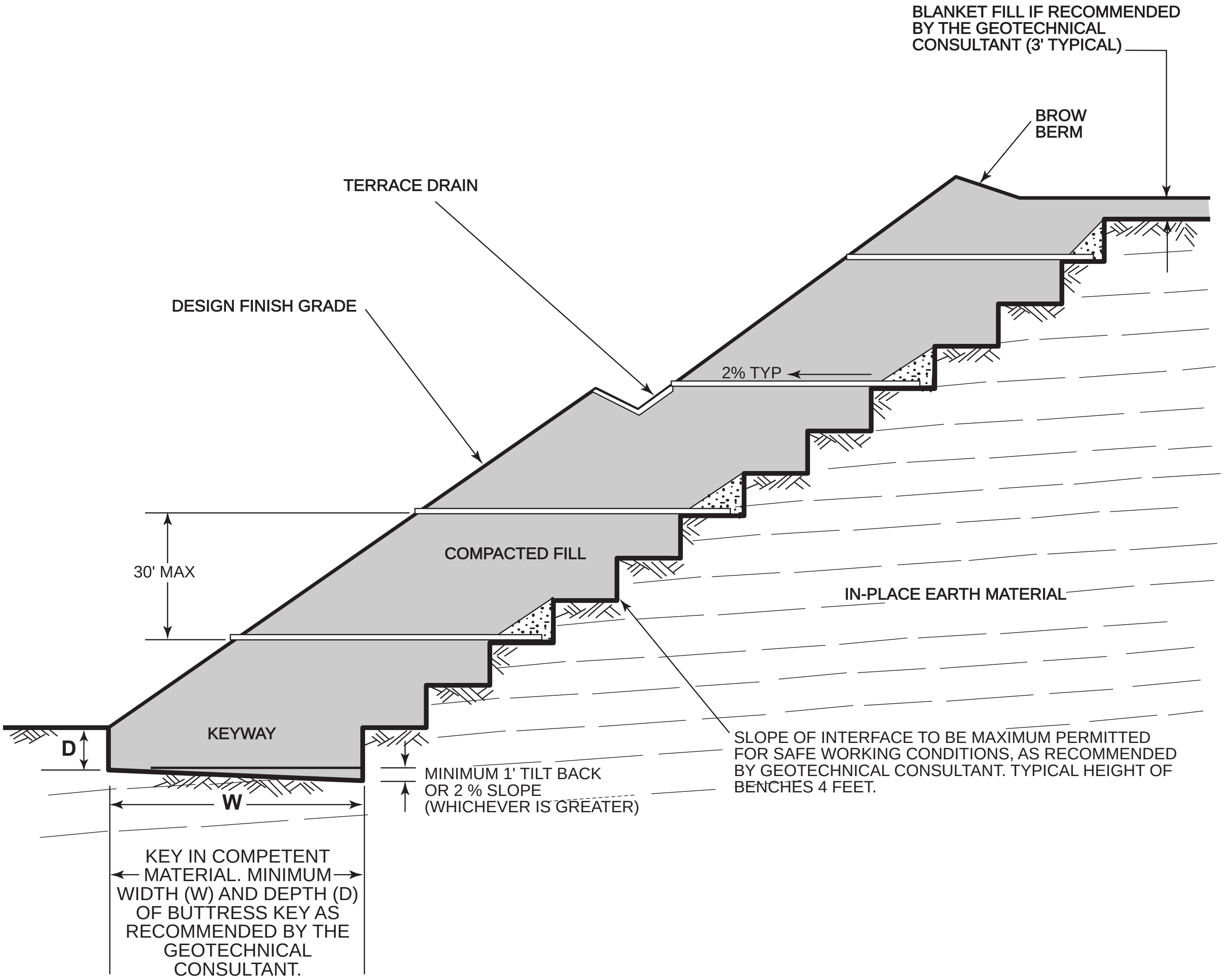
NOTE: THE FILL PORTION OF THE SLOPE SHALL BE COMPACTED AS STATED IN THE PROJECT SPECIFICATIONS.

FIGURE 2

TYPICAL FILL ABOVE CUT SLOPE
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.

8/03 TYP FILL ABOVE CUT SLOPE.ai

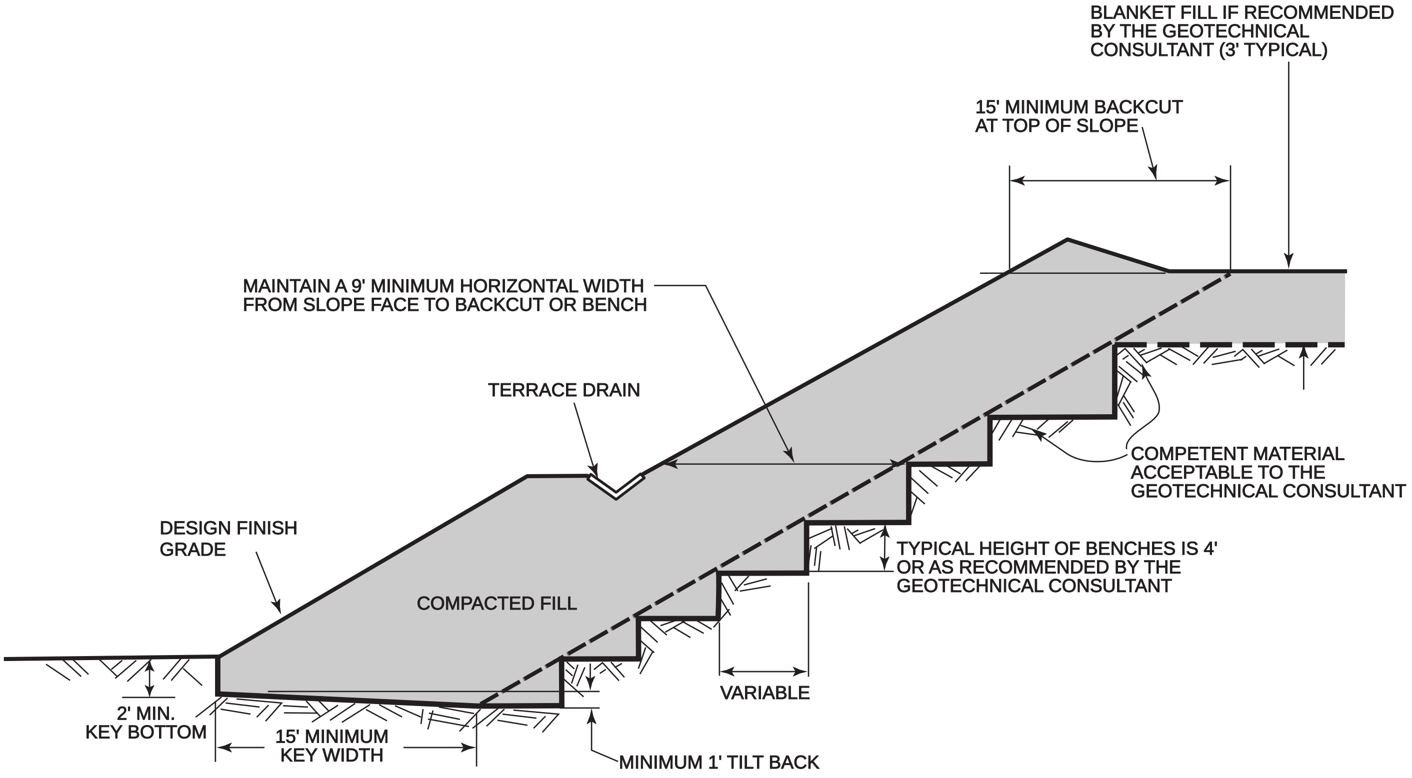


NOTE: SUBDRAIN DETAILS, SEE FIGURE 5.

FIGURE 3

TYPICAL BUTTRESS FILL
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.



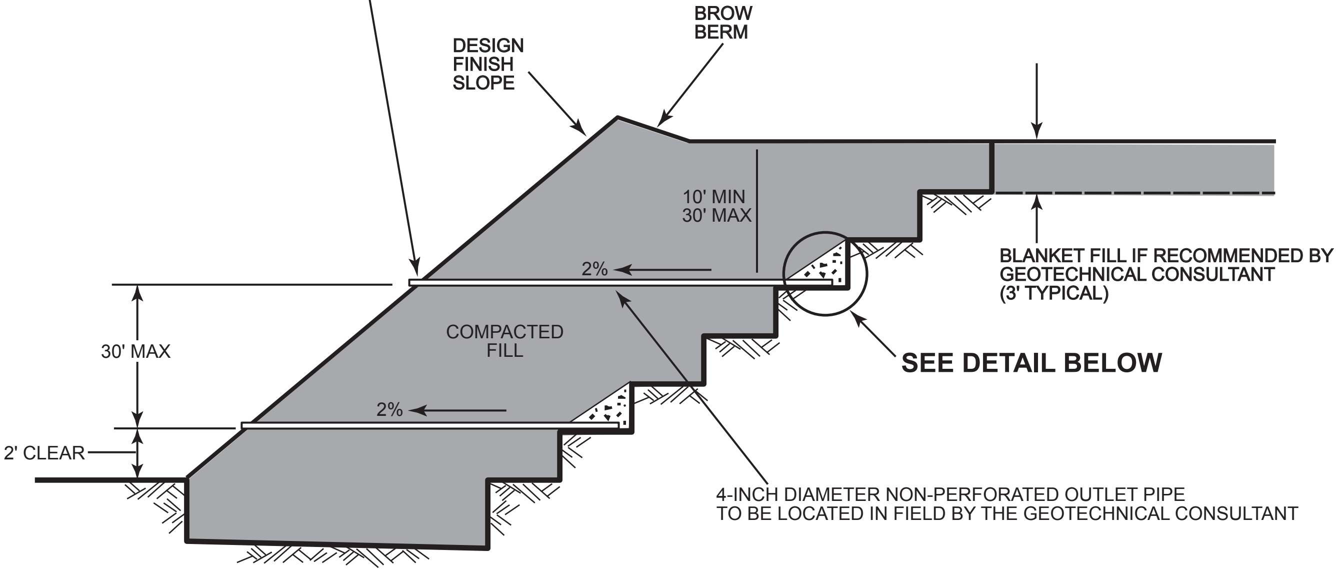
NOTE:
SEE FIGURE 5 FOR TYPICAL SUBDRAIN DETAILS FOR STABILIZATION FILLS

FIGURE 4

TYPICAL STABILIZATION FILL
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.

OUTLETS TO BE SPACED AT 100' MAXIMUM INTERVALS. EXTEND 12 INCHES BEYOND FACE OF SLOPE AT TIME OF ROUGH GRADING CONSTRUCTION.



BLANKET FILL IF RECOMMENDED BY GEOTECHNICAL CONSULTANT (3' TYPICAL)

SEE DETAIL BELOW

4-INCH DIAMETER NON-PERFORATED OUTLET PIPE TO BE LOCATED IN FIELD BY THE GEOTECHNICAL CONSULTANT

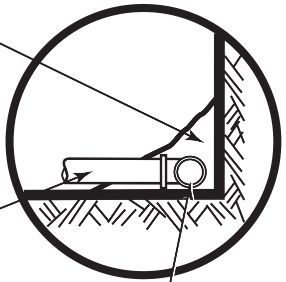
FILTER MATERIAL - MINIMUM OF THREE CUBIC FEET PER FOOT OF PIPE. SEE FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL, THREE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE GRAVEL SPECIFICATION, AND FIGURE 6 FOR FILTER FABRIC SPECIFICATION

"GRAVEL" TO CONSIST OF 1/2" TO 1" CRUSHED ROCK PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

DETAIL



OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW

MINIMUM 4-INCH DIAMETER SCHEDULE 40 ASTM D1527 OR D1785 OR SDR 35 ASTM D2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT.

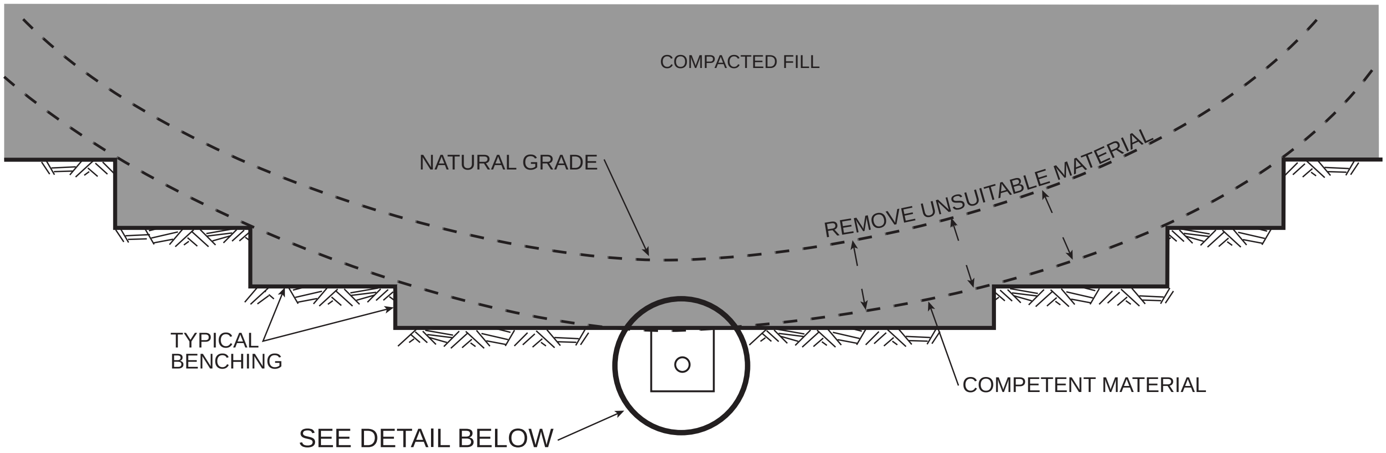
SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOTE:
TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

FIGURE 5

TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAINS
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.



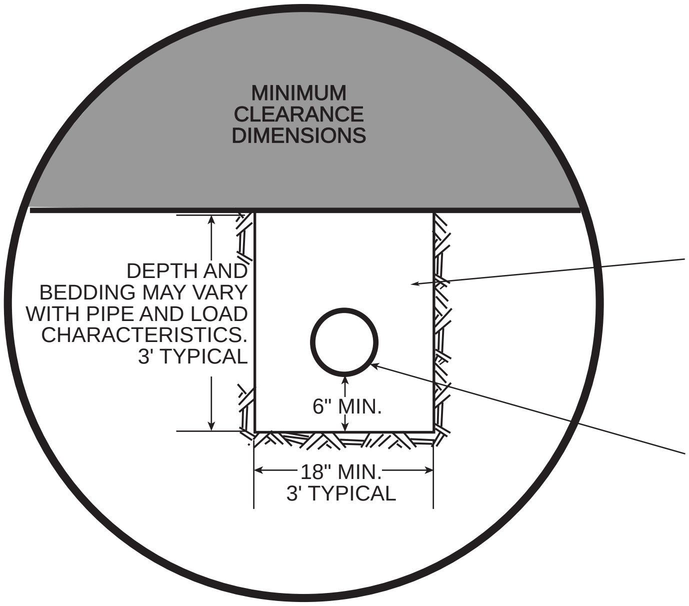
FILTER FABRICS SHALL BE PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL CONFORMING TO THE FOLLOWING:

1) GRAB TENSILE STRENGTH. POUNDS, MIN. ASTM D 4632...90
2) ELONGATION, AT PEAK LOAD, PERCENT, MIN. ASTM D 4632..50
3) PUNCTURE STRENGTH, LBS., MIN. ASTM D 3787...45
4) COEFFICIENT OF WATER PERMITTIVITY, 1/SEC. ASTM D 4491..>0.7
5) BURST STRENGTH, P.S.I., MIN. ASTM D 3786...180

NOTES: DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

PIPE SHALL BE A MINIMUM OF 4-INCH DIAMETER. FOR RUNS OF 500 FEET OR MORE, USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT

DETAIL



FILTER MATERIAL - MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE FIGURE 5 FOR FILTER MATERIAL SPECIFICATIONS.

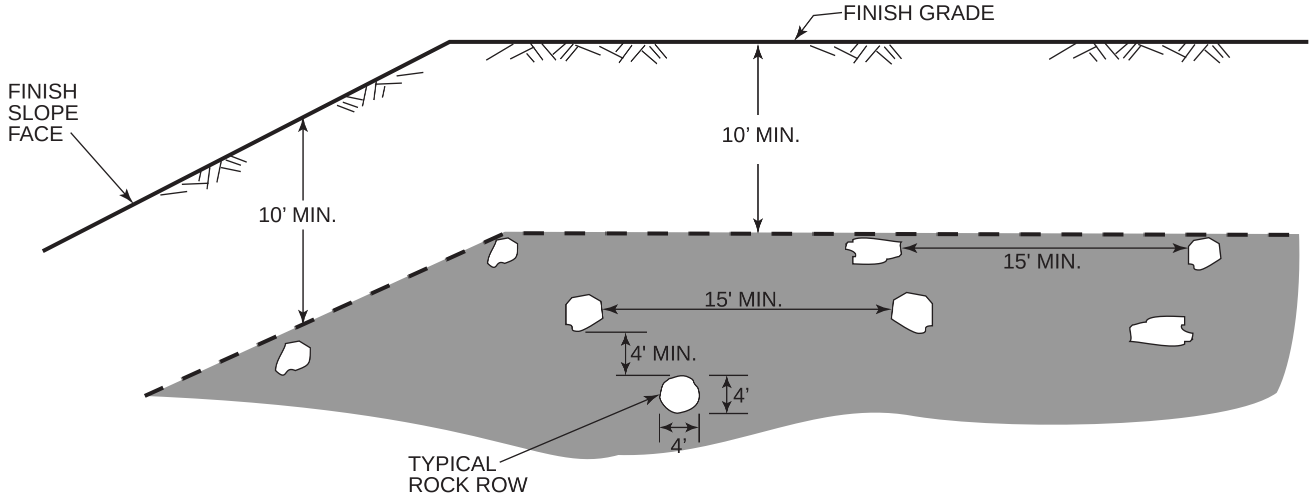
ALTERNATE: IN LIEU OF FILTER MATERIAL, NINE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE FIGURE 5 TO GRAVEL SPECIFICATION. SEE ABOVE FOR FILTER FABRIC SPECIFICATION. FILTER FABRIC SHALL BE LAPPED MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4 INCH DIAMETER SCHEDULE 40 ASTM D 1527, OR D 1785, OR SDR 35 ASTM 2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR APPROVED EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

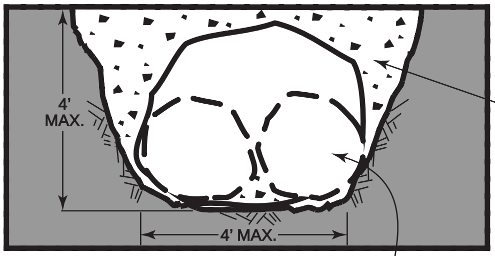
FIGURE 6

TYPICAL CANYON SUBDRAIN
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.

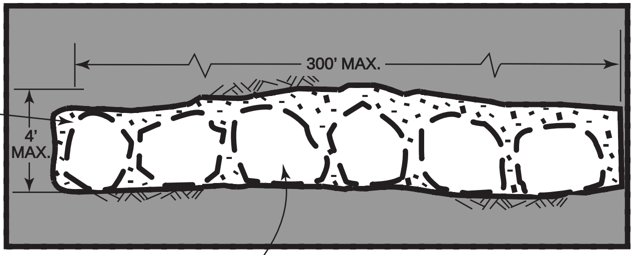


SECTION THROUGH ROCKROW



FILL VOIDS WITH SELECT GRANULAR SOIL PLACED BY WATER DENSIFICATION AND MECHANICAL COMPACTION. NESTING OR STACKING OF OVERSIZE MATERIAL IS NOT ACCEPTABLE.

PROFILE ALONG ROCKROW



PLACE OVERSIZE MATERIAL IN TRENCH. FALSE SLOPE OR CUT SLOT INTO APPROVED MATERIAL. OVERSIZE MATERIAL MAY BE PLACED SIDE BY SIDE IF SIZE PERMITS. (NOT TO EXCEED A WIDTH OF 4 FEET)

NOTES:

A) OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE (IN GREATEST DIMENSION).

B) SPACE BETWEEN ROCKROWS SHOULD BE ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.

C) THE WIDTH AND HEIGHT OF THE ROCKROW SHALL BE LIMITED TO FOUR FEET AND THE LENGTH LIMITED TO 300 FEET UNLESS APPROVED OTHERWISE BY THE GEOTECHNICAL CONSULTANT. OVERSIZE SHOULD BE PLACED WITH FLATEST SIDE ON THE BOTTOM.

D) OVERSIZE MATERIAL EXCEEDING FOUR FEET MAY BE PLACED ON AN INDIVIDUAL BASIS IF APPROVED BY THE GEOTECHNICAL CONSULTANT.

E) FILLING OF VOIDS WILL REQUIRE SELECT GRANULAR SOIL (SE > 20, OR LESS THAN 20 PERCENT FINES) AS APPROVED BY THE GEOTECHNICAL CONSULTANT. VOIDS IN THE ROCKROW TO BE FILLED BY WATER DENSIFYING GRANULAR SOIL INTO PLACE ALONG WITH MECHANICAL COMPACTION EFFORT.

F) IF APPROVED BY THE GEOTECHNICAL CONSULTANT, ROCKROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK, PROVIDED ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.

G) THE FIRST LIFT OF MATERIAL ABOVE THE ROCKROW SHALL CONSIST OF GRANULAR MATERIAL AND SHALL BE PROOF-ROLLED WITH A D-8 OR LARGER DOZER OR EQUIVALENT.

H) ROCKROWS NEAR SLOPES SHOULD BE ORIENTED PARALLEL TO SLOPE FACE.

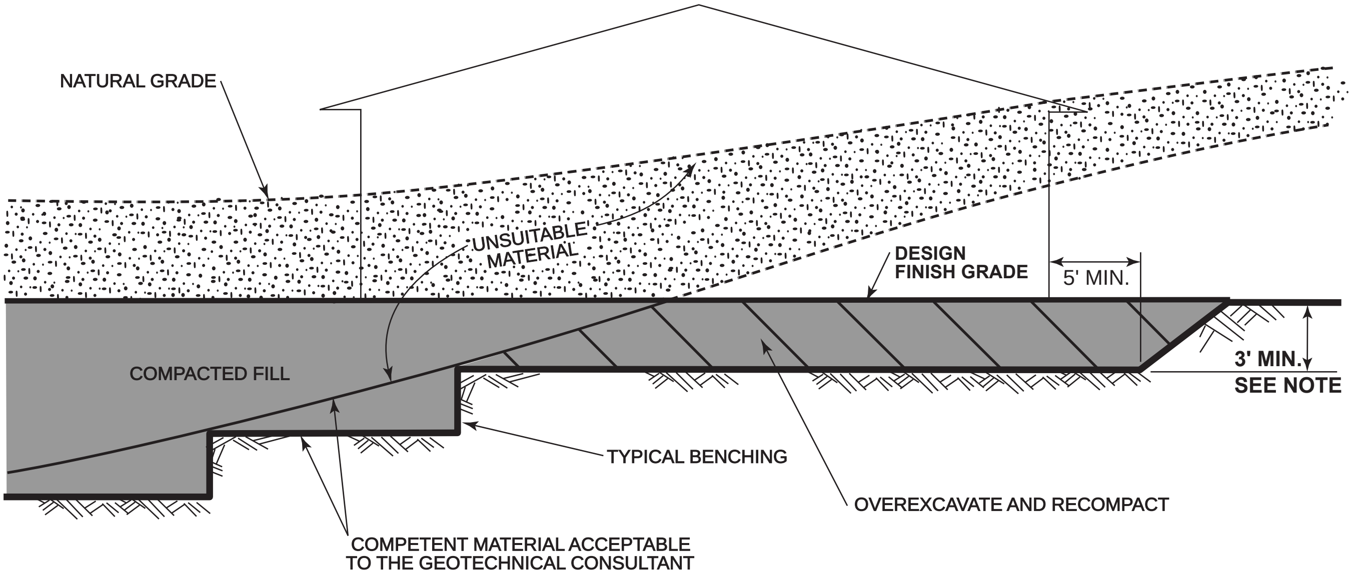
I) NESTING OR STACKING OF ROCKS IS NOT ACCEPTABLE.

FIGURE 7

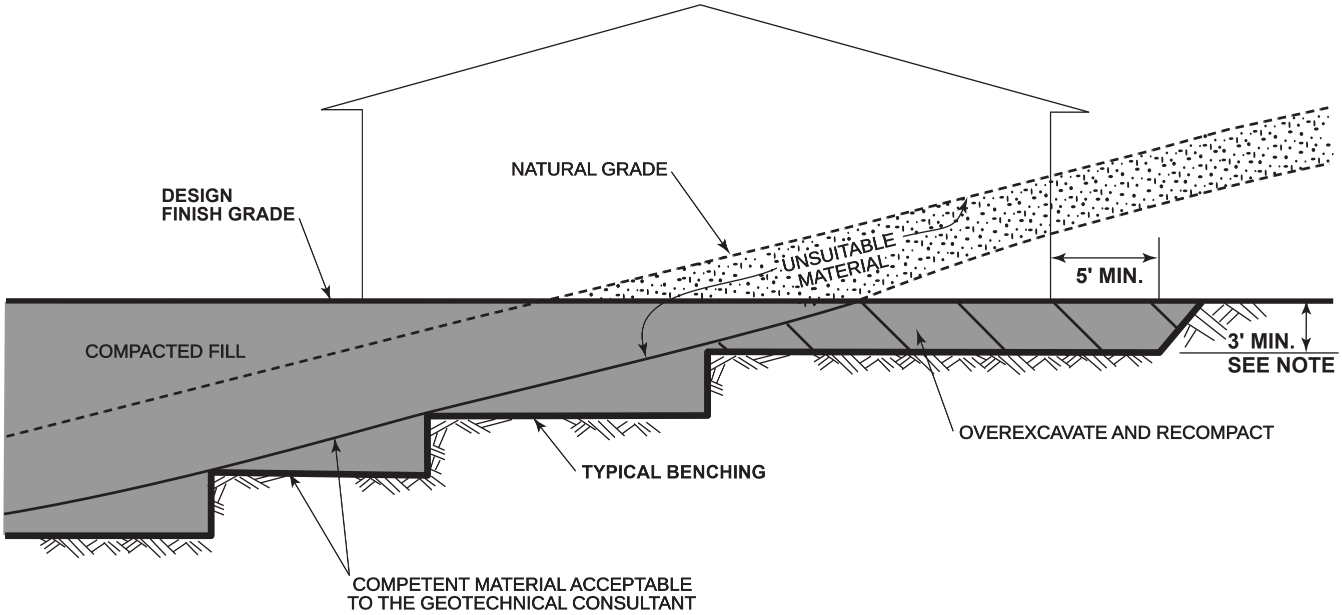
TYPICAL OVERSIZE ROCK PLACEMENT METHOD
MINIMUM STANDARD GRADING DETAIL
FOR STRUCTURAL FILL

NMG
Geotechnical, Inc.

CUT LOT



CUT FILL LOT (TRANSITION)



NOTE: DEEPER THAN THE 3-FOOT OVEREXCAVATION MAY BE RECOMMENDED BY THE GEOTECHNICAL CONSULTANT IN STEEP TRANSITIONS.

FIGURE 8

TYPICAL OVEREXCAVATION OF DAYLIGHT LINE
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.

LEGEND

EARTH UNITS - CIRCLED WHERE BURIED

Qyf	YOUNG ALLUVIAL FAN
Qof	OLDER ALLUVIAL FAN
Qls	LANDSLIDE MATERIAL
gr	GRANITIC BEDROCK

SYMBOLS - LOCATIONS ARE APPROXIMATE, QUERIED WHERE UNCERTAIN

— — — — · · · ·	GEOLOGIC CONTACT, DOTTED WHERE BURIED
——— ———· · ·	FAULT, DOTTED WHERE BURIED

GEOLOGIC ATTITUDES- LOCATIONS ARE APPROXIMATE, DASHED WHERE BURIED

─▬─	JOINT
═▬═	DIKE

OTHER SYMBOLS - LOCATIONS ARE APPROXIMATE

● P-5 T.D.30'	PERCOLATION TEST BORING BY NMG (2021), SHOWING TOTAL DEPTH
● H-2 T.D.40'	HOLLOW STEM AUGER BORING BY NMG (2021), SHOWING TOTAL DEPTH
80% Sa & Gr 20% Cobbles <1% Boulder ▬ TP-51 T.D. 20'	EXPLORATORY TRENCH BY EARTH SYSTEMS SOUTHWEST (2007d) SHOWING TOTAL DEPTH AND VISUAL GRAIN SIZE DISTRIBUTION
UB-12 T.D.26.5'	HOLLOW STEM AUGER BORING BY URS (2003), SHOWING TOTAL DEPTH
⊕ SB-12 T.D.11' (R)	HOLLOW STEM AUGER BORING BY SLADDEN (2005), SHOWING TOTAL DEPTH OR DEPTH TO REFUSAL (R)
◐ ESB-4 T.D.9.5'	HOLLOW STEM AUGER BORING BY EARTH SYSTEMS SOUTHWEST (2007b), SHOWING TOTAL DEPTH
⦶ SB-10 T.D.11.5'	HOLLOW STEM AUGER BORING BY SLADDEN (2001), SHOWING TOTAL DEPTH OR DEPTH TO REFUSAL (R)
◒ ESI-7 T.D.15'	HOLLOW STEM AUGER BORING AND INFILTRATION TEST BY EARTH SYSTEMS SOUTHWEST (2007c), SHOWING TOTAL DEPTH OR DEPTH TO REFUSAL (R)
065-07E-34D-015 @60.2' (12-18-2019)	COACHELLA VALLEY WATER DISTRICT GROUNDWATER MONITORING WELL, SHOWING DEPTH TO GROUND WATER AND DATE OF READING
UTP-8 T.D.11'	TEST PIT BY URS (2003) SHOWING TOTAL DEPTH
ESS-6	SURFACE SAMPLE COLLECTED BY EARTH SYSTEMS SOUTHWEST (2007c) FOR LABORATORY TESTING
SL-3	SEISMIC LINE

PLATE 1

PRELIMINARY GEOTECHNICAL MAP
TRAVERTINE DEVELOPMENT
CITY OF LA QUINTA, CALIFORNIA

Project No.:18186-01 By:SBK/TW
Project Name:Hofmann/Travertine
Date: 8/27/2021 SCALE: 1" = 200'

NMG
Geotechnical, Inc.

Drawing: P:\2018\18186-01 TRG LaQuinta Travertine\Drafting_WIP\

SEE PLATE 1

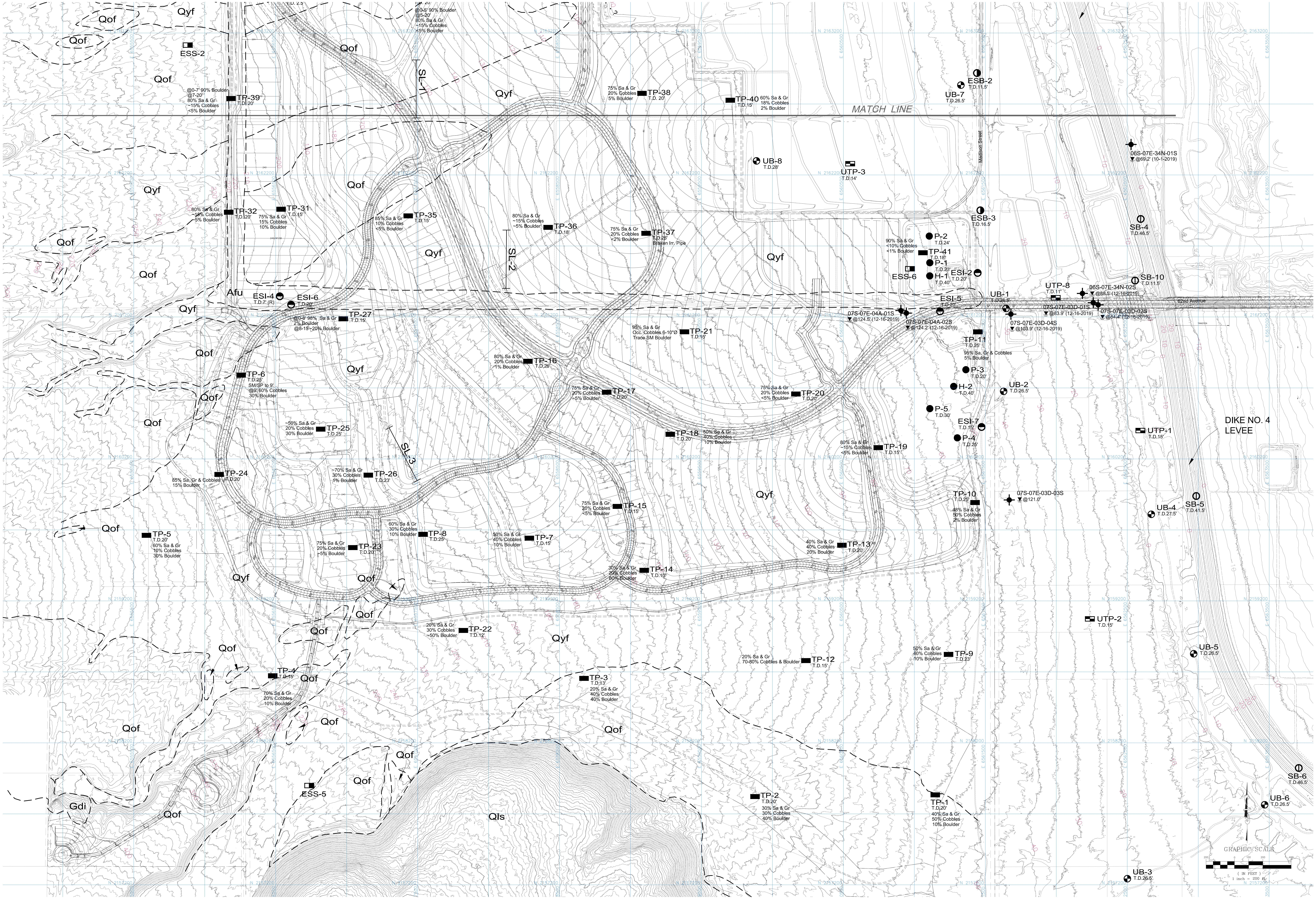


PLATE 2

Project No.:18186-01	By:SBK/TW
Project Name:Hofmann/Travertine	
Date: 8/27/2021	SCALE: 1" = 200'

NMG
Geotechnical, Inc.

Drawing: P:\2018\18186-01 TRG LaQuinta Travertine

APPROXIMATE ROCK DISTRIBUTION MAP
TRAVERTINE DEVELOPMENT
CITY OF LA QUINTA, CALIFORNIA

Project No.:18186-01 By:SBK/TW
Project Name:Hofmann/La Quinta Travertine
Date: 8/27/21 SCALE: 1" = 200'

NMG
Geotechnical, Inc.

PLATE 3

LEGEND

SYMBOLS - LOCATIONS ARE APPROXIMATE, QUERIED WHERE UNCERTAIN

80% Sa & Gr 20% Cobbles <1% Boulder ▬ TP-51 T.D. 20'	EXPLORATORY TRENCH SHOWING TOTAL DEPTH AND VISUAL GRAIN SIZE DISTRIBUTION
4% B	AVERAGE PERCENTAGE OF BOULDERS (OVERSIZE) IN ALLUVIAL FAN DEPOSITS
▬	APPROXIMATE LIMITS OF BOULDER PERCENTAGE AREAS

NOTE: BOULDERS (OVERSIZE) ARE GRANITIC AND METAMORPHIC MATERIAL THAT IS GREATER THAN 12 INCHES IN THE MAXIMUM DIAMETER

Appendix F

Structural BMP and/or Retention Facility Sizing Calculation and Design Details Including Travertine Hydrology Study Dated Sept 2021

Travertine Project
Preliminary Hydrology Study
Tentative Tract Map 37387

Submitted to:

City of La Quinta
78-495 Calle Tampico
La Quinta, CA 92253

Prepared by:

Proactive Engineering Consultants, Inc.
27042 Towne Centre Drive, Suite 110
Foothill Ranch, CA 92610

Prepared: September 2021

REGISTERED PROFESSIONAL ENGINEER
MARK S. ANDERSON
NO. 26821
CIVIL
STATE OF CALIFORNIA

City PN:

Prepared by: Mark Anderson, PE

PROACTIVE
ENGINEERING CONSULTANTS

Table of Contents

1 INTRODUCTION 3
1.1 Description of Study Area and responsibility 3
2 PROJECT SITE LOCATION MAP 2
3 PURPOSE AND SCOPE 3
4 HYDROLOGY METHODOLOGY 3
5 HYDROLOGIC ANALYSIS 4
5.1 Project Conditions 6
6 DISCUSSION OF RESULTS 8

APPENDIX A -SOILS TYPE MAP I

APPENDIX B –NOAA ATLAS PRECIPITATION FREQUENCY II

APPENDIX C –HYDROLOGY STUDY (AES RATIONAL METHOD) III

C.1 – 100-YR EXISTING HYDROLOGY iv
C.2 – 100-YR PROPOSED HYDROLOGY v
C.3 – 10-YR EXISTING HYDROLOGY vi
C.4 – 10-YR PROPOSED HYDROLOGY vii

APPENDIX D –HYDROLOGY STUDY (AES UNIT HYDROGRAPH) VIII

D.1 –100-YR EXISTING HYDROLOGY ix
D.2 – 100-YR pROPOSED HYDROLOGY x

APPENDIX E- HYDRAULIC ANALYSIS FOR PEAKFLOW Q_{100} XI

NORMAL DEPTH XI

E.1 – DRAINAGE FACILITIES BASED ON NORMAL DEPTH METHOD xii

APPENDIX F – SPILLWAY CALCULATIONS XIII

APPENDIX G - LIST OF MAPS XIV

EXISTING HYDROLOGY MAP XV
PROPOSED HYDROLOGY MAP XVI

1 INTRODUCTION

1.1 DESCRIPTION OF STUDY AREA AND RESPONSIBILITY

The Travertine Project is an 855.4-acre site with 524.0-acre being disturbed for development. The project is located west of Madison Street, and north of Avenue 62 in the City of La Quinta. The project is a residential and park development. Several improvements are planned for the development including road improvements, drainage systems, two infiltration basins and water/sewer systems to serve the proposed community. The project is generally bounded by mountain ranges to the west, Coachella Valley Water District (CVWD) spreading basins (Groundwater Recharge Facility) and Madison Street to the east, and 62nd Street and undeveloped area to the south.

Currently, the site is undeveloped and includes an abandoned vineyard. Drainages sheet flow from the west San Jacinto and Santa Rosa mountan ranges. There are several dikes that have been constructed to protect the vineyard areas from the mountain slope drainages. The project site is located upstream behind CVWD Dike #4 (See figure 1). The drainages are contained behind the dike where storm water runoff is retained and infiltrated.

Responsibility for analysis and design of regional flood control structures lies with Riverside County Flood Control and Water Conservation District (RCFC & WCD). The Coachella Valley Water District (CVWD) manages regional facilities, which collect runoff from areas outside the City, including the mountains. Regional facilities include Coachella Valley Stormwater Channel, La Quinta Evacuation Channel, Bear Creek System and Lake Cahuilla. Maintenance of local facilities, which collect runoff from local streets and properties to regional channels and basins, is the responsibility of the City of La Quinta.

2 PROJECT SITE LOCATION MAP

Figure 1: Project Location Map

3 PURPOSE AND SCOPE

The purpose of this study is to develop a preliminary drainage plan for the Travertine Project, Tentative Tract Map 37387, that would provide the project with drainage and flood protection from a 100-yr storm event without adversely impacting the adjacent properties and improvements. This study assumes discharge of the project's "mitigated-developed" on-site 100-year storm flow to the area behind Dike #4, matching existing or reducing peak flows.

The scope of the study includes the following:

- Establish baseline drainage conditions and watershed areas.
- Determine the pre and post 100- and 10-year/1-hour precipitation peak flow rates in accordance with the County of Riverside Hydrology Manual methodology.
- Determination preliminary size and location of the proposed drainage facilities required to flood-protect the proposed development from the 100-yr storm event

4 HYDROLOGY METHODOLOGY

Hydrologic calculations were performed in accordance to the methods described in the Riverside County Flood Control District (RCFCD) Hydrology Manual. The AES software utilizing the rational method was used to compute the peak flowrate for the 100-year storm event for the existing and proposed conditions.

The rainfall values used for the study area 10-year and 100-year storm events were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 (appendix B). A slope of intensity duration curve from the RCFCD Hydrology Manual of **0.58** was used in the study.

The entire study consists of hydrologic soils **group A** obtained from the Web Soil Survey.

Due to the presence of detention basins, the Unit Hydrograph Method was used to establish a comparison of the baseline and project conditions total storm runoff volumes. The AES software, Flood routing computer model was used to evaluate frequency (100-year) storm event for durations of 1, 3, 6, and 24-hour.

The Unit Hydrograph (UH) Method establishes a peak flowrate and volume for the given drainage area. This method evaluates the watersheds response to a given rainfall pattern and event. The development of this method was established using the following assumptions and guidelines per the Riverside County Hydrology Manual:

- *Lag Time* – Lag time is defined as the elapsed time in hours from the beginning of unit effective rainfall to the instant that the summation hydrograph for the concentration point of an area reaches 50-percent of the peak discharge. Lag time was calculated using the empirical formula identified in the Hydrology Manual (Sheet 1 of Plate E-1.1). Several parameters that area encompassed in this equation include drainage area, length of longest watercourse, slope of the most remote traveled distance, and overall conveyance Manning's value. Lag was used in the derivation of the "UI" cards for HEC-1 (Appendix A).

- *Unit Time Period* – For the calculation process of the UH, a calculation time step is defined based on the lag time. Generally, a time step is chosen to be 25- to 40-percent of lag time than the calculated lag time for a given area.

- *S-Graph* – An S-Graph represents the basic time-runoff relationship for a watershed type. For Riverside County, four different S-Graphs can be used, or a combination of the four. Given the topographic region of this project, the Valley S-Graph was used (Plate E-4.1).
- *Rainfall Patterns*– Using a 3 and 6-hour duration storm event, the point precipitation for the 100-year/3-& 6-hr storm event is 2.28" and 2.89". These are identified from NOAA Atlas 14 (Appendix B).
- *Loss Rate Calculations* – For the UH method, several losses need to be calculated based on land uses, soil types, and percent imperviousness. The soil type for this project is 100-percent Hydrologic Soil Type "A" (Plate C-1.17).
    - Pervious Area Loss Rate (F) – Calculated based on percent impervious
    - Low Loss Rate (Y bar) – Calculated base on rate of rainfall

5 HYDROLOGIC ANALYSIS

The preliminary drainage plan for the Travertine Project proposes a system of underground storm drains and catch basins to intercept and convey the runoffs generated by the project site. Two detention/water quality basins are proposed to treat the water and detain the stom flows. The storm drain systems and the basins are both designed for the 100-year storm event.

The tables below contain a hydrologic summary of the peak flow rate for the 100-year storm event obtained by running the rational method on AES. Refer to Appendix **C** for more detailed calculation results

Tabel 5-1: 100-year Peak Flowrate for Post Development

Drainage Area	Area Proposed (acres)	Fow Rate (Q_{100}) (cfs)
A	220.4	532.1
B	293.8	472.1
Total	**514.2**	**1,004**

Table 5-2: 100-year Peak Flowrate for Pre-Development

Drainage Area	Area Existing (acres)	Fow Rate (Q_{100}) (cfs)
A	110.5	131.1
B	151.3	180.9
C	252.4	294.5
Total	**514.2**	**607**

Tables 5-3 compares the post development flow (unmitigated) with that of the pre-development flow. The detention basins are designed to outlet flows at or below the existing peak flow rate.

Table 5-3: 100-year Peak Flowrate Summary

Existing Flow Rate (cfs)	Poposed Flow Rate (cfs)	Flow Rate (To be Mitigated) (cfs)
607	1,004	**397**

The tables below contain the basin routing summary of the volumes for the 100-year 1, 3, 6 and 24-hr durations modeled by the Unit Hydrograph Method. The basins in turn are designed to infiltrate the delta between the existing and proposed storm event that produces the most volume, in this case the 24 hour storm duration. Refer to Appendix **D** for more detailed calculation results

Tabel 5-4: 100-year Storm Flow Volume for Post-development

Drainage Area	Area Proposed (acres)	1-hr Volume (ac-ft)	3-hr Volume (ac-ft)	6-hr Volume (ac-ft)	24-hr Volume (ac-ft)
A	220.4	22.2	26.0	29.9	40.4
B	293.8	29.6	34.2	39.1	52.0
Total	**514.2**	**51.8**	**60.2**	**69.0**	**92.4**

Table 5-5: 100-year Storm Flow Volume for Pre-development

Drainage Area	Area Existing (acres)	1-hr Volume (ac-ft)	3-hr Volume (ac-ft)	6-hr Volume (ac-ft)	24-hr Volume (ac-ft)
A	110.5	11.9	13.6	12.9	12.8
B	151.3	16.3	18.7	17.7	17.6
C	252.4	27.2	31.2	29.6	29.4
Total	**514.2**	**55.4**	**63.5**	**60.2**	**59.8**

Table 5-6: 100-year 24-hr Storm Flow Volume Summary

Existing Volume (ac-ft)	Poposed Volume (ac-ft)	Volume Difference (ac-ft)
59.8	**92.4**	**32.6**

5.1 PROJECT CONDITIONS

The proposed conditions for this project include rerouting stormwater runoff into two detention basins, a north basin (Basin "A") and a south basin (Basin "B"). Watershed Subarea "A", to the north, is 220.4 acres of residential and roadway land use. Watershed Subarea "B", to the south, is 293.8 acres of residential, recreational and roadway land use. These two basins will discharge mitigated flows to the area behind dike #4 where it will continue to be retained and infiltrated. The two basins are connected with a culvert to maintain the identical water surface elevation in both basins.

Proposed Basins

The basins proposed are to provide water quality treatment and flood control attenuation. These basins are designed to retain the largest volume delta between the existing and proposed 100 year storm, in this case the 24 hour event, as seen in Tables 5-4 through 5-6. Additionally, the basins are to outlet at a mitigated rate at or below the existing 100 year peak flow, summarized in Table 5-3.

The unit hydrograph data was used to model the basin routing of the peak flows through the proposed detention basins. The two basins were modeled together with a total basin volume of 50.7 ac-ft. The basins were designed to infiltrate delta in peak volumes which translated to a volume of 32.2 acre-feet. This volume in turn sets the top of the outlet risers at an elevation of 2.7' above basin bottom. The basin is a total of 6' deep. The max depth of ponding for the 100 year event was set at 4' to allow for 1' of flow over the emergency spillway plus 1' of freeboard (spillway calculations can be found in Appendix F). Flows will oulet through 6-42" risers, 3 per basin, and then continue through a 66" RCP in Avenue 62, ouletting behind Dike #4. The outlet flows never exceed the existing rational method peak flow of 607 cfs. The results are summarized in the following tables and figure.

Table 5-7: Basin Routing Input Parameters

Depth (ft)	Outflow thru Risers (cfs)	Storage (ac-ft)
1.00	0	12.22
2.00	0	24.74
2.70	0	33.66
3.00	33.61	37.53
4.00	303.14	50.66

Table 5-8: Basin Routing Results

Storm Duration (hrs)	Peak Depth (ft)	Peak Flow (cfs)
1	3.37	133.6
3	3.70	222.1
6	3.94	286.9
24	3.36	130.7

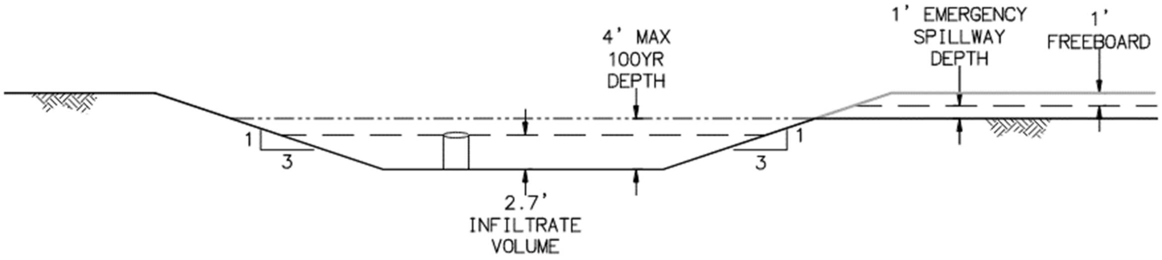


Figure 2: Basin Cross Section

Proposed Storm drain

The hydraulic calculations in support of the proposed drainage improvements as well as capacities were done using the normal-depth method. The AES rational method calculations for each area tributary to the basins were developed to identify peak flows onsite for the 100-year storm event. These calculations were used to size the facilities. A more detailed hydraulic analysis will be done during final storm drain improvement plans.

Table 5-9 and 5-10 summarizes the Main Storm Drain line sizes within the project site. Refer to Appendix E for Calculations using normal-depth method.

Table 5-9: Main Storm Drain Subarea A

	Q_{100} (cfs)	Diameter (In)
Line-A		
Node 30-40	532	78" RCP
Node 21-30	387	72" RCP
Node 16-21	272	60" RCP
Node 9-16	187	54" RCP
Line-2A		
Node 21-25	123	48" RCP
Line-3A		
Node 34-30	112	48" RCP

Table 5-10: Main Storm Drain Subarea B		
	Q_{100} (cfs)	**Diameter (In)**
Line-B		
Node 195-180	472	78" RCP
Node 180-140	360	66" RCP
Node 140-160	184	54" RCP
Node 160-158	140	48" RCP
Node 158-150	78	36" RCP
Node 150-142	33	24" RCP
Line-2B		
Node 140-130	199	54" RCP
Node 130-110	171	48" RCP
Node 110-106	66	36" RCP
Node 106-102	26	24" RCP
Line-3B		
Node 160-165	39	30" RCP
Node 165-163	28	24" RCP
Line-4B		
Node 180-186	110	48" RCP
Node 186-184	85	36" RCP
Node 186-184	30	24" RCP

Table 5-11: Main Storm Drain From Basins to Dike #4		
	Q_{100} (cfs)	**Diameter (In)**
Outlet Pipe		
Basins A & B to Dike #4	287	66" RCP

6 DISCUSSION OF RESULTS

Comparing the existing peak flowrate with that of the proposed, the unmitigated flowrate increase is **397** cfs. The increase in flow rate is due to the proposed development which can be attributed to the difference in land-use designation (from undeveloped to developed condition). This flowrate will be mitigated through Basin "A" and "B" with an anticipated mitigated flow rate of **287** cfs.

The storm flow volume difference between the Pre and Post Development is **32.6** ac-ft. This volume will be retained and infiltrated in the proposed basins "A" and "B".

APPENDIX A -SOILS TYPE MAP

APPENDIX B –NOAA ATLAS PRECIPITATION FREQUENCY

General Information
Homepage
Progress Reports
FAQ
Glossary

Precipitation Frequency
Data Server
GIS Grids
Maps
Time Series
Temporals
Documents

Probable Maximum Precipitation
Documents

Miscellaneous
Publications
Storm Analysis
Record Precipitation

Contact Us
Inquiries

USA.gov

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

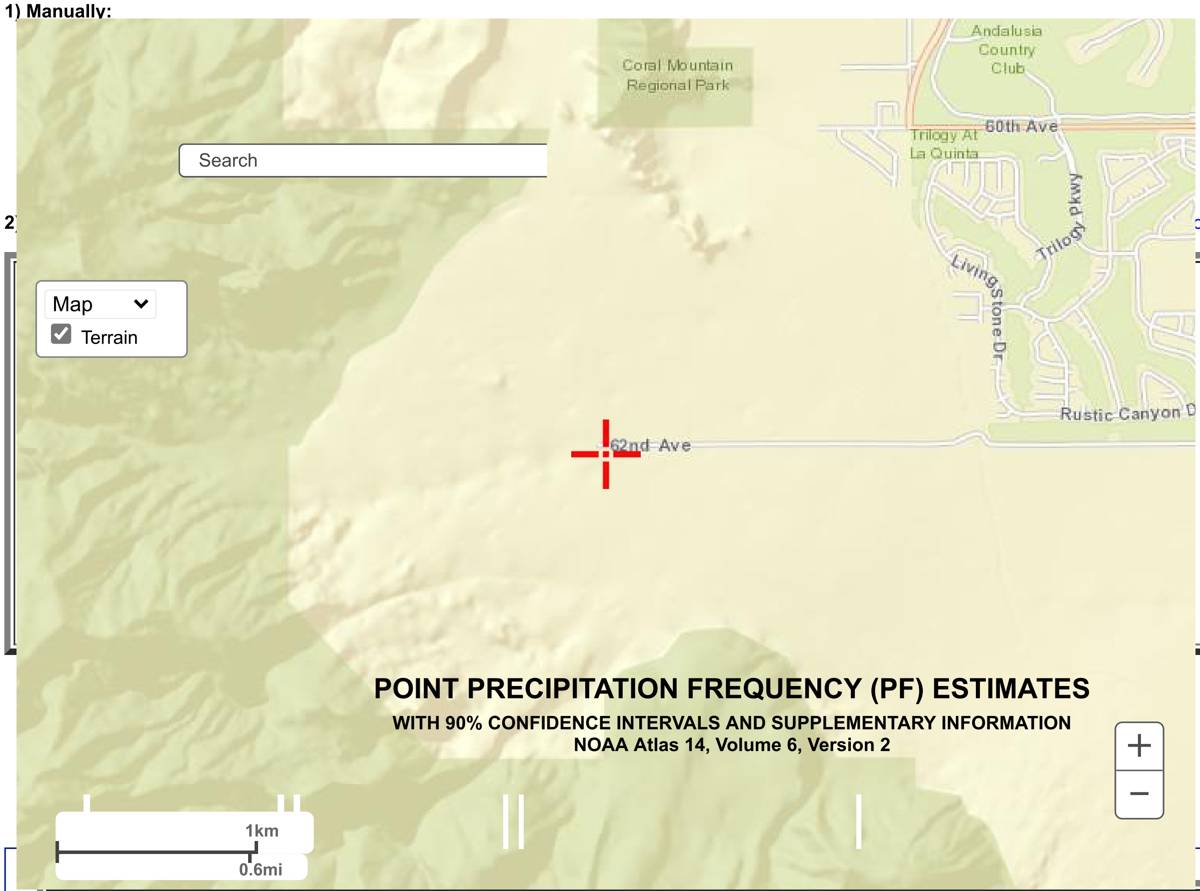
Data description

Data type: Precipitation intensity **Units:** English **Time series type:** Partial duration

Select location

1) Manually:

2) aa.gov):



a) Select location
Move crosshair or double click

b) Click on station icon
☐ Show stations on map

Location information:
Name: La Quinta, California, USA*
Latitude: 33.5977°
Longitude: -116.2675°
Elevation: 231.29 ft **
* Source: ESRI Maps
** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

Print page

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.864** (0.720-1.03)	**1.32** (1.10-1.60)	**2.00** (1.67-2.42)	**2.62** (2.16-3.20)	**3.56** (2.84-4.51)	**4.38** (3.42-5.68)	**5.32** (4.04-7.06)	**6.38** (4.73-8.72)	**8.06** (5.71-11.5)	**9.59** (6.56-14.2)

10-min	**0.612** (0.516-0.744)	**0.948** (0.792-1.15)	**1.43** (1.19-1.74)	**1.87** (1.55-2.29)	**2.55** (2.03-3.23)	**3.14** (2.45-4.06)	**3.81** (2.90-5.05)	**4.58** (3.38-6.26)	**5.78** (4.10-8.24)	**6.88** (4.70-10.2)
15-min	**0.496** (0.416-0.600)	**0.764** (0.636-0.924)	**1.16** (0.960-1.40)	**1.51** (1.25-1.85)	**2.06** (1.64-2.60)	**2.53** (1.98-3.28)	**3.07** (2.34-4.08)	**3.69** (2.73-5.04)	**4.66** (3.30-6.65)	**5.54** (3.79-8.19)
30-min	**0.358** (0.298-0.432)	**0.550** (0.458-0.664)	**0.832** (0.694-1.01)	**1.09** (0.898-1.33)	**1.48** (1.18-1.88)	**1.83** (1.42-2.36)	**2.21** (1.68-2.94)	**2.66** (1.97-3.64)	**3.36** (2.38-4.79)	**3.99** (2.73-5.90)
60-min	**0.251** (0.210-0.304)	**0.387** (0.323-0.468)	**0.586** (0.488-0.711)	**0.766** (0.632-0.937)	**1.04** (0.832-1.32)	**1.28** (1.00-1.66)	**1.56** (1.19-2.07)	**1.87** (1.38-2.56)	**2.36** (1.68-3.37)	**2.81** (1.92-4.15)
2-hr	**0.174** (0.146-0.210)	**0.254** (0.212-0.308)	**0.375** (0.312-0.454)	**0.486** (0.400-0.594)	**0.658** (0.524-0.832)	**0.808** (0.631-1.05)	**0.980** (0.746-1.30)	**1.18** (0.872-1.61)	**1.49** (1.05-2.12)	**1.76** (1.21-2.60)
3-hr	**0.139** (0.116-0.167)	**0.199** (0.166-0.241)	**0.291** (0.242-0.353)	**0.375** (0.310-0.459)	**0.507** (0.405-0.643)	**0.624** (0.487-0.808)	**0.758** (0.576-1.00)	**0.912** (0.674-1.25)	**1.15** (0.817-1.64)	**1.37** (0.935-2.02)
6-hr	**0.090** (0.075-0.109)	**0.129** (0.108-0.156)	**0.187** (0.155-0.226)	**0.240** (0.198-0.294)	**0.324** (0.259-0.411)	**0.398** (0.311-0.516)	**0.483** (0.368-0.641)	**0.582** (0.430-0.795)	**0.735** (0.521-1.05)	**0.873** (0.597-1.29)
12-hr	**0.054** (0.045-0.065)	**0.079** (0.066-0.095)	**0.115** (0.096-0.140)	**0.149** (0.123-0.182)	**0.201** (0.160-0.254)	**0.246** (0.192-0.318)	**0.297** (0.226-0.394)	**0.356** (0.263-0.486)	**0.446** (0.316-0.636)	**0.526** (0.359-0.777)
24-hr	**0.033** (0.030-0.039)	**0.050** (0.045-0.058)	**0.075** (0.066-0.087)	**0.097** (0.085-0.114)	**0.131** (0.111-0.158)	**0.160** (0.133-0.196)	**0.192** (0.156-0.241)	**0.228** (0.180-0.295)	**0.283** (0.215-0.381)	**0.331** (0.243-0.459)
2-day	**0.019** (0.017-0.022)	**0.029** (0.026-0.034)	**0.044** (0.039-0.051)	**0.057** (0.050-0.067)	**0.077** (0.065-0.092)	**0.093** (0.077-0.115)	**0.111** (0.090-0.140)	**0.132** (0.104-0.170)	**0.163** (0.123-0.219)	**0.189** (0.139-0.262)
3-day	**0.014** (0.012-0.016)	**0.021** (0.019-0.024)	**0.032** (0.028-0.037)	**0.041** (0.036-0.048)	**0.055** (0.047-0.066)	**0.067** (0.056-0.082)	**0.080** (0.065-0.101)	**0.095** (0.075-0.122)	**0.117** (0.088-0.157)	**0.135** (0.099-0.188)
4-day	**0.011** (0.010-0.013)	**0.017** (0.015-0.019)	**0.025** (0.022-0.029)	**0.033** (0.029-0.038)	**0.044** (0.037-0.053)	**0.053** (0.044-0.065)	**0.064** (0.052-0.080)	**0.075** (0.059-0.097)	**0.092** (0.070-0.124)	**0.107** (0.079-0.149)
7-day	**0.007** (0.006-0.008)	**0.010** (0.009-0.012)	**0.015** (0.013-0.018)	**0.020** (0.017-0.023)	**0.026** (0.022-0.032)	**0.032** (0.027-0.039)	**0.038** (0.031-0.048)	**0.045** (0.036-0.058)	**0.055** (0.042-0.074)	**0.064** (0.047-0.089)
10-day	**0.005** (0.004-0.006)	**0.007** (0.007-0.009)	**0.011** (0.010-0.013)	**0.014** (0.012-0.017)	**0.019** (0.016-0.023)	**0.023** (0.019-0.028)	**0.028** (0.022-0.035)	**0.032** (0.026-0.042)	**0.040** (0.030-0.053)	**0.046** (0.034-0.064)
20-day	**0.003** (0.002-0.003)	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.010** (0.009-0.013)	**0.013** (0.011-0.016)	**0.015** (0.012-0.019)	**0.018** (0.014-0.023)	**0.022** (0.016-0.029)	**0.025** (0.018-0.035)
30-day	**0.002** (0.002-0.002)	**0.003** (0.003-0.003)	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.008** (0.006-0.009)	**0.009** (0.008-0.011)	**0.011** (0.009-0.014)	**0.013** (0.010-0.017)	**0.016** (0.012-0.021)	**0.018** (0.013-0.025)
45-day	**0.001** (0.001-0.002)	**0.002** (0.002-0.002)	**0.003** (0.003-0.004)	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.007** (0.006-0.009)	**0.008** (0.007-0.010)	**0.010** (0.008-0.012)	**0.012** (0.009-0.016)	**0.013** (0.010-0.019)
60-day	**0.001** (0.001-0.001)	**0.002** (0.002-0.002)	**0.003** (0.002-0.003)	**0.003** (0.003-0.004)	**0.005** (0.004-0.006)	**0.006** (0.005-0.007)	**0.007** (0.005-0.008)	**0.008** (0.006-0.010)	**0.010** (0.007-0.013)	**0.011** (0.008-0.015)

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

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

Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in CSV format: Precipitation frequency estimates ▾ Submit

Main Link Categories:
Home | OWP

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
Office of Water Prediction (OWP)
1325 East West Highway
Silver Spring, MD 20910
Page Author: HDSC webmaster
Page last modified: April 21, 2017

Map Disclaimer
Disclaimer
Credits
Glossary

Privacy Policy
About Us
Career Opportunities

NOAA Atlas 14, Volume 6, Version 2
Location name: La Quinta, California, USA*
Latitude: 33.5977°, Longitude: -116.2675°
Elevation: 231.29 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.072** (0.060-0.086)	**0.110** (0.092-0.133)	**0.167** (0.139-0.202)	**0.218** (0.180-0.267)	**0.297** (0.237-0.376)	**0.365** (0.285-0.473)	**0.443** (0.337-0.588)	**0.532** (0.394-0.727)	**0.672** (0.476-0.959)	**0.799** (0.547-1.18)
10-min	**0.102** (0.086-0.124)	**0.158** (0.132-0.191)	**0.239** (0.199-0.290)	**0.312** (0.258-0.382)	**0.425** (0.339-0.538)	**0.523** (0.409-0.677)	**0.635** (0.483-0.842)	**0.763** (0.564-1.04)	**0.964** (0.683-1.37)	**1.15** (0.783-1.69)
15-min	**0.124** (0.104-0.150)	**0.191** (0.159-0.231)	**0.289** (0.240-0.350)	**0.378** (0.312-0.462)	**0.514** (0.410-0.651)	**0.633** (0.494-0.819)	**0.768** (0.584-1.02)	**0.923** (0.683-1.26)	**1.17** (0.826-1.66)	**1.39** (0.947-2.05)
30-min	**0.179** (0.149-0.216)	**0.275** (0.229-0.332)	**0.416** (0.347-0.505)	**0.544** (0.449-0.666)	**0.741** (0.591-0.939)	**0.913** (0.712-1.18)	**1.11** (0.842-1.47)	**1.33** (0.984-1.82)	**1.68** (1.19-2.40)	**2.00** (1.37-2.95)
60-min	**0.251** (0.210-0.304)	**0.387** (0.323-0.468)	**0.586** (0.488-0.711)	**0.766** (0.632-0.937)	**1.04** (0.832-1.32)	**1.28** (1.00-1.66)	**1.56** (1.19-2.07)	**1.87** (1.38-2.56)	**2.36** (1.68-3.37)	**2.81** (1.92-4.15)
2-hr	**0.348** (0.291-0.420)	**0.509** (0.425-0.615)	**0.750** (0.624-0.909)	**0.971** (0.801-1.19)	**1.32** (1.05-1.67)	**1.62** (1.26-2.09)	**1.96** (1.49-2.60)	**2.36** (1.74-3.22)	**2.97** (2.11-4.24)	**3.53** (2.41-5.21)
3-hr	**0.416** (0.348-0.503)	**0.598** (0.500-0.724)	**0.873** (0.727-1.06)	**1.13** (0.931-1.38)	**1.52** (1.22-1.93)	**1.87** (1.46-2.43)	**2.28** (1.73-3.02)	**2.74** (2.03-3.74)	**3.46** (2.45-4.93)	**4.11** (2.81-6.07)
6-hr	**0.541** (0.452-0.654)	**0.771** (0.644-0.933)	**1.12** (0.931-1.36)	**1.44** (1.19-1.76)	**1.94** (1.55-2.46)	**2.39** (1.86-3.09)	**2.89** (2.20-3.84)	**3.48** (2.58-4.76)	**4.40** (3.12-6.28)	**5.23** (3.57-7.72)
12-hr	**0.649** (0.543-0.784)	**0.947** (0.791-1.15)	**1.39** (1.16-1.69)	**1.80** (1.48-2.20)	**2.42** (1.93-3.07)	**2.97** (2.32-3.84)	**3.58** (2.73-4.75)	**4.29** (3.17-5.86)	**5.38** (3.81-7.67)	**6.33** (4.33-9.36)
24-hr	**0.803** (0.710-0.926)	**1.21** (1.07-1.40)	**1.80** (1.59-2.09)	**2.34** (2.04-2.73)	**3.14** (2.66-3.79)	**3.83** (3.18-4.71)	**4.61** (3.74-5.79)	**5.48** (4.33-7.08)	**6.80** (5.16-9.14)	**7.93** (5.83-11.0)
2-day	**0.922** (0.816-1.06)	**1.41** (1.25-1.63)	**2.11** (1.86-2.45)	**2.74** (2.40-3.20)	**3.68** (3.12-4.43)	**4.47** (3.71-5.50)	**5.35** (4.34-6.73)	**6.34** (5.00-8.19)	**7.80** (5.92-10.5)	**9.06** (6.65-12.6)
3-day	**0.990** (0.875-1.14)	**1.52** (1.34-1.75)	**2.28** (2.01-2.64)	**2.96** (2.59-3.46)	**3.97** (3.37-4.79)	**4.83** (4.01-5.93)	**5.77** (4.68-7.26)	**6.82** (5.39-8.81)	**8.39** (6.37-11.3)	**9.73** (7.14-13.5)
4-day	**1.05** (0.929-1.21)	**1.61** (1.42-1.86)	**2.42** (2.13-2.81)	**3.14** (2.75-3.67)	**4.21** (3.57-5.07)	**5.12** (4.25-6.29)	**6.11** (4.96-7.68)	**7.22** (5.70-9.32)	**8.87** (6.73-11.9)	**10.3** (7.54-14.3)
7-day	**1.12** (0.990-1.29)	**1.71** (1.51-1.98)	**2.57** (2.26-2.97)	**3.33** (2.91-3.88)	**4.45** (3.77-5.36)	**5.39** (4.48-6.63)	**6.43** (5.22-8.09)	**7.58** (5.99-9.80)	**9.29** (7.05-12.5)	**10.7** (7.88-14.9)
10-day	**1.16** (1.02-1.33)	**1.77** (1.56-2.04)	**2.65** (2.33-3.07)	**3.43** (3.00-4.00)	**4.58** (3.88-5.52)	**5.55** (4.61-6.82)	**6.61** (5.36-8.31)	**7.78** (6.14-10.1)	**9.52** (7.22-12.8)	**11.0** (8.06-15.3)
20-day	**1.25** (1.11-1.44)	**1.93** (1.71-2.23)	**2.90** (2.56-3.36)	**3.76** (3.29-4.39)	**5.03** (4.26-6.06)	**6.09** (5.05-7.48)	**7.24** (5.87-9.10)	**8.51** (6.72-11.0)	**10.4** (7.87-13.9)	**11.9** (8.75-16.6)
30-day	**1.34** (1.19-1.55)	**2.09** (1.85-2.42)	**3.17** (2.79-3.67)	**4.12** (3.60-4.80)	**5.52** (4.67-6.64)	**6.68** (5.55-8.21)	**7.94** (6.44-9.98)	**9.32** (7.36-12.0)	**11.3** (8.60-15.2)	**13.0** (9.54-18.1)
45-day	**1.46** (1.30-1.69)	**2.31** (2.04-2.67)	**3.53** (3.11-4.08)	**4.59** (4.02-5.36)	**6.17** (5.23-7.43)	**7.48** (6.21-9.19)	**8.88** (7.21-11.2)	**10.4** (8.23-13.5)	**12.6** (9.60-17.0)	**14.5** (10.6-20.1)
60-day	**1.56** (1.38-1.80)	**2.49** (2.20-2.88)	**3.82** (3.37-4.43)	**4.99** (4.36-5.82)	**6.71** (5.68-8.08)	**8.13** (6.75-9.99)	**9.67** (7.84-12.2)	**11.3** (8.95-14.6)	**13.7** (10.4-18.5)	**15.7** (11.5-21.8)

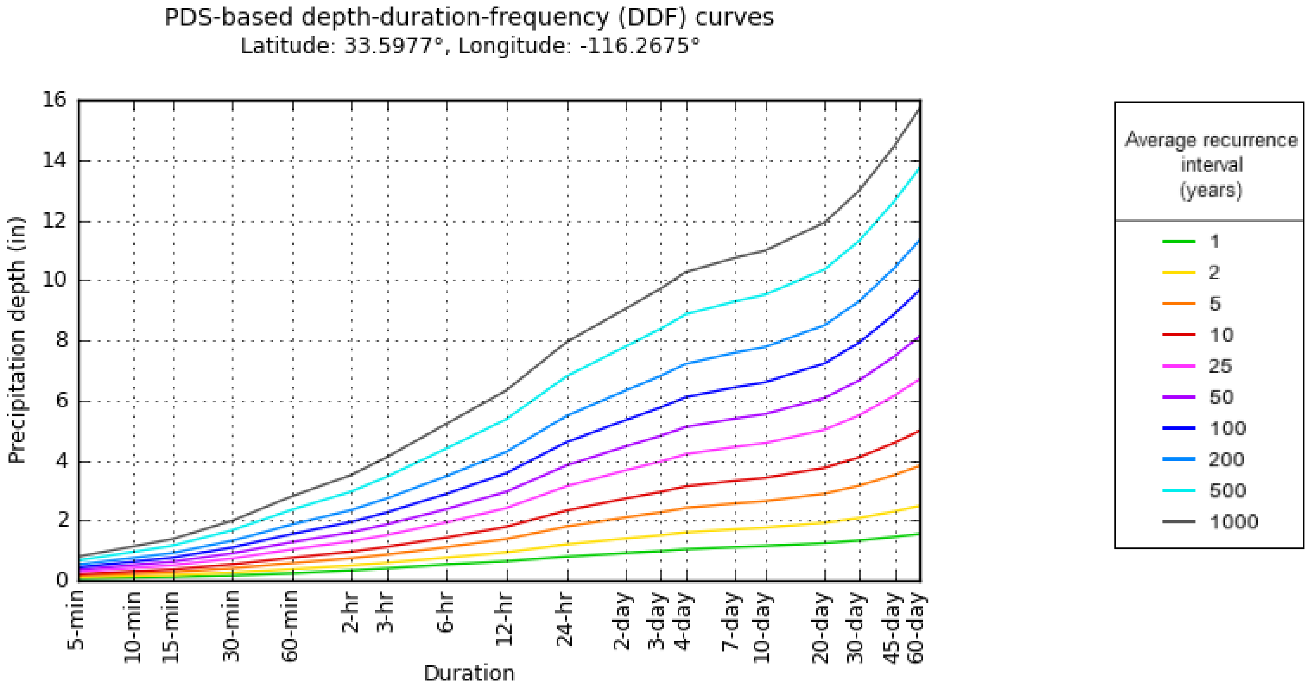
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

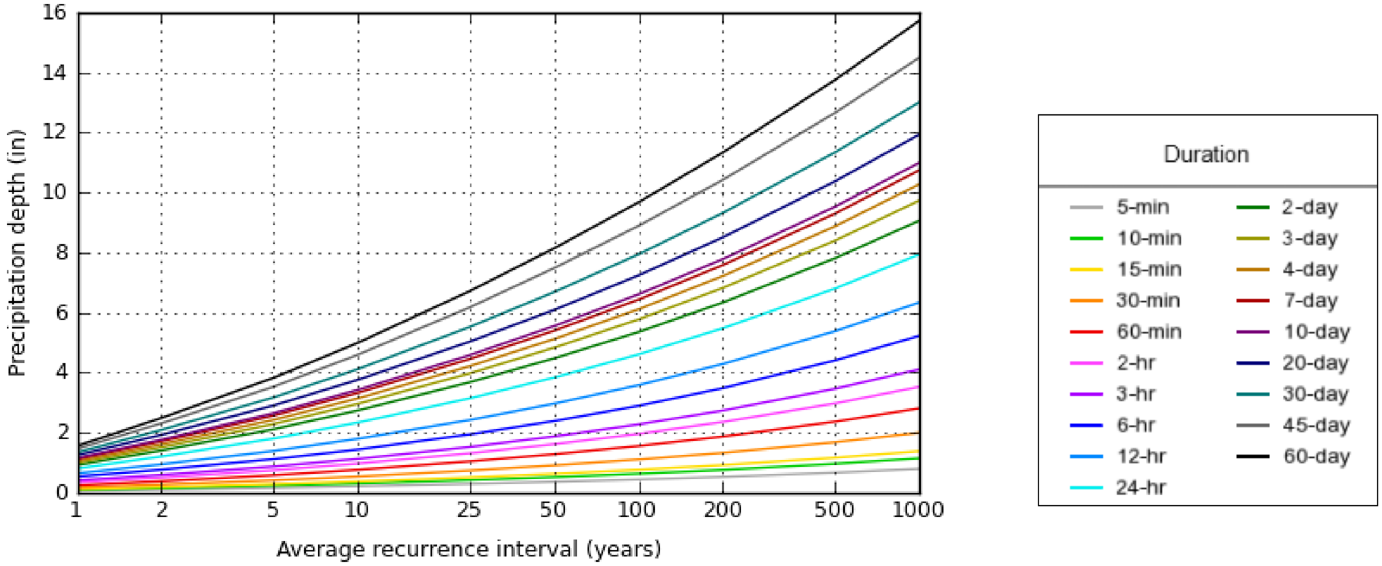
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical





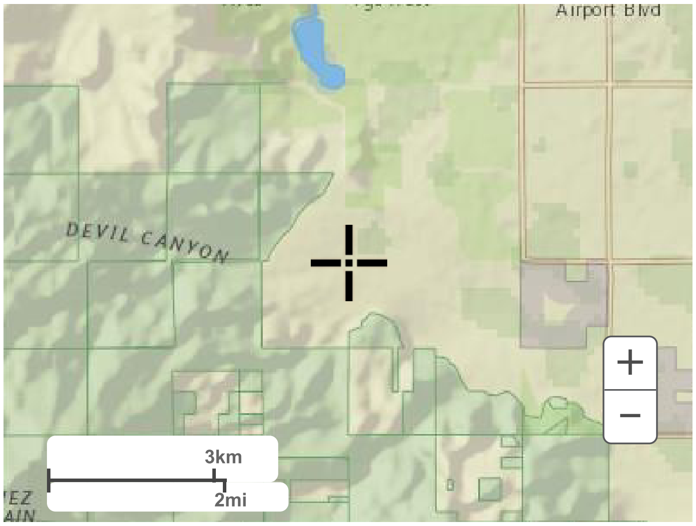
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu Oct 15 17:43:26 2020

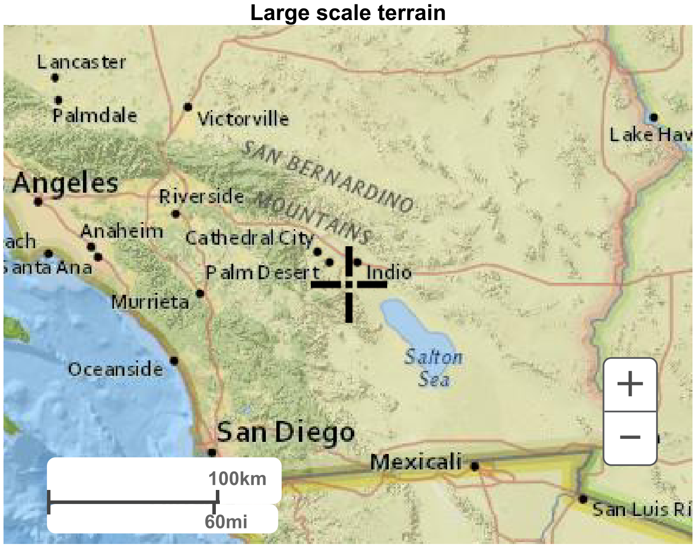
Back to Top

Maps & aerials

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

APPENDIX C –HYDROLOGY STUDY (AES RATIONAL METHOD)

C.1 – 100-YR EXISTING HYDROLOGY

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                      (Rational Tabling Version 22.0)
                   Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:

                          Proactive Engineering Consultants
                              27042 Towne Centre Drive
                              Foothill Ranch, CA. 92610

 ************************** DESCRIPTION OF STUDY **************************
* Travertine Project                                                       *
* Existing 100-yr Storm Event                                              *
* Subarea A                                                                *
 **************************************************************************

  FILE NAME: TRA-X00A.DAT
  TIME/DATE OF STUDY: 11:14 10/16/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======   ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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.*

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   708.00
  UPSTREAM ELEVATION(FEET) =    191.60
```

```
  DOWNSTREAM ELEVATION(FEET) =    168.70
  ELEVATION DIFFERENCE(FEET) =     22.90
  TC = 0.533*[(  708.00**3)/(    22.90)]**.2 =   14.603
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.155
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4742
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     13.91
  TOTAL AREA(ACRES) =      9.30   TOTAL RUNOFF(CFS) =     13.91

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    168.70  DOWNSTREAM(FEET) =     97.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2414.00   CHANNEL SLOPE =  0.0293
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.659
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4357
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      73.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.73
  AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   5.98
  Tc(MIN.) =   20.58
  SUBAREA AREA(ACRES) =   101.20       SUBAREA RUNOFF(CFS) =  117.23
  TOTAL AREA(ACRES) =      110.5         PEAK FLOW RATE(CFS) =     131.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.19   FLOW VELOCITY(FEET/SEC.) =   8.08
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =    3122.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      110.5  TC(MIN.) =     20.58
  PEAK FLOW RATE(CFS)   =     131.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                      (Rational Tabling Version 22.0)
                   Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:

                          Proactive Engineering Consultants
                              27042 Towne Centre Drive
                              Foothill Ranch, CA. 92610

 ************************** DESCRIPTION OF STUDY **************************
 * Travertine Project                                                       *
 * Existing 100-yr Storm Event                                              *
 * Subarea B                                                                *
 **************************************************************************

  FILE NAME: TRA-X00B.DAT
  TIME/DATE OF STUDY: 11:11 10/16/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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.*

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   867.00
  UPSTREAM ELEVATION(FEET) =    221.30
```

```
  DOWNSTREAM ELEVATION(FEET) =    178.20
  ELEVATION DIFFERENCE(FEET) =     43.10
  TC = 0.533*[(  867.00**3)/(    43.10)]**.2 =   14.532
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.163
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4747
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     14.86
  TOTAL AREA(ACRES) =      9.90   TOTAL RUNOFF(CFS) =     14.86

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    178.20  DOWNSTREAM(FEET) =    125.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1460.00   CHANNEL SLOPE =  0.0364
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.839
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4504
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      63.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.92
  AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   3.52
  Tc(MIN.) =   18.05
  SUBAREA AREA(ACRES) =    76.10       SUBAREA RUNOFF(CFS) =   97.30
  TOTAL AREA(ACRES) =       86.0         PEAK FLOW RATE(CFS) =     112.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.03   FLOW VELOCITY(FEET/SEC.) =   8.27
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =    2327.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    125.10  DOWNSTREAM(FEET) =     33.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2789.00   CHANNEL SLOPE =  0.0328
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4213
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     146.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.68
  AVERAGE FLOW DEPTH(FEET) =   1.23   TRAVEL TIME(MIN.) =   5.36
  Tc(MIN.) =   23.41
  SUBAREA AREA(ACRES) =    65.40       SUBAREA RUNOFF(CFS) =   68.72
  TOTAL AREA(ACRES) =      151.4         PEAK FLOW RATE(CFS) =     180.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.38   FLOW VELOCITY(FEET/SEC.) =   9.24
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    5116.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      151.4  TC(MIN.) =     23.41
  PEAK FLOW RATE(CFS)   =     180.88
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                      (Rational Tabling Version 22.0)
                   Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:

                          Proactive Engineering Consultants
                              27042 Towne Centre Drive
                             Foothill Ranch, CA. 92610


 ************************* DESCRIPTION OF STUDY *************************
* Travertine Project                                                       *
* Existing 100-yr Storm Event                                              *
* Subarea C                                                                *
 **************************************************************************

  FILE NAME: TRA-X00C.DAT
  TIME/DATE OF STUDY: 10:57 10/16/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   825.00
```

```
  UPSTREAM ELEVATION(FEET) =    275.00
  DOWNSTREAM ELEVATION(FEET) =    233.70
  ELEVATION DIFFERENCE(FEET) =     41.30
  TC = 0.533*[(  825.00**3)/(    41.30)]**.2 =   14.226
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.196
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4771
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     14.94
  TOTAL AREA(ACRES) =      9.80   TOTAL RUNOFF(CFS) =     14.94

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    300.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    233.70  DOWNSTREAM(FEET) =    136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2183.00   CHANNEL SLOPE =  0.0448
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.796
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4470
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      89.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.30
  AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   4.38
  Tc(MIN.) =   18.61
  SUBAREA AREA(ACRES) =   118.70       SUBAREA RUNOFF(CFS) =  148.35
  TOTAL AREA(ACRES) =      128.5         PEAK FLOW RATE(CFS) =     163.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.20   FLOW VELOCITY(FEET/SEC.) =   9.98
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    300.00 =    3008.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    400.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    136.00  DOWNSTREAM(FEET) =     40.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2784.00   CHANNEL SLOPE =  0.0345
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.504
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4222
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     229.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.07
  AVERAGE FLOW DEPTH(FEET) =   1.55   TRAVEL TIME(MIN.) =   4.61
  Tc(MIN.) =   23.21
  SUBAREA AREA(ACRES) =   124.10       SUBAREA RUNOFF(CFS) =  131.22
  TOTAL AREA(ACRES) =      252.6         PEAK FLOW RATE(CFS) =     294.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.77   FLOW VELOCITY(FEET/SEC.) =  10.84
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    400.00 =    5792.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      252.6  TC(MIN.) =     23.21
  PEAK FLOW RATE(CFS)   =     294.51
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

C.2 – 100-YR PROPOSED HYDROLOGY

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                     (RCFC&WCD)  1978 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                     (Rational Tabling Version 22.0)
                  Release Date: 07/01/2015  License ID 1673

                         Analysis prepared by:

                      Proactive Engineering Consultants
                          27042 Towne Centre Drive
                          Foothill Ranch, Ca. 92610


 ************************** DESCRIPTION OF STUDY **************************
 * Travertine Project                                                      *
 * Proposed 100-yr Storm Event                                             *
 * Subarea A                                                               *
 **************************************************************************

  FILE NAME: TRAV-00A.DAT
  TIME/DATE OF STUDY: 09:03 10/13/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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   20.0     10.0    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 =  0.40 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   788.00
```

```
  UPSTREAM ELEVATION(FEET) =    218.50
  DOWNSTREAM ELEVATION(FEET) =    206.50
  ELEVATION DIFFERENCE(FEET) =     12.00
  TC = 0.303*[(  788.00**3)/(    12.00)]**.2 =   10.085
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.794
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8615
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.59   TOTAL RUNOFF(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.794
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8615
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.64   SUBAREA RUNOFF(CFS) =    2.09
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       7.29
  TC(MIN.) =   10.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.50  DOWNSTREAM(FEET) =   182.00
  FLOW LENGTH(FEET) =   690.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.29
  PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =   11.46
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    1478.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.560
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5011
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.42   SUBAREA RUNOFF(CFS) =    4.32
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      11.61
  TC(MIN.) =   11.46

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   182.00  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =  1103.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.61
  PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =    2581.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.83
  RAINFALL INTENSITY(INCH/HR) =   3.36
  TOTAL STREAM AREA(ACRES) =     4.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.61

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS CONDOMINIUM
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   615.00
  UPSTREAM ELEVATION(FEET) =    208.00
  DOWNSTREAM ELEVATION(FEET) =    170.00
  ELEVATION DIFFERENCE(FEET) =     38.00
  TC = 0.359*[(  615.00**3)/(    38.00)]**.2 =    8.179
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.211
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7733
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     16.02
  TOTAL AREA(ACRES) =      4.92   TOTAL RUNOFF(CFS) =     16.02

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   160.00  DOWNSTREAM(FEET) =   148.70
  FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.02
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    8.47
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =     855.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.138
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7720
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    6.53   SUBAREA RUNOFF(CFS) =   20.86
  TOTAL AREA(ACRES) =       11.5   TOTAL RUNOFF(CFS) =      36.88
  TC(MIN.) =    8.47

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   148.70  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =   375.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.37
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.88
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    8.79
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      8.00 =    1230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.062
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8630
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    4.07
  TOTAL AREA(ACRES) =       12.6   TOTAL RUNOFF(CFS) =      40.95
  TC(MIN.) =    8.79

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   126.80  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.35
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.95
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.83
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      4.00 =    1280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.053
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .8074
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.59   SUBAREA RUNOFF(CFS) =   11.75
  TOTAL AREA(ACRES) =       16.2   TOTAL RUNOFF(CFS) =      52.70
  TC(MIN.) =    8.83

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.83
  RAINFALL INTENSITY(INCH/HR) =   4.05
  TOTAL STREAM AREA(ACRES) =    16.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     52.70

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.61    12.83        3.365          4.65
```

```
      2       52.70     8.83       4.053         16.20

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       60.69     8.83       4.053
      2       55.36    12.83       3.365

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      60.69   Tc(MIN.) =    8.83
  TOTAL AREA(ACRES) =       20.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =    2581.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   122.00  DOWNSTREAM(FEET) =   118.00
  FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.43
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.69
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.99
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    2724.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.99
  RAINFALL INTENSITY(INCH/HR) =   4.02
  TOTAL STREAM AREA(ACRES) =    20.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     60.69

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   725.00
  UPSTREAM ELEVATION(FEET) =    215.00
  DOWNSTREAM ELEVATION(FEET) =    163.00
  ELEVATION DIFFERENCE(FEET) =     52.00
  TC = 0.533*[(  725.00**3)/(    52.00)]**.2 =   12.572
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.399
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4909
  SOIL CLASSIFICATION IS "A"
```

```
  SUBAREA RUNOFF(CFS) =     15.47
  TOTAL AREA(ACRES) =      9.27   TOTAL RUNOFF(CFS) =     15.47

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    163.00  DOWNSTREAM(FEET) =    140.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   990.00   CHANNEL SLOPE =  0.0232
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.194
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4769
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.87
  AVERAGE FLOW DEPTH(FEET) =   1.49   TRAVEL TIME(MIN.) =   1.67
  Tc(MIN.) =   14.24
  SUBAREA AREA(ACRES) =     8.47       SUBAREA RUNOFF(CFS) =   12.90
  TOTAL AREA(ACRES) =       17.7         PEAK FLOW RATE(CFS) =      28.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.64   FLOW VELOCITY(FEET/SEC.) =  10.51
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   118.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.21
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.37
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =    1770.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.28
  RAINFALL INTENSITY(INCH/HR) =   3.19
  TOTAL STREAM AREA(ACRES) =    17.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.37

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       60.69     8.99        4.019        20.85
     2       28.37    14.28        3.191        17.74

 ********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
```

```
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       78.55     8.99       4.019
      2       76.56    14.28       3.191

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      78.55   Tc(MIN.) =    8.99
  TOTAL AREA(ACRES) =       38.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    2724.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   118.00  DOWNSTREAM(FEET) =   106.00
  FLOW LENGTH(FEET) =   245.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.36
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      78.55
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.19
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     13.00 =    2969.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.975
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8625
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    5.82   SUBAREA RUNOFF(CFS) =   19.95
  TOTAL AREA(ACRES) =       44.4   TOTAL RUNOFF(CFS) =      98.50
  TC(MIN.) =    9.19

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.975
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5254
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.53   SUBAREA RUNOFF(CFS) =    9.46
  TOTAL AREA(ACRES) =       48.9   TOTAL RUNOFF(CFS) =     107.96
  TC(MIN.) =    9.19

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   106.00  DOWNSTREAM(FEET) =    96.00
  FLOW LENGTH(FEET) =   628.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.4 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.49
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     107.96
  PIPE TRAVEL TIME(MIN.) =    0.72    Tc(MIN.) =     9.91
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    3597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.828
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7086
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   29.14   SUBAREA RUNOFF(CFS) =   79.03
  TOTAL AREA(ACRES) =       78.1   TOTAL RUNOFF(CFS) =     186.99
  TC(MIN.) =    9.91

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    96.00  DOWNSTREAM(FEET) =    88.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     186.99
  PIPE TRAVEL TIME(MIN.) =    0.17    Tc(MIN.) =    10.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    3822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.796
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7654
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    9.84   SUBAREA RUNOFF(CFS) =   28.59
  TOTAL AREA(ACRES) =       87.9   TOTAL RUNOFF(CFS) =     215.58
  TC(MIN.) =   10.07

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.796
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8615
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.88   SUBAREA RUNOFF(CFS) =    6.15
  TOTAL AREA(ACRES) =       89.8   TOTAL RUNOFF(CFS) =     221.73
  TC(MIN.) =   10.07

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    88.00  DOWNSTREAM(FEET) =    70.00
  FLOW LENGTH(FEET) =  2370.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  45.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.13
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     221.73
  PIPE TRAVEL TIME(MIN.) =   3.01    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    6192.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.333
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6932
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   22.07   SUBAREA RUNOFF(CFS) =   50.99
  TOTAL AREA(ACRES) =      111.9   TOTAL RUNOFF(CFS) =     272.71
  TC(MIN.) =   13.08

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    70.00  DOWNSTREAM(FEET) =    65.00
  FLOW LENGTH(FEET) =   521.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.90
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     272.71
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6713.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS MOBILE HOME PARK
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1009.00
  UPSTREAM ELEVATION(FEET) =    140.00
  DOWNSTREAM ELEVATION(FEET) =    102.60
  ELEVATION DIFFERENCE(FEET) =     37.40
  TC = 0.336*[( 1009.00**3)/(    37.40)]**.2 =   10.327
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.749
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .8032
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      6.84
  TOTAL AREA(ACRES) =      2.27   TOTAL RUNOFF(CFS) =      6.84

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    92.60  DOWNSTREAM(FEET) =    92.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.84
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   10.51
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     24.00 =    1074.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.717
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .8027
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.63   SUBAREA RUNOFF(CFS) =    1.88
  TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =       8.72
  TC(MIN.) =   10.51

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    92.00  DOWNSTREAM(FEET) =    71.50
  FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.72
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =   11.59
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     25.00 =    1734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.539
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8600
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.25   SUBAREA RUNOFF(CFS) =    3.80
  TOTAL AREA(ACRES) =        4.2   TOTAL RUNOFF(CFS) =      12.52
  TC(MIN.) =   11.59

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.539
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8600
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.29   SUBAREA RUNOFF(CFS) =   10.01
  TOTAL AREA(ACRES) =        7.4   TOTAL RUNOFF(CFS) =      22.53
  TC(MIN.) =   11.59

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    71.50  DOWNSTREAM(FEET) =    71.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.32
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.53
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.69
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     26.00 =    1784.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.69
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     7.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.53

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   545.00
  UPSTREAM ELEVATION(FEET) =    139.50
  DOWNSTREAM ELEVATION(FEET) =    100.00
  ELEVATION DIFFERENCE(FEET) =     39.50
  TC = 0.393*[(  545.00**3)/(    39.50)]**.2 =    8.250
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.193
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7185
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     30.04
  TOTAL AREA(ACRES) =      9.97   TOTAL RUNOFF(CFS) =     30.04

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     85.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   772.00   CHANNEL SLOPE =  0.0194
  CHANNEL BASE(FEET) =   20.00    "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.763
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7067
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.43
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   2.00
  Tc(MIN.) =   10.25
  SUBAREA AREA(ACRES) =    10.47       SUBAREA RUNOFF(CFS) =   27.85
  TOTAL AREA(ACRES) =       20.4         PEAK FLOW RATE(CFS) =      57.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   7.11
  LONGEST FLOWPATH FROM NODE     27.00 TO NODE     29.00 =    1317.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.763
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5134
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.76   SUBAREA RUNOFF(CFS) =    5.33
  TOTAL AREA(ACRES) =       23.2   TOTAL RUNOFF(CFS) =      63.22
  TC(MIN.) =   10.25

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.763
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7067
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   15.14   SUBAREA RUNOFF(CFS) =   40.27
  TOTAL AREA(ACRES) =       38.3   TOTAL RUNOFF(CFS) =     103.49
  TC(MIN.) =   10.25

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    71.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.12
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     103.49
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   10.28
  LONGEST FLOWPATH FROM NODE     27.00 TO NODE     26.00 =    1367.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.28
  RAINFALL INTENSITY(INCH/HR) =   3.76
  TOTAL STREAM AREA(ACRES) =    38.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    103.49

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       22.53    11.69        3.524          7.44
      2      103.49    10.28        3.758         38.34

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      123.30    10.28       3.758
      2      119.59    11.69       3.524

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     123.30   Tc(MIN.) =   10.28
  TOTAL AREA(ACRES) =       45.8
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     26.00 =    1784.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    71.00  DOWNSTREAM(FEET) =    65.00
  FLOW LENGTH(FEET) =   892.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     123.30
  PIPE TRAVEL TIME(MIN.) =   1.38    Tc(MIN.) =   11.66
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     21.00 =    2676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      123.30    11.66       3.529       45.78
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     21.00 =    2676.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      272.71    13.67       3.261      111.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6713.00 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     356.00      11.66        3.529
      2     386.64      13.67        3.261

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     386.64   Tc(MIN.) =   13.67
  TOTAL AREA(ACRES) =      157.6

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  12
```

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

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    65.00  DOWNSTREAM(FEET) =    36.00
  FLOW LENGTH(FEET) =  1108.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.78
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     386.64
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   14.44
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    7821.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.44
  RAINFALL INTENSITY(INCH/HR) =   3.17
  TOTAL STREAM AREA(ACRES) =   157.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    386.64

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   435.00
  UPSTREAM ELEVATION(FEET) =    120.50
  DOWNSTREAM ELEVATION(FEET) =     88.00
  ELEVATION DIFFERENCE(FEET) =     32.50
  TC = 0.393*[(  435.00**3)/(    32.50)]**.2 =    7.493
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.399
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7237
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     15.28
  TOTAL AREA(ACRES) =      4.80   TOTAL RUNOFF(CFS) =     15.28

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =     82.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   503.00   CHANNEL SLOPE =  0.0119
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.967
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7125
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.85
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   1.73
  Tc(MIN.) =    9.22
  SUBAREA AREA(ACRES) =    11.52       SUBAREA RUNOFF(CFS) =   32.57
  TOTAL AREA(ACRES) =       16.3         PEAK FLOW RATE(CFS) =      47.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   5.73
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     33.00 =     938.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     82.00  DOWNSTREAM(FEET) =     75.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   579.00   CHANNEL SLOPE =  0.0112
  CHANNEL BASE(FEET) =   20.00    "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.669
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7039
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      61.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.16
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   1.57
  Tc(MIN.) =   10.79
  SUBAREA AREA(ACRES) =    10.52       SUBAREA RUNOFF(CFS) =   27.17
  TOTAL AREA(ACRES) =       26.8         PEAK FLOW RATE(CFS) =      75.02

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   6.63
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     34.00 =    1517.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.669
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7039
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   10.38   SUBAREA RUNOFF(CFS) =   26.81
  TOTAL AREA(ACRES) =       37.2   TOTAL RUNOFF(CFS) =     101.83
  TC(MIN.) =   10.79

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.669
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7039
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.03   SUBAREA RUNOFF(CFS) =    7.83
  TOTAL AREA(ACRES) =       40.2   TOTAL RUNOFF(CFS) =     109.65
  TC(MIN.) =   10.79

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.50  DOWNSTREAM(FEET) =    52.00
  FLOW LENGTH(FEET) =   410.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.47
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     109.65
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   11.08
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     35.00 =    1927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.621
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8605
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.81   SUBAREA RUNOFF(CFS) =    2.52
  TOTAL AREA(ACRES) =       41.1   TOTAL RUNOFF(CFS) =     112.18
  TC(MIN.) =   11.08

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    36.00
  FLOW LENGTH(FEET) =   964.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     112.18
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   12.16
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     30.00 =    2891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.456
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6973
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   14.86   SUBAREA RUNOFF(CFS) =   35.81
  TOTAL AREA(ACRES) =       55.9   TOTAL RUNOFF(CFS) =     147.99
  TC(MIN.) =   12.16

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.16
  RAINFALL INTENSITY(INCH/HR) =   3.46
  TOTAL STREAM AREA(ACRES) =    55.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    147.99

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      386.64    14.44        3.172        157.65
      2      147.99    12.16        3.456         55.92
```

```
 ********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 *************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      473.54    12.16       3.456
      2      522.47    14.44       3.172

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     522.47   Tc(MIN.) =   14.44
  TOTAL AREA(ACRES) =      213.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    7821.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.00  DOWNSTREAM(FEET) =    26.00
  FLOW LENGTH(FEET) =   942.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  63.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.09
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     522.47
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   15.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     40.00 =    8763.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.081
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4689
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    6.69   SUBAREA RUNOFF(CFS) =    9.67
  TOTAL AREA(ACRES) =      220.3   TOTAL RUNOFF(CFS) =     532.14
  TC(MIN.) =   15.31
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      220.3  TC(MIN.) =     15.31
  PEAK FLOW RATE(CFS)   =     532.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                     (RCFC&WCD)  1978 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                     (Rational Tabling Version 22.0)
                  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
                   Proactive Engineering Consultants
                         27042 Towne Centre Drive
                         Foothill Ranch, Ca. 92610


 ************************** DESCRIPTION OF STUDY **************************
 * Travertine Project                                                       *
 * Proposed 100-yr Storm Event                                              *
 * Subarea B                                                                *
 **************************************************************************

  FILE NAME: TRAV-00B.DAT
  TIME/DATE OF STUDY: 09:34 10/13/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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   20.0     10.0    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 =  0.40 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   750.00
  UPSTREAM ELEVATION(FEET) =    245.00
```

```
  DOWNSTREAM ELEVATION(FEET) =    237.50
  ELEVATION DIFFERENCE(FEET) =      7.50
  TC = 0.393*[(  750.00**3)/(     7.50)]**.2 =   13.931
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.230
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6897
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     11.81
  TOTAL AREA(ACRES) =      5.30   TOTAL RUNOFF(CFS) =     11.81

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    237.50  DOWNSTREAM(FEET) =    231.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0103
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.934
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6789
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.54
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   2.96
  Tc(MIN.) =   16.89
  SUBAREA AREA(ACRES) =     3.88       SUBAREA RUNOFF(CFS) =    7.73
  TOTAL AREA(ACRES) =        9.2         PEAK FLOW RATE(CFS) =      19.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   3.86
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   221.00  DOWNSTREAM(FEET) =   162.00
  FLOW LENGTH(FEET) =   720.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.53
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   17.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.57
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =     9.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.53

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   547.00
  UPSTREAM ELEVATION(FEET) =    232.00
  DOWNSTREAM ELEVATION(FEET) =    208.00
  ELEVATION DIFFERENCE(FEET) =     24.00
  TC = 0.937*[(  547.00**3)/(    24.00)]**.2 =   21.811
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.583
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4292
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      4.09
  TOTAL AREA(ACRES) =      3.69   TOTAL RUNOFF(CFS) =      4.09

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  208.00  DOWNSTREAM ELEVATION(FEET) =  172.00
  STREET LENGTH(FEET) =   672.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.42
  STREET FLOW TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   24.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.453
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6588
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.22      SUBAREA RUNOFF(CFS) =    5.20
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =       9.30

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   8.53
  FLOW VELOCITY(FEET/SEC.) =  5.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.67
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    105.00 =    1219.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.19
  RAINFALL INTENSITY(INCH/HR) =   2.45
  TOTAL STREAM AREA(ACRES) =     6.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.30

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       19.53    17.57        2.877          9.18
      2        9.30    24.19        2.453          6.91

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       26.29    17.57       2.877
      2       25.95    24.19       2.453

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.29   Tc(MIN.) =   17.57
  TOTAL AREA(ACRES) =       16.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   162.00  DOWNSTREAM(FEET) =   159.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.36
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.29
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   17.63
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    2155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.873
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7436
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   14.93   SUBAREA RUNOFF(CFS) =   31.89
  TOTAL AREA(ACRES) =       31.0   TOTAL RUNOFF(CFS) =      58.18
  TC(MIN.) =   17.63

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   159.00  DOWNSTREAM(FEET) =   134.30
  FLOW LENGTH(FEET) =   760.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.34
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.18
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   18.40
```

```
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2915.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.812
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7871
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.79   SUBAREA RUNOFF(CFS) =    8.39
  TOTAL AREA(ACRES) =       34.8   TOTAL RUNOFF(CFS) =      66.56
  TC(MIN.) =   18.40

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   134.30  DOWNSTREAM(FEET) =   130.00
  FLOW LENGTH(FEET) =   213.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.97
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      66.56
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   18.65
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    3128.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   378.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    278.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  TC = 0.709*[(  378.00**3)/(     2.00)]**.2 =   21.736
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.588
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4296
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      2.82   TOTAL RUNOFF(CFS) =      3.13

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   271.00  DOWNSTREAM(FEET) =   268.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.19
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.13
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   21.90
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    113.00 =     458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.578
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4288
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.54   SUBAREA RUNOFF(CFS) =    1.70
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =       4.84
  TC(MIN.) =   21.90

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   268.00  DOWNSTREAM(FEET) =   231.70
  FLOW LENGTH(FEET) =   710.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.84
  PIPE TRAVEL TIME(MIN.) =   1.14    Tc(MIN.) =   23.04
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    115.00 =    1168.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.04
  RAINFALL INTENSITY(INCH/HR) =   2.51
  TOTAL STREAM AREA(ACRES) =     4.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.84

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS CONDOMINIUM
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   618.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    278.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  TC = 0.359*[(  618.00**3)/(     2.00)]**.2 =   14.782
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.136
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7505
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      2.59
  TOTAL AREA(ACRES) =      1.10   TOTAL RUNOFF(CFS) =      2.59

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

```
  FLOW PROCESS FROM NODE    113.00 TO NODE    115.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  278.00  DOWNSTREAM ELEVATION(FEET) =  243.00
  STREET LENGTH(FEET) =   685.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.40
  STREET FLOW TRAVEL TIME(MIN.) =   2.47   Tc(MIN.) =   17.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6777
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.04      SUBAREA RUNOFF(CFS) =    7.95
  TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =      10.54

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.22
  FLOW VELOCITY(FEET/SEC.) =  5.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.74
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    115.00 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.25
  RAINFALL INTENSITY(INCH/HR) =   2.90
  TOTAL STREAM AREA(ACRES) =     5.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.54

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.84    23.04        2.513          4.36
      2       10.54    17.25        2.903          5.14

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
```

```
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.16    17.25       2.903
      2       13.96    23.04       2.513

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.16   Tc(MIN.) =   17.25
  TOTAL AREA(ACRES) =        9.5
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    115.00 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   231.70  DOWNSTREAM(FEET) =   224.30
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.16
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   17.41
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    117.00 =    1439.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.890
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6772
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    6.39   SUBAREA RUNOFF(CFS) =   12.51
  TOTAL AREA(ACRES) =       15.9   TOTAL RUNOFF(CFS) =      26.67
  TC(MIN.) =   17.41

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   224.30  DOWNSTREAM(FEET) =   214.40
  FLOW LENGTH(FEET) =   188.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.18
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.67
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   17.61
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    118.00 =    1627.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.874
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6766
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   11.75   SUBAREA RUNOFF(CFS) =   22.85
  TOTAL AREA(ACRES) =       27.6   TOTAL RUNOFF(CFS) =      49.52
  TC(MIN.) =   17.61
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   214.40  DOWNSTREAM(FEET) =   204.00
  FLOW LENGTH(FEET) =   198.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.33
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.52
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   17.79
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    119.00 =    1825.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.860
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4521
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    0.59
  TOTAL AREA(ACRES) =       28.1   TOTAL RUNOFF(CFS) =      50.11
  TC(MIN.) =   17.79

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   204.00  DOWNSTREAM(FEET) =   195.50
  FLOW LENGTH(FEET) =   162.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.33
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.11
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   17.93
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    120.00 =    1987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.848
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6756
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.32   SUBAREA RUNOFF(CFS) =    8.31
  TOTAL AREA(ACRES) =       32.4   TOTAL RUNOFF(CFS) =      58.42
  TC(MIN.) =   17.93

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   195.50  DOWNSTREAM(FEET) =   177.00
  FLOW LENGTH(FEET) =   331.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.02
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      58.42
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   18.21
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    121.00 =    2318.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.826
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6747
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.76   SUBAREA RUNOFF(CFS) =    7.17
  TOTAL AREA(ACRES) =       36.2   TOTAL RUNOFF(CFS) =      65.59
  TC(MIN.) =   18.21

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.826
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4494
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    7.29   SUBAREA RUNOFF(CFS) =    9.26
  TOTAL AREA(ACRES) =       43.5   TOTAL RUNOFF(CFS) =      74.85
  TC(MIN.) =   18.21

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   177.00  DOWNSTREAM(FEET) =   139.00
  FLOW LENGTH(FEET) =   470.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.33
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      74.85
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   18.53
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    122.00 =    2788.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.802
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6737
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   11.78   SUBAREA RUNOFF(CFS) =   22.24
  TOTAL AREA(ACRES) =       55.2   TOTAL RUNOFF(CFS) =      97.09
  TC(MIN.) =   18.53

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   139.00  DOWNSTREAM(FEET) =   130.00
  FLOW LENGTH(FEET) =   409.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.03
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       97.09
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   18.96
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    110.00 =    3197.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.770
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7407
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.78   SUBAREA RUNOFF(CFS) =    7.76
  TOTAL AREA(ACRES) =       59.0   TOTAL RUNOFF(CFS) =     104.84
  TC(MIN.) =   18.96

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       104.84    18.96       2.770       59.03
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    110.00 =    3197.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        66.56    18.65       2.792       34.81
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    3128.00 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     169.74      18.65        2.792
     2     170.88      18.96        2.770

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     170.88   Tc(MIN.) =   18.96
  TOTAL AREA(ACRES) =       93.8

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   120.00
  FLOW LENGTH(FEET) =   990.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.68
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     170.88
  PIPE TRAVEL TIME(MIN.) =   1.21    Tc(MIN.) =   20.16
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    130.00 =    4187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.16
  RAINFALL INTENSITY(INCH/HR) =   2.69
  TOTAL STREAM AREA(ACRES) =    93.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    170.88

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   564.00
  UPSTREAM ELEVATION(FEET) =    210.00
  DOWNSTREAM ELEVATION(FEET) =    195.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  TC = 0.937*[(  564.00**3)/(    15.00)]**.2 =   24.405
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.442
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4167
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      2.67
  TOTAL AREA(ACRES) =      2.62   TOTAL RUNOFF(CFS) =      2.67

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.442
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4167
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.27   SUBAREA RUNOFF(CFS) =    2.31
  TOTAL AREA(ACRES) =        4.9   TOTAL RUNOFF(CFS) =       4.98
  TC(MIN.) =   24.40

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    195.00  DOWNSTREAM(FEET) =    168.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   830.00   CHANNEL SLOPE =  0.0319
  CHANNEL BASE(FEET) =    8.00    "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.318
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4050
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.13
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.70
  Tc(MIN.) =   27.10
  SUBAREA AREA(ACRES) =     3.94       SUBAREA RUNOFF(CFS) =    3.70
  TOTAL AREA(ACRES) =        8.8         PEAK FLOW RATE(CFS) =       8.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   5.64
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    133.00 =    1394.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   158.50  DOWNSTREAM(FEET) =   130.00
  FLOW LENGTH(FEET) =   321.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.87
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.68
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   27.46
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    134.00 =    1715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.303
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6518
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    8.72   SUBAREA RUNOFF(CFS) =   13.09
  TOTAL AREA(ACRES) =       17.5   TOTAL RUNOFF(CFS) =      21.76
  TC(MIN.) =   27.46

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   120.00
  FLOW LENGTH(FEET) =   264.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.62
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.76
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   27.78
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    130.00 =    1979.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.290
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4022
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.48   SUBAREA RUNOFF(CFS) =    3.20
  TOTAL AREA(ACRES) =       21.0   TOTAL RUNOFF(CFS) =      24.97
  TC(MIN.) =   27.78

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

```
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.290
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7756
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.51   SUBAREA RUNOFF(CFS) =    6.23
  TOTAL AREA(ACRES) =       24.5   TOTAL RUNOFF(CFS) =      31.20
  TC(MIN.) =   27.78

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   27.78
  RAINFALL INTENSITY(INCH/HR) =   2.29
  TOTAL STREAM AREA(ACRES) =    24.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      170.88    20.16        2.686         93.84
     2       31.20    27.78        2.290         24.54

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      193.52    20.16       2.686
     2      176.84    27.78       2.290

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     193.52   Tc(MIN.) =   20.16
  TOTAL AREA(ACRES) =      118.4
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    130.00 =    4187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   120.00  DOWNSTREAM(FEET) =   112.00
  FLOW LENGTH(FEET) =   635.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.31
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     193.52
  PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   20.85
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    135.00 =    4822.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.642
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7836
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.72   SUBAREA RUNOFF(CFS) =    5.63
  TOTAL AREA(ACRES) =      121.1   TOTAL RUNOFF(CFS) =     199.15
  TC(MIN.) =   20.85

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   112.00  DOWNSTREAM(FEET) =   110.00
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.84
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     199.15
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   21.11
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    140.00 =    5032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   406.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    275.50
  ELEVATION DIFFERENCE(FEET) =      4.50
  TC = 0.393*[(  406.00**3)/(     4.50)]**.2 =   10.676
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.688
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7045
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      3.40
  TOTAL AREA(ACRES) =      1.31   TOTAL RUNOFF(CFS) =      3.40

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.688
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7045
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.02   SUBAREA RUNOFF(CFS) =    2.65
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       6.05
  TC(MIN.) =   10.68

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

```
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   265.50  DOWNSTREAM(FEET) =   254.40
  FLOW LENGTH(FEET) =   202.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.05
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    143.00 =     608.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.638
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7030
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.37   SUBAREA RUNOFF(CFS) =    6.06
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      12.11
  TC(MIN.) =   10.97

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.638
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7030
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.53   SUBAREA RUNOFF(CFS) =    6.47
  TOTAL AREA(ACRES) =        7.2   TOTAL RUNOFF(CFS) =      18.58
  TC(MIN.) =   10.97

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.40  DOWNSTREAM(FEET) =   227.50
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.58
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   11.41
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    145.00 =    1024.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.568
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7008
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    5.09   SUBAREA RUNOFF(CFS) =   12.73
  TOTAL AREA(ACRES) =       12.3   TOTAL RUNOFF(CFS) =      31.31
  TC(MIN.) =   11.41
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.41
  RAINFALL INTENSITY(INCH/HR) =   3.57
  TOTAL STREAM AREA(ACRES) =    12.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.31

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    147.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   552.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    260.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  TC = 0.937*[(  552.00**3)/(    20.00)]**.2 =   22.745
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.530
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4245
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      1.51   TOTAL RUNOFF(CFS) =      1.62

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    148.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    260.00  DOWNSTREAM(FEET) =    243.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   632.00   CHANNEL SLOPE =  0.0269
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.358
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4088
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.07
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   3.44
  Tc(MIN.) =   26.18
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    0.77
  TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =       2.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.34
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    148.00 =    1184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    145.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    243.00  DOWNSTREAM(FEET) =    238.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0120
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
```

```
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.236
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .5982
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.11
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   2.96
  Tc(MIN.) =   29.14
  SUBAREA AREA(ACRES) =     2.08       SUBAREA RUNOFF(CFS) =    2.78
  TOTAL AREA(ACRES) =        4.4         PEAK FLOW RATE(CFS) =       5.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.46
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    145.00 =    1559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   29.14
  RAINFALL INTENSITY(INCH/HR) =   2.24
  TOTAL STREAM AREA(ACRES) =     4.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.18

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       31.31    11.41        3.568         12.32
      2        5.18    29.14        2.236          4.39

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       33.34    11.41       3.568
      2       24.80    29.14       2.236

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      33.34   Tc(MIN.) =   11.41
  TOTAL AREA(ACRES) =       16.7
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    145.00 =    1559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   227.50  DOWNSTREAM(FEET) =   209.70
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.33
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      33.34
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.66
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    150.00 =    1834.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.66
  RAINFALL INTENSITY(INCH/HR) =   3.53
  TOTAL STREAM AREA(ACRES) =    16.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.34

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    152.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   734.00
  UPSTREAM ELEVATION(FEET) =    281.00
  DOWNSTREAM ELEVATION(FEET) =    267.70
  ELEVATION DIFFERENCE(FEET) =     13.30
  TC = 0.393*[(  734.00**3)/(    13.30)]**.2 =   12.263
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.442
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6968
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      6.21
  TOTAL AREA(ACRES) =      2.59   TOTAL RUNOFF(CFS) =      6.21

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  267.70  DOWNSTREAM ELEVATION(FEET) =  243.00
  STREET LENGTH(FEET) =   347.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.66
  STREET FLOW TRAVEL TIME(MIN.) =    1.05   Tc(MIN.) =   13.32
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.303
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6922
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    3.20
```

```
  TOTAL AREA(ACRES) =        4.0        PEAK FLOW RATE(CFS) =       9.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.03
  FLOW VELOCITY(FEET/SEC.) =  5.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.80
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    153.00 =    1081.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   233.00  DOWNSTREAM(FEET) =   212.00
  FLOW LENGTH(FEET) =   525.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.34
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.41
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   14.09
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    154.00 =    1606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    154.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.212
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6891
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.63   SUBAREA RUNOFF(CFS) =    5.82
  TOTAL AREA(ACRES) =        6.6   TOTAL RUNOFF(CFS) =      15.23
  TC(MIN.) =   14.09

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   212.00  DOWNSTREAM(FEET) =   209.70
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.23
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   14.14
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    150.00 =    1652.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.206
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7944
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.91   SUBAREA RUNOFF(CFS) =    4.86
  TOTAL AREA(ACRES) =        8.5   TOTAL RUNOFF(CFS) =      20.10
  TC(MIN.) =   14.14

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.14
  RAINFALL INTENSITY(INCH/HR) =   3.21
  TOTAL STREAM AREA(ACRES) =     8.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       33.34    11.66        3.530         16.71
      2       20.10    14.14        3.206          8.53

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       49.90    11.66       3.530
      2       50.37    14.14       3.206

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      49.90   Tc(MIN.) =   11.66
  TOTAL AREA(ACRES) =       25.2
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    150.00 =    1834.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   209.70  DOWNSTREAM(FEET) =   198.00
  FLOW LENGTH(FEET) =   178.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.31
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.90
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    155.00 =    2012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.508
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4979
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    2.29
  TOTAL AREA(ACRES) =       26.5   TOTAL RUNOFF(CFS) =      52.19
  TC(MIN.) =   11.80

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   198.00  DOWNSTREAM(FEET) =   174.50
  FLOW LENGTH(FEET) =   364.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.26
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.19
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   12.10
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    156.00 =    2376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    156.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.464
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6975
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    9.24   SUBAREA RUNOFF(CFS) =   22.33
  TOTAL AREA(ACRES) =       35.8   TOTAL RUNOFF(CFS) =      74.52
  TC(MIN.) =   12.10

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    157.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   174.50  DOWNSTREAM(FEET) =   152.20
  FLOW LENGTH(FEET) =   342.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.09
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      74.52
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   12.36
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    157.00 =    2718.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    157.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.428
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4927
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =    3.72
  TOTAL AREA(ACRES) =       38.0   TOTAL RUNOFF(CFS) =      78.24
  TC(MIN.) =   12.36

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    158.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   152.20  DOWNSTREAM(FEET) =   140.70
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.78
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      78.24
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.49
```

```
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    158.00 =    2897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.410
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6958
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   12.64   SUBAREA RUNOFF(CFS) =   29.99
  TOTAL AREA(ACRES) =       50.6   TOTAL RUNOFF(CFS) =     108.23
  TC(MIN.) =   12.49

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.410
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6958
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   13.21   SUBAREA RUNOFF(CFS) =   31.34
  TOTAL AREA(ACRES) =       63.8   TOTAL RUNOFF(CFS) =     139.57
  TC(MIN.) =   12.49

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   140.70  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =   289.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.23
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     139.57
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.68
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    160.00 =    3186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.68
  RAINFALL INTENSITY(INCH/HR) =   3.39
  TOTAL STREAM AREA(ACRES) =    63.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    139.57

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    162.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1005.00
  UPSTREAM ELEVATION(FEET) =    244.00
  DOWNSTREAM ELEVATION(FEET) =    208.30
  ELEVATION DIFFERENCE(FEET) =     35.70
```

```
  TC = 0.393*[( 1005.00**3)/(    35.70)]**.2 =   12.154
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.457
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6973
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      8.36
  TOTAL AREA(ACRES) =      3.47   TOTAL RUNOFF(CFS) =      8.36

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  208.30  DOWNSTREAM ELEVATION(FEET) =  172.00
  STREET LENGTH(FEET) =   920.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   10.51
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.75
  STREET FLOW TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =   15.38
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.074
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6842
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    7.82
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      16.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  11.91
  FLOW VELOCITY(FEET/SEC.) =  5.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.99
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    163.00 =    1925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    165.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   161.00  DOWNSTREAM(FEET) =   132.50
  FLOW LENGTH(FEET) =   819.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.13
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.19
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   16.51
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    165.00 =    2744.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.968
```

```
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6802
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    5.90   SUBAREA RUNOFF(CFS) =   11.91
  TOTAL AREA(ACRES) =       13.1   TOTAL RUNOFF(CFS) =      28.10
  TC(MIN.) =   16.51

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    166.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   132.50  DOWNSTREAM(FEET) =   130.90
  FLOW LENGTH(FEET) =   118.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.82
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.10
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   16.71
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    166.00 =    2862.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    166.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.950
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6795
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =    3.69
  TOTAL AREA(ACRES) =       14.9   TOTAL RUNOFF(CFS) =      31.79
  TC(MIN.) =   16.71

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    167.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.90  DOWNSTREAM(FEET) =   127.00
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.79
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   17.12
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    167.00 =    3122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    167.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.914
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6782
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.09   SUBAREA RUNOFF(CFS) =    4.13
  TOTAL AREA(ACRES) =       17.0   TOTAL RUNOFF(CFS) =      35.92
  TC(MIN.) =   17.12

****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    168.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   127.00  DOWNSTREAM(FEET) =   124.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.41
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.92
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   17.37
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    168.00 =    3292.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    168.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.893
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6774
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.78   SUBAREA RUNOFF(CFS) =    3.49
  TOTAL AREA(ACRES) =       18.8   TOTAL RUNOFF(CFS) =      39.40
  TC(MIN.) =   17.37

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   124.00  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.87
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.40
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   17.43
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    160.00 =    3342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.889
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6772
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    7.55   SUBAREA RUNOFF(CFS) =   14.77
  TOTAL AREA(ACRES) =       26.4   TOTAL RUNOFF(CFS) =      54.17
  TC(MIN.) =   17.43

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.889
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7886
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.72   SUBAREA RUNOFF(CFS) =    6.20
  TOTAL AREA(ACRES) =       29.1   TOTAL RUNOFF(CFS) =      60.37
  TC(MIN.) =   17.43

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.43
  RAINFALL INTENSITY(INCH/HR) =   2.89
  TOTAL STREAM AREA(ACRES) =    29.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     60.37

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      139.57    12.68        3.385         63.84
      2       60.37    17.43        2.889         29.07

 *********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      183.48    12.68       3.385
      2      179.47    17.43       2.889

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     183.48   Tc(MIN.) =   12.68
  TOTAL AREA(ACRES) =       92.9
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    160.00 =    3342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   122.00  DOWNSTREAM(FEET) =   110.00
  FLOW LENGTH(FEET) =   431.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.23
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     183.48
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   13.03
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    140.00 =    3773.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.339
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7967
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.61   SUBAREA RUNOFF(CFS) =    6.94
  TOTAL AREA(ACRES) =       95.5   TOTAL RUNOFF(CFS) =     190.43
  TC(MIN.) =   13.03

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      190.43    13.03       3.339       95.52
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    140.00 =    3773.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      199.15    21.11       2.626      121.10
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    140.00 =    5032.00 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     313.38      13.03        3.339
      2     348.89      21.11        2.626

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     348.89   Tc(MIN.) =   21.11
  TOTAL AREA(ACRES) =      216.6

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    170.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   107.00
  FLOW LENGTH(FEET) =  1097.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  87.0 INCH PIPE IS  69.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.87
  ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     348.89
  PIPE TRAVEL TIME(MIN.) =   1.85    Tc(MIN.) =   22.96
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    170.00 =    6129.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.518
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7809
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.62   SUBAREA RUNOFF(CFS) =    7.12
  TOTAL AREA(ACRES) =      220.2   TOTAL RUNOFF(CFS) =     356.01
  TC(MIN.) =   22.96

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

```
  FLOW PROCESS FROM NODE    170.00 TO NODE    175.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   107.00  DOWNSTREAM(FEET) =    78.00
  FLOW LENGTH(FEET) =   926.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.05
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     356.01
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   23.57
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    175.00 =    7055.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.485
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7801
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.31   SUBAREA RUNOFF(CFS) =    6.42
  TOTAL AREA(ACRES) =      223.5   TOTAL RUNOFF(CFS) =     362.43
  TC(MIN.) =   23.57

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.00  DOWNSTREAM(FEET) =    75.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.42
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     362.43
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   23.62
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    180.00 =    7130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    181.00 TO NODE    182.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
  UPSTREAM ELEVATION(FEET) =    175.00
  DOWNSTREAM ELEVATION(FEET) =    138.30
  ELEVATION DIFFERENCE(FEET) =     36.70
  TC = 0.393*[(  979.00**3)/(    36.70)]**.2 =  11.898
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.494
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6985
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      8.05
  TOTAL AREA(ACRES) =      3.30   TOTAL RUNOFF(CFS) =      8.05
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    182.00 TO NODE    183.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  138.30  DOWNSTREAM ELEVATION(FEET) =   95.50
  STREET LENGTH(FEET) =  1112.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   10.51
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.72
  STREET FLOW TRAVEL TIME(MIN.) =   3.97   Tc(MIN.) =   15.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.027
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6824
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    8.06
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      16.11

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  11.91
  FLOW VELOCITY(FEET/SEC.) =  5.01   DEPTH*VELOCITY(FT*FT/SEC.) =   1.99
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    183.00 =    2091.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    184.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    85.50  DOWNSTREAM(FEET) =    85.20
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.11
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.98
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    184.00 =    2136.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.016
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6820
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.56   SUBAREA RUNOFF(CFS) =    9.38
  TOTAL AREA(ACRES) =       11.8   TOTAL RUNOFF(CFS) =      25.49
  TC(MIN.) =   15.98
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    85.20  DOWNSTREAM(FEET) =    80.00
  FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.73
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.49
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   16.41
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    185.00 =    2416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.976
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7903
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.71   SUBAREA RUNOFF(CFS) =    4.02
  TOTAL AREA(ACRES) =       13.5   TOTAL RUNOFF(CFS) =      29.51
  TC(MIN.) =   16.41

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    186.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    80.00  DOWNSTREAM(FEET) =    78.40
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.08
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.51
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   17.06
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    186.00 =    2691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    186.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.06
  RAINFALL INTENSITY(INCH/HR) =   2.92
  TOTAL STREAM AREA(ACRES) =    13.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.51

****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    188.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   574.00
  UPSTREAM ELEVATION(FEET) =    168.00
  DOWNSTREAM ELEVATION(FEET) =    123.00
```

```
  ELEVATION DIFFERENCE(FEET) =     45.00
  TC = 0.393*[(  574.00**3)/(    45.00)]**.2 =    8.292
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.183
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7183
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     14.72
  TOTAL AREA(ACRES) =      4.90   TOTAL RUNOFF(CFS) =     14.72

****************************************************************************
  FLOW PROCESS FROM NODE    188.00 TO NODE    189.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    123.00  DOWNSTREAM(FEET) =    115.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   533.00   CHANNEL SLOPE =  0.0150
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.779
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7072
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.74
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.88
  Tc(MIN.) =   10.17
  SUBAREA AREA(ACRES) =     7.06       SUBAREA RUNOFF(CFS) =   18.87
  TOTAL AREA(ACRES) =       12.0         PEAK FLOW RATE(CFS) =      33.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   5.39
  LONGEST FLOWPATH FROM NODE    187.00 TO NODE    189.00 =    1107.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    189.00 TO NODE    190.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    115.00  DOWNSTREAM(FEET) =    105.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   667.00   CHANNEL SLOPE =  0.0150
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.468
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6977
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.83
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   1.91
  Tc(MIN.) =   12.08
  SUBAREA AREA(ACRES) =     6.92       SUBAREA RUNOFF(CFS) =   16.74
  TOTAL AREA(ACRES) =       18.9         PEAK FLOW RATE(CFS) =      50.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   6.27
  LONGEST FLOWPATH FROM NODE    187.00 TO NODE    190.00 =    1774.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.468
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6977
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   14.24   SUBAREA RUNOFF(CFS) =   34.46
```

```
  TOTAL AREA(ACRES) =       33.1   TOTAL RUNOFF(CFS) =      84.79
  TC(MIN.) =   12.08

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    186.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    95.00  DOWNSTREAM(FEET) =    78.40
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  37.88
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.79
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   12.11
  LONGEST FLOWPATH FROM NODE    187.00 TO NODE    186.00 =    1844.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    186.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.11
  RAINFALL INTENSITY(INCH/HR) =   3.46
  TOTAL STREAM AREA(ACRES) =    33.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     84.79

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       29.51    17.06        2.919         13.47
      2       84.79    12.11        3.464         33.12

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      105.73    12.11       3.464
      2      100.97    17.06       2.919

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     105.73   Tc(MIN.) =   12.11
  TOTAL AREA(ACRES) =       46.6
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    186.00 =    2691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.40  DOWNSTREAM(FEET) =    75.40
  FLOW LENGTH(FEET) =   522.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.63
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     105.73
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    191.00 =    3213.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.342
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7968
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.51   SUBAREA RUNOFF(CFS) =    4.02
  TOTAL AREA(ACRES) =       48.1   TOTAL RUNOFF(CFS) =     109.75
  TC(MIN.) =   13.01

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.40  DOWNSTREAM(FEET) =    75.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  37.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.36
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     109.75
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.11
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    180.00 =    3273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      109.75    13.11       3.330       48.10
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    180.00 =    3273.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      362.43    23.62       2.483      223.55
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    180.00 =    7130.00 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     310.85      13.11        3.330
     2     444.26      23.62        2.483

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =     444.26   Tc(MIN.) =   23.62
  TOTAL AREA(ACRES) =      271.6

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    195.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    35.00
  FLOW LENGTH(FEET) =   930.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.52
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.26
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   24.14
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    195.00 =    8060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.456
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4179
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   19.95   SUBAREA RUNOFF(CFS) =   20.47
  TOTAL AREA(ACRES) =      291.6   TOTAL RUNOFF(CFS) =     464.73
  TC(MIN.) =   24.14

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.456
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7312
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.13   SUBAREA RUNOFF(CFS) =    7.42
  TOTAL AREA(ACRES) =      295.7   TOTAL RUNOFF(CFS) =     472.14
  TC(MIN.) =   24.14
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      295.7  TC(MIN.) =     24.14
  PEAK FLOW RATE(CFS)   =     472.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

C.3 – 10-YR EXISTING HYDROLOGY

```
____________________________________________________________________________
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                      (Rational Tabling Version 22.0)
                   Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:

                          Proactive Engineering Consultants
                              27042 Towne Centre Drive
                              Foothill Ranch, CA. 92610

 ************************** DESCRIPTION OF STUDY **************************
* Travertine Project                                                       *
* Existing 100-yr Storm Event                                              *
* Subarea A                                                                *
 **************************************************************************

  FILE NAME: TRA-X00A.DAT
  TIME/DATE OF STUDY: 11:14 10/16/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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.*

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   708.00
  UPSTREAM ELEVATION(FEET) =    191.60
```

```
  DOWNSTREAM ELEVATION(FEET) =    168.70
  ELEVATION DIFFERENCE(FEET) =     22.90
  TC = 0.533*[(  708.00**3)/(    22.90)]**.2 =   14.603
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.155
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4742
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     13.91
  TOTAL AREA(ACRES) =      9.30   TOTAL RUNOFF(CFS) =     13.91

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    168.70  DOWNSTREAM(FEET) =     97.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2414.00   CHANNEL SLOPE =  0.0293
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.659
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4357
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      73.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.73
  AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   5.98
  Tc(MIN.) =   20.58
  SUBAREA AREA(ACRES) =   101.20       SUBAREA RUNOFF(CFS) =  117.23
  TOTAL AREA(ACRES) =      110.5         PEAK FLOW RATE(CFS) =     131.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.19   FLOW VELOCITY(FEET/SEC.) =   8.08
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =    3122.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      110.5  TC(MIN.) =     20.58
  PEAK FLOW RATE(CFS)   =     131.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                     (RCFC&WCD)  1978 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                     (Rational Tabling Version 22.0)
                  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:

                         Proactive Engineering Consultants
                              27042 Towne Centre Drive
                              Foothill Ranch, CA. 92610

 ************************** DESCRIPTION OF STUDY **************************
 * Travertine Project                                                     *
 * Existing 100-yr Storm Event                                            *
 * Subarea B                                                              *
 **************************************************************************

  FILE NAME: TRA-X00B.DAT
  TIME/DATE OF STUDY: 11:11 10/16/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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.*

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   867.00
  UPSTREAM ELEVATION(FEET) =    221.30
```

```
  DOWNSTREAM ELEVATION(FEET) =    178.20
  ELEVATION DIFFERENCE(FEET) =     43.10
  TC = 0.533*[(  867.00**3)/(    43.10)]**.2 =   14.532
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.163
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4747
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     14.86
  TOTAL AREA(ACRES) =      9.90   TOTAL RUNOFF(CFS) =     14.86

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    178.20  DOWNSTREAM(FEET) =    125.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1460.00   CHANNEL SLOPE =  0.0364
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.839
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4504
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      63.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.92
  AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   3.52
  Tc(MIN.) =   18.05
  SUBAREA AREA(ACRES) =    76.10       SUBAREA RUNOFF(CFS) =   97.30
  TOTAL AREA(ACRES) =       86.0         PEAK FLOW RATE(CFS) =     112.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.03   FLOW VELOCITY(FEET/SEC.) =   8.27
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =    2327.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    125.10  DOWNSTREAM(FEET) =     33.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2789.00   CHANNEL SLOPE =  0.0328
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4213
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     146.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.68
  AVERAGE FLOW DEPTH(FEET) =   1.23   TRAVEL TIME(MIN.) =   5.36
  Tc(MIN.) =   23.41
  SUBAREA AREA(ACRES) =    65.40       SUBAREA RUNOFF(CFS) =   68.72
  TOTAL AREA(ACRES) =      151.4         PEAK FLOW RATE(CFS) =     180.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.38   FLOW VELOCITY(FEET/SEC.) =   9.24
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    5116.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      151.4  TC(MIN.) =     23.41
  PEAK FLOW RATE(CFS)   =     180.88
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                      (Rational Tabling Version 22.0)
                   Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:

                          Proactive Engineering Consultants
                              27042 Towne Centre Drive
                             Foothill Ranch, CA. 92610


 ************************* DESCRIPTION OF STUDY *************************
* Travertine Project                                                       *
* Existing 100-yr Storm Event                                              *
* Subarea C                                                                *
 **************************************************************************

  FILE NAME: TRA-X00C.DAT
  TIME/DATE OF STUDY: 10:57 10/16/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.560
  SLOPE OF INTENSITY DURATION CURVE = 0.4984
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   825.00
```

```
  UPSTREAM ELEVATION(FEET) =    275.00
  DOWNSTREAM ELEVATION(FEET) =    233.70
  ELEVATION DIFFERENCE(FEET) =     41.30
  TC = 0.533*[( 825.00**3)/(    41.30)]**.2 =   14.226
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.196
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4771
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     14.94
  TOTAL AREA(ACRES) =      9.80   TOTAL RUNOFF(CFS) =     14.94

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    300.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    233.70  DOWNSTREAM(FEET) =    136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2183.00   CHANNEL SLOPE =  0.0448
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.796
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4470
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      89.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.30
  AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   4.38
  Tc(MIN.) =   18.61
  SUBAREA AREA(ACRES) =   118.70       SUBAREA RUNOFF(CFS) =  148.35
  TOTAL AREA(ACRES) =      128.5         PEAK FLOW RATE(CFS) =     163.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.20   FLOW VELOCITY(FEET/SEC.) =   9.98
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    300.00 =    3008.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    400.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    136.00  DOWNSTREAM(FEET) =     40.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2784.00   CHANNEL SLOPE =  0.0345
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.504
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4222
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     229.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.07
  AVERAGE FLOW DEPTH(FEET) =   1.55   TRAVEL TIME(MIN.) =   4.61
  Tc(MIN.) =   23.21
  SUBAREA AREA(ACRES) =   124.10       SUBAREA RUNOFF(CFS) =  131.22
  TOTAL AREA(ACRES) =      252.6         PEAK FLOW RATE(CFS) =     294.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.77   FLOW VELOCITY(FEET/SEC.) =  10.84
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    400.00 =    5792.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      252.6  TC(MIN.) =     23.21
  PEAK FLOW RATE(CFS)   =     294.51
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

C.4 – 10-YR PROPOSED HYDROLOGY

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                      (Rational Tabling Version 22.0)
                   Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:

                      Proactive Engineering Consultants
                           27042 Towne Centre Drive
                          Foothill Ranch, Ca. 92610


 ************************* DESCRIPTION OF STUDY ***************************
* Travertine Project                                                       *
* Proposed 10-yr Storm Event                                               *
* Subarea A                                                                *
 **************************************************************************

  FILE NAME: TRA-P10A.DAT
  TIME/DATE OF STUDY: 11:34 10/13/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.774
  SLOPE OF INTENSITY DURATION CURVE = 0.4981
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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   20.0     10.0    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 =  0.40 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   788.00
```

```
  UPSTREAM ELEVATION(FEET) =    218.50
  DOWNSTREAM ELEVATION(FEET) =    206.50
  ELEVATION DIFFERENCE(FEET) =     12.00
  TC = 0.303*[(  788.00**3)/(   12.00)]**.2 =   10.085
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.881
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8459
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      2.53
  TOTAL AREA(ACRES) =      1.59   TOTAL RUNOFF(CFS) =      2.53

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.881
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8459
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.64   SUBAREA RUNOFF(CFS) =    1.02
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       3.55
  TC(MIN.) =   10.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   196.50  DOWNSTREAM(FEET) =   182.00
  FLOW LENGTH(FEET) =   690.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.55
  PIPE TRAVEL TIME(MIN.) =   1.67    Tc(MIN.) =   11.75
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    1478.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.743
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3428
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.42   SUBAREA RUNOFF(CFS) =    1.45
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =       4.99
  TC(MIN.) =   11.75

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   182.00  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =  1103.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.99
  PIPE TRAVEL TIME(MIN.) =   1.72    Tc(MIN.) =   13.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =    2581.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.47
  RAINFALL INTENSITY(INCH/HR) =   1.63
  TOTAL STREAM AREA(ACRES) =     4.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.99

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS CONDOMINIUM
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   615.00
  UPSTREAM ELEVATION(FEET) =    208.00
  DOWNSTREAM ELEVATION(FEET) =    170.00
  ELEVATION DIFFERENCE(FEET) =     38.00
  TC = 0.359*[(  615.00**3)/(    38.00)]**.2 =    8.179
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.088
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7186
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      7.38
  TOTAL AREA(ACRES) =      4.92   TOTAL RUNOFF(CFS) =      7.38

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   160.00  DOWNSTREAM(FEET) =   148.70
  FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.38
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    8.53
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =     855.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.044
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7170
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    6.53   SUBAREA RUNOFF(CFS) =    9.57
  TOTAL AREA(ACRES) =       11.5   TOTAL RUNOFF(CFS) =      16.95
  TC(MIN.) =    8.53

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.70  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =   375.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.29
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.95
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    8.92
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      8.00 =    1230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.000
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8472
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    1.97
  TOTAL AREA(ACRES) =       12.6   TOTAL RUNOFF(CFS) =      18.92
  TC(MIN.) =    8.92

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   126.80  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.74
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.92
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.96
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      4.00 =    1280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.995
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7680
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.59   SUBAREA RUNOFF(CFS) =    5.50
  TOTAL AREA(ACRES) =       16.2   TOTAL RUNOFF(CFS) =      24.42
  TC(MIN.) =    8.96

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.96
  RAINFALL INTENSITY(INCH/HR) =   1.99
  TOTAL STREAM AREA(ACRES) =    16.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.42

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.99    13.47        1.628          4.65
      2       24.42     8.96        1.995         16.20

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       27.74     8.96       1.995
      2       24.92    13.47       1.628

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.74   Tc(MIN.) =    8.96
  TOTAL AREA(ACRES) =      20.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =    2581.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   122.00  DOWNSTREAM(FEET) =   118.00
  FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.89
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.74
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.15
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    2724.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.15
  RAINFALL INTENSITY(INCH/HR) =   1.97
  TOTAL STREAM AREA(ACRES) =    20.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.74

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   725.00
  UPSTREAM ELEVATION(FEET) =    215.00
  DOWNSTREAM ELEVATION(FEET) =    163.00
  ELEVATION DIFFERENCE(FEET) =     52.00
  TC = 0.533*[(  725.00**3)/(    52.00)]**.2 =   12.572
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.685
```

```
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3357
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      5.24
  TOTAL AREA(ACRES) =      9.27   TOTAL RUNOFF(CFS) =      5.24

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    163.00  DOWNSTREAM(FEET) =    140.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   990.00   CHANNEL SLOPE =  0.0232
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.555
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3190
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.51
  AVERAGE FLOW DEPTH(FEET) =   0.99   TRAVEL TIME(MIN.) =   2.20
  Tc(MIN.) =   14.77
  SUBAREA AREA(ACRES) =     8.47       SUBAREA RUNOFF(CFS) =    4.20
  TOTAL AREA(ACRES) =       17.7         PEAK FLOW RATE(CFS) =       9.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.09   FLOW VELOCITY(FEET/SEC.) =   7.98
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   118.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.06
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.45
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.81
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =    1770.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.81
  RAINFALL INTENSITY(INCH/HR) =   1.55
  TOTAL STREAM AREA(ACRES) =    17.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.45

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       27.74     9.15        1.975         20.85
      2        9.45    14.81        1.553         17.74

 *********************************WARNING**********************************
```

```
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 *************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       33.57     9.15       1.975
      2       31.26    14.81       1.553

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      33.57   Tc(MIN.) =    9.15
  TOTAL AREA(ACRES) =       38.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    2724.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   118.00  DOWNSTREAM(FEET) =   106.00
  FLOW LENGTH(FEET) =   245.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.20
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.57
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    9.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     13.00 =    2969.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.948
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8467
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    5.82   SUBAREA RUNOFF(CFS) =    9.60
  TOTAL AREA(ACRES) =       44.4   TOTAL RUNOFF(CFS) =      43.17
  TC(MIN.) =    9.40

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.948
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3667
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.53   SUBAREA RUNOFF(CFS) =    3.24
  TOTAL AREA(ACRES) =       48.9   TOTAL RUNOFF(CFS) =      46.40
  TC(MIN.) =    9.40

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   106.00  DOWNSTREAM(FEET) =    96.00
```

```
  FLOW LENGTH(FEET) =   628.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      46.40
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   10.30
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    3597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.861
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6284
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   29.14   SUBAREA RUNOFF(CFS) =   34.09
  TOTAL AREA(ACRES) =       78.1   TOTAL RUNOFF(CFS) =      80.49
  TC(MIN.) =   10.30

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    96.00  DOWNSTREAM(FEET) =    88.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      80.49
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   10.50
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    3822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.843
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7092
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    9.84   SUBAREA RUNOFF(CFS) =   12.86
  TOTAL AREA(ACRES) =       87.9   TOTAL RUNOFF(CFS) =      93.35
  TC(MIN.) =   10.50

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.843
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8455
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.88   SUBAREA RUNOFF(CFS) =    2.93
  TOTAL AREA(ACRES) =       89.8   TOTAL RUNOFF(CFS) =      96.28
  TC(MIN.) =   10.50

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    88.00  DOWNSTREAM(FEET) =    70.00
  FLOW LENGTH(FEET) =  2370.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.57
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.28
  PIPE TRAVEL TIME(MIN.) =   3.74    Tc(MIN.) =   14.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    6192.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.584
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6114
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   22.07   SUBAREA RUNOFF(CFS) =   21.37
  TOTAL AREA(ACRES) =      111.9   TOTAL RUNOFF(CFS) =     117.65
  TC(MIN.) =   14.24

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    70.00  DOWNSTREAM(FEET) =    65.00
  FLOW LENGTH(FEET) =   521.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.27
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     117.65
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   14.95
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6713.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS MOBILE HOME PARK
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1009.00
  UPSTREAM ELEVATION(FEET) =    140.00
  DOWNSTREAM ELEVATION(FEET) =    102.60
  ELEVATION DIFFERENCE(FEET) =     37.40
  TC = 0.336*[( 1009.00**3)/(    37.40)]**.2 =   10.327
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.859
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7641
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      3.22
  TOTAL AREA(ACRES) =      2.27   TOTAL RUNOFF(CFS) =      3.22

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    92.60  DOWNSTREAM(FEET) =    92.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.98
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.22
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   10.54
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     24.00 =    1074.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.839
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7636
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.63   SUBAREA RUNOFF(CFS) =    0.88
  TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =       4.11
  TC(MIN.) =   10.54

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    92.00  DOWNSTREAM(FEET) =    71.50
  FLOW LENGTH(FEET) =   660.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.11
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   11.87
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     25.00 =    1734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.734
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8442
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.25   SUBAREA RUNOFF(CFS) =    1.83
  TOTAL AREA(ACRES) =        4.2   TOTAL RUNOFF(CFS) =       5.94
  TC(MIN.) =   11.87

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.734
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8442
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.29   SUBAREA RUNOFF(CFS) =    4.82
  TOTAL AREA(ACRES) =        7.4   TOTAL RUNOFF(CFS) =      10.75
  TC(MIN.) =   11.87

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

```
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    71.50  DOWNSTREAM(FEET) =    71.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.75
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.99
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     26.00 =    1784.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.99
  RAINFALL INTENSITY(INCH/HR) =   1.73
  TOTAL STREAM AREA(ACRES) =     7.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.75

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   545.00
  UPSTREAM ELEVATION(FEET) =    139.50
  DOWNSTREAM ELEVATION(FEET) =    100.00
  ELEVATION DIFFERENCE(FEET) =     39.50
  TC = 0.393*[(  545.00**3)/(    39.50)]**.2 =    8.250
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.079
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6404
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =     13.27
  TOTAL AREA(ACRES) =      9.97   TOTAL RUNOFF(CFS) =     13.27

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     85.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   772.00   CHANNEL SLOPE =  0.0194
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.801
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6249
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.67
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.75
  Tc(MIN.) =   11.00
  SUBAREA AREA(ACRES) =    10.47       SUBAREA RUNOFF(CFS) =   11.78
  TOTAL AREA(ACRES) =       20.4         PEAK FLOW RATE(CFS) =      25.05
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   5.24
  LONGEST FLOWPATH FROM NODE     27.00 TO NODE     29.00 =    1317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.801
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3497
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.76   SUBAREA RUNOFF(CFS) =    1.74
  TOTAL AREA(ACRES) =       23.2   TOTAL RUNOFF(CFS) =      26.79
  TC(MIN.) =   11.00

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.801
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6249
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   15.14   SUBAREA RUNOFF(CFS) =   17.04
  TOTAL AREA(ACRES) =       38.3   TOTAL RUNOFF(CFS) =      43.83
  TC(MIN.) =   11.00

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    71.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.50
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       43.83
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   11.04
  LONGEST FLOWPATH FROM NODE     27.00 TO NODE     26.00 =    1367.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.04
  RAINFALL INTENSITY(INCH/HR) =   1.80
  TOTAL STREAM AREA(ACRES) =    38.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     43.83

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.75    11.99        1.725         7.44
      2       43.83    11.04        1.798        38.34

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
```

```
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       53.73    11.04       1.798
      2       52.81    11.99       1.725

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      53.73   Tc(MIN.) =   11.04
  TOTAL AREA(ACRES) =       45.8
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     26.00 =    1784.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    71.00  DOWNSTREAM(FEET) =    65.00
  FLOW LENGTH(FEET) =   892.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.87
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.73
  PIPE TRAVEL TIME(MIN.) =   1.68    Tc(MIN.) =   12.72
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     21.00 =    2676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       53.73    12.72       1.675       45.78
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE     21.00 =    2676.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      117.65    14.95       1.546      111.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6713.00 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     153.87      12.72        1.675
      2     167.24      14.95        1.546

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     167.24   Tc(MIN.) =   14.95
  TOTAL AREA(ACRES) =      157.6
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    65.00  DOWNSTREAM(FEET) =    36.00
  FLOW LENGTH(FEET) =  1108.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.47
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     167.24
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =   15.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    7821.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.89
  RAINFALL INTENSITY(INCH/HR) =   1.50
  TOTAL STREAM AREA(ACRES) =   157.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    167.24

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   435.00
  UPSTREAM ELEVATION(FEET) =    120.50
  DOWNSTREAM ELEVATION(FEET) =     88.00
  ELEVATION DIFFERENCE(FEET) =     32.50
  TC = 0.393*[(  435.00**3)/(    32.50)]**.2 =    7.493
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.181
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6457
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      6.76
  TOTAL AREA(ACRES) =      4.80   TOTAL RUNOFF(CFS) =      6.76

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =     82.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   503.00   CHANNEL SLOPE =  0.0119
  CHANNEL BASE(FEET) =   20.00    "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.904
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6309
```

```
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.58
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   2.34
  Tc(MIN.) =    9.84
  SUBAREA AREA(ACRES) =    11.52       SUBAREA RUNOFF(CFS) =   13.84
  TOTAL AREA(ACRES) =       16.3         PEAK FLOW RATE(CFS) =      20.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   4.17
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     33.00 =     938.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     82.00  DOWNSTREAM(FEET) =     75.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   579.00   CHANNEL SLOPE =  0.0112
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.724
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6202
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.44
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   2.17
  Tc(MIN.) =   12.01
  SUBAREA AREA(ACRES) =    10.52       SUBAREA RUNOFF(CFS) =   11.25
  TOTAL AREA(ACRES) =       26.8         PEAK FLOW RATE(CFS) =      31.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   4.77
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     34.00 =    1517.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.724
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6202
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   10.38   SUBAREA RUNOFF(CFS) =   11.10
  TOTAL AREA(ACRES) =       37.2   TOTAL RUNOFF(CFS) =      42.95
  TC(MIN.) =   12.01

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.724
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6202
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.03   SUBAREA RUNOFF(CFS) =    3.24
  TOTAL AREA(ACRES) =       40.2   TOTAL RUNOFF(CFS) =      46.19
  TC(MIN.) =   12.01

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.50  DOWNSTREAM(FEET) =    52.00
  FLOW LENGTH(FEET) =   410.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.95
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      46.19
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   12.37
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     35.00 =    1927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.699
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8437
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.81   SUBAREA RUNOFF(CFS) =    1.16
  TOTAL AREA(ACRES) =       41.1   TOTAL RUNOFF(CFS) =      47.35
  TC(MIN.) =   12.37

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    36.00
  FLOW LENGTH(FEET) =   964.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.90
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.35
  PIPE TRAVEL TIME(MIN.) =   1.35    Tc(MIN.) =   13.72
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     30.00 =    2891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.613
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6133
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   14.86   SUBAREA RUNOFF(CFS) =   14.70
  TOTAL AREA(ACRES) =       55.9   TOTAL RUNOFF(CFS) =      62.05
  TC(MIN.) =   13.72

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.72
  RAINFALL INTENSITY(INCH/HR) =   1.61
  TOTAL STREAM AREA(ACRES) =    55.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     62.05

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
```

```
     1      167.24    15.89        1.499        157.65
     2       62.05    13.72        1.613         55.92

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      206.42    13.72       1.613
     2      224.91    15.89       1.499

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     224.91   Tc(MIN.) =   15.89
  TOTAL AREA(ACRES) =      213.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    7821.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.00  DOWNSTREAM(FEET) =    26.00
  FLOW LENGTH(FEET) =   942.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  46.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.67
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     224.91
  PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =   16.96
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     40.00 =    8763.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.452
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3049
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    6.69   SUBAREA RUNOFF(CFS) =    2.96
  TOTAL AREA(ACRES) =      220.3   TOTAL RUNOFF(CFS) =     227.87
  TC(MIN.) =   16.96
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      220.3  TC(MIN.) =     16.96
  PEAK FLOW RATE(CFS)   =     227.87
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                       (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
                       (Rational Tabling Version 22.0)
                  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:

                      Proactive Engineering Consultants
                          27042 Towne Centre Drive
                          Foothill Ranch, Ca. 92610


 ************************** DESCRIPTION OF STUDY **************************
 * Travertine Project                                                     *
 * Proposed 10-yr Storm Event                                             *
 * Subarea B                                                              *
 **************************************************************************

  FILE NAME: TRA-P10B.DAT
  TIME/DATE OF STUDY: 11:36 10/13/2020
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.870
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.766
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.810
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.560
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4981200
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4983611
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.774
  SLOPE OF INTENSITY DURATION CURVE = 0.4981
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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   20.0     10.0    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 =  0.40 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   750.00
```

```
  UPSTREAM ELEVATION(FEET) =    245.00
  DOWNSTREAM ELEVATION(FEET) =    237.50
  ELEVATION DIFFERENCE(FEET) =      7.50
  TC = 0.393*[(  750.00**3)/(     7.50)]**.2 =   13.931
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.601
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6125
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      5.30   TOTAL RUNOFF(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    237.50  DOWNSTREAM(FEET) =    231.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0103
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.407
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5993
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.55
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   4.12
  Tc(MIN.) =   18.06
  SUBAREA AREA(ACRES) =     3.88       SUBAREA RUNOFF(CFS) =    3.27
  TOTAL AREA(ACRES) =        9.2         PEAK FLOW RATE(CFS) =       8.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   2.79
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   221.00  DOWNSTREAM(FEET) =   162.00
  FLOW LENGTH(FEET) =   720.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.47
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   18.89
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.89
  RAINFALL INTENSITY(INCH/HR) =   1.38
  TOTAL STREAM AREA(ACRES) =     9.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.47

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   547.00
  UPSTREAM ELEVATION(FEET) =    232.00
  DOWNSTREAM ELEVATION(FEET) =    208.00
  ELEVATION DIFFERENCE(FEET) =     24.00
  TC = 0.937*[(  547.00**3)/(    24.00)]**.2 =   21.811
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.281
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2802
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      1.32
  TOTAL AREA(ACRES) =      3.69   TOTAL RUNOFF(CFS) =      1.32

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  208.00  DOWNSTREAM ELEVATION(FEET) =  172.00
  STREET LENGTH(FEET) =   672.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.47
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    2.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =    2.51   Tc(MIN.) =   24.32
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.213
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5849
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.22      SUBAREA RUNOFF(CFS) =    2.28
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =       3.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.78
  FLOW VELOCITY(FEET/SEC.) =  4.32   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    105.00 =    1219.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.32
  RAINFALL INTENSITY(INCH/HR) =   1.21
  TOTAL STREAM AREA(ACRES) =     6.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.61
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.47    18.89        1.376          9.18
      2        3.61    24.32        1.213          6.91

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       11.27    18.89       1.376
      2       11.08    24.32       1.213

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.27   Tc(MIN.) =   18.89
  TOTAL AREA(ACRES) =       16.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    2100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   162.00  DOWNSTREAM(FEET) =   159.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.27
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   18.96
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    2155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.373
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .6878
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   14.93   SUBAREA RUNOFF(CFS) =   14.10
  TOTAL AREA(ACRES) =       31.0   TOTAL RUNOFF(CFS) =      25.38
  TC(MIN.) =   18.96

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   159.00  DOWNSTREAM(FEET) =   134.30
  FLOW LENGTH(FEET) =   760.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.12
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.38
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   19.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2915.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.340
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7472
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.79   SUBAREA RUNOFF(CFS) =    3.79
  TOTAL AREA(ACRES) =       34.8   TOTAL RUNOFF(CFS) =      29.17
  TC(MIN.) =   19.93

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   134.30  DOWNSTREAM(FEET) =   130.00
  FLOW LENGTH(FEET) =   213.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.33
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.17
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   20.24
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    3128.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   378.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    278.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  TC = 0.709*[(  378.00**3)/(     2.00)]**.2 =   21.736
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.283
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2805
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      1.01
  TOTAL AREA(ACRES) =      2.82   TOTAL RUNOFF(CFS) =      1.01

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   271.00  DOWNSTREAM(FEET) =   268.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
```

```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.01
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   21.96
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    113.00 =     458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.276
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2795
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.54   SUBAREA RUNOFF(CFS) =    0.55
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =       1.56
  TC(MIN.) =   21.96

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   268.00  DOWNSTREAM(FEET) =   231.70
  FLOW LENGTH(FEET) =   710.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.56
  PIPE TRAVEL TIME(MIN.) =   1.58    Tc(MIN.) =   23.55
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    115.00 =    1168.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.55
  RAINFALL INTENSITY(INCH/HR) =   1.23
  TOTAL STREAM AREA(ACRES) =     4.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.56

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS CONDOMINIUM
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   618.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    278.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  TC = 0.359*[(  618.00**3)/(     2.00)]**.2 =   14.782
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.555
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .6966
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      1.19
```

```
  TOTAL AREA(ACRES) =      1.10   TOTAL RUNOFF(CFS) =      1.19

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    115.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  278.00  DOWNSTREAM ELEVATION(FEET) =  243.00
  STREET LENGTH(FEET) =   685.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    3.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   2.71   Tc(MIN.) =   17.49
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.430
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6009
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.04      SUBAREA RUNOFF(CFS) =    3.47
  TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =       4.66

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   5.84
  FLOW VELOCITY(FEET/SEC.) =  4.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    115.00 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.49
  RAINFALL INTENSITY(INCH/HR) =   1.43
  TOTAL STREAM AREA(ACRES) =     5.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.66

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.56    23.55        1.233          4.36
      2        4.66    17.49        1.430          5.14

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

```
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.82    17.49       1.430
      2        5.58    23.55       1.233

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.82   Tc(MIN.) =   17.49
  TOTAL AREA(ACRES) =        9.5
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    115.00 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   231.70  DOWNSTREAM(FEET) =   224.30
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.82
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   17.69
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    117.00 =    1439.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.421
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6003
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    6.39   SUBAREA RUNOFF(CFS) =    5.45
  TOTAL AREA(ACRES) =       15.9   TOTAL RUNOFF(CFS) =      11.28
  TC(MIN.) =   17.69

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   224.30  DOWNSTREAM(FEET) =   214.40
  FLOW LENGTH(FEET) =   188.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.28
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   17.93
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    118.00 =    1627.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.412
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5997
  SOIL CLASSIFICATION IS "A"
```

```
  SUBAREA AREA(ACRES) =   11.75   SUBAREA RUNOFF(CFS) =    9.95
  TOTAL AREA(ACRES) =       27.6   TOTAL RUNOFF(CFS) =      21.23
  TC(MIN.) =   17.93

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   214.40  DOWNSTREAM(FEET) =   204.00
  FLOW LENGTH(FEET) =   198.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.04
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.23
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   18.15
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    119.00 =    1825.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.404
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2981
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =       28.1   TOTAL RUNOFF(CFS) =      21.42
  TC(MIN.) =   18.15

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   204.00  DOWNSTREAM(FEET) =   195.50
  FLOW LENGTH(FEET) =   162.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.04
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.42
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   18.33
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    120.00 =    1987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.397
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5986
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.32   SUBAREA RUNOFF(CFS) =    3.61
  TOTAL AREA(ACRES) =       32.4   TOTAL RUNOFF(CFS) =      25.03
  TC(MIN.) =   18.33

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   195.50  DOWNSTREAM(FEET) =   177.00
```

```
  FLOW LENGTH(FEET) =   331.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.35
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.03
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   18.67
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    121.00 =    2318.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.384
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5977
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.76   SUBAREA RUNOFF(CFS) =    3.11
  TOTAL AREA(ACRES) =       36.2   TOTAL RUNOFF(CFS) =      28.14
  TC(MIN.) =   18.67

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.384
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2954
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    7.29   SUBAREA RUNOFF(CFS) =    2.98
  TOTAL AREA(ACRES) =       43.5   TOTAL RUNOFF(CFS) =      31.12
  TC(MIN.) =   18.67

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   177.00  DOWNSTREAM(FEET) =   139.00
  FLOW LENGTH(FEET) =   470.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.80
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.12
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   19.06
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    122.00 =    2788.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.370
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5966
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   11.78   SUBAREA RUNOFF(CFS) =    9.63
  TOTAL AREA(ACRES) =       55.2   TOTAL RUNOFF(CFS) =      40.75
  TC(MIN.) =   19.06

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   139.00  DOWNSTREAM(FEET) =   130.00
  FLOW LENGTH(FEET) =   409.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.75
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   19.60
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    110.00 =    3197.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.351
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .6867
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.78   SUBAREA RUNOFF(CFS) =    3.51
  TOTAL AREA(ACRES) =       59.0   TOTAL RUNOFF(CFS) =      44.25
  TC(MIN.) =   19.60

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       44.25    19.60       1.351       59.03
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    110.00 =    3197.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       29.17    20.24       1.329       34.81
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    3128.00 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      72.50      19.60        1.351
      2      72.72      20.24        1.329

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      72.50   Tc(MIN.) =   19.60
  TOTAL AREA(ACRES) =       93.8

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   120.00
  FLOW LENGTH(FEET) =   990.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.03
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      72.50
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   21.09
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    130.00 =    4187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.09
  RAINFALL INTENSITY(INCH/HR) =   1.30
  TOTAL STREAM AREA(ACRES) =    93.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     72.50

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   564.00
  UPSTREAM ELEVATION(FEET) =    210.00
  DOWNSTREAM ELEVATION(FEET) =    195.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  TC = 0.937*[(  564.00**3)/(    15.00)]**.2 =   24.405
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.211
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2695
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      0.86
  TOTAL AREA(ACRES) =      2.62   TOTAL RUNOFF(CFS) =      0.86

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.211
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2695
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.27   SUBAREA RUNOFF(CFS) =    0.74
  TOTAL AREA(ACRES) =        4.9   TOTAL RUNOFF(CFS) =       1.60
  TC(MIN.) =   24.40

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    195.00  DOWNSTREAM(FEET) =    168.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   830.00   CHANNEL SLOPE =  0.0319
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.119
```

```
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2548
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.30
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   4.20
  Tc(MIN.) =   28.60
  SUBAREA AREA(ACRES) =     3.94       SUBAREA RUNOFF(CFS) =    1.12
  TOTAL AREA(ACRES) =        8.8         PEAK FLOW RATE(CFS) =       2.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   3.56
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    133.00 =    1394.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   158.50  DOWNSTREAM(FEET) =   130.00
  FLOW LENGTH(FEET) =   321.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.72
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   29.10
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    134.00 =    1715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.109
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5766
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    8.72   SUBAREA RUNOFF(CFS) =    5.58
  TOTAL AREA(ACRES) =       17.5   TOTAL RUNOFF(CFS) =       8.30
  TC(MIN.) =   29.10

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.00  DOWNSTREAM(FEET) =   120.00
  FLOW LENGTH(FEET) =   264.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.30
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   29.51
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    130.00 =    1979.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.102
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2520
  SOIL CLASSIFICATION IS "A"
```

```
  SUBAREA AREA(ACRES) =    3.48   SUBAREA RUNOFF(CFS) =    0.97
  TOTAL AREA(ACRES) =       21.0   TOTAL RUNOFF(CFS) =       9.26
  TC(MIN.) =   29.51

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.102
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7380
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.51   SUBAREA RUNOFF(CFS) =    2.85
  TOTAL AREA(ACRES) =       24.5   TOTAL RUNOFF(CFS) =      12.12
  TC(MIN.) =   29.51

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   29.51
  RAINFALL INTENSITY(INCH/HR) =   1.10
  TOTAL STREAM AREA(ACRES) =    24.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.12

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       72.50    21.09        1.302         93.84
     2       12.12    29.51        1.102         24.54

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       81.16    21.09       1.302
     2       73.45    29.51       1.102

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      81.16   Tc(MIN.) =   21.09
  TOTAL AREA(ACRES) =      118.4
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    130.00 =    4187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   120.00  DOWNSTREAM(FEET) =   112.00
  FLOW LENGTH(FEET) =   635.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.16
  PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =   21.95
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    135.00 =    4822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.277
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7449
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.72   SUBAREA RUNOFF(CFS) =    2.59
  TOTAL AREA(ACRES) =      121.1   TOTAL RUNOFF(CFS) =      83.74
  TC(MIN.) =   21.95

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   112.00  DOWNSTREAM(FEET) =   110.00
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.21
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      83.74
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   22.26
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    140.00 =    5032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   406.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    275.50
  ELEVATION DIFFERENCE(FEET) =      4.50
  TC = 0.393*[(  406.00**3)/(     4.50)]**.2 =   10.676
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.828
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6265
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      1.50
  TOTAL AREA(ACRES) =      1.31   TOTAL RUNOFF(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.828
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6265
  SOIL CLASSIFICATION IS "A"
```

```
  SUBAREA AREA(ACRES) =    1.02   SUBAREA RUNOFF(CFS) =    1.17
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       2.67
  TC(MIN.) =   10.68

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    143.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   265.50  DOWNSTREAM(FEET) =   254.40
  FLOW LENGTH(FEET) =   202.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.97
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.67
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    143.00 =     608.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.797
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6246
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.37   SUBAREA RUNOFF(CFS) =    2.66
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =       5.33
  TC(MIN.) =   11.05

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    143.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.797
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6246
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.53   SUBAREA RUNOFF(CFS) =    2.84
  TOTAL AREA(ACRES) =        7.2   TOTAL RUNOFF(CFS) =       8.17
  TC(MIN.) =   11.05

****************************************************************************
  FLOW PROCESS FROM NODE    143.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.40  DOWNSTREAM(FEET) =   227.50
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.17
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE    141.00 TO NODE    145.00 =    1024.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.755
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6221
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    5.09   SUBAREA RUNOFF(CFS) =    5.56
  TOTAL AREA(ACRES) =       12.3   TOTAL RUNOFF(CFS) =      13.73
  TC(MIN.) =   11.58

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   1.76
  TOTAL STREAM AREA(ACRES) =    12.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.73

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    147.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   552.00
  UPSTREAM ELEVATION(FEET) =    280.00
  DOWNSTREAM ELEVATION(FEET) =    260.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  TC = 0.937*[(  552.00**3)/(    20.00)]**.2 =   22.745
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.254
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2762
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      1.51   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    148.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    260.00  DOWNSTREAM(FEET) =    243.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   632.00   CHANNEL SLOPE =  0.0269
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.127
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2561
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.94
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   5.44
  Tc(MIN.) =   28.19
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    0.23
  TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =       0.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.18
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    148.00 =    1184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    148.00 TO NODE    145.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    243.00  DOWNSTREAM(FEET) =    238.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0120
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.044
  SINGLE-FAMILY(1/2 ACRE LOT) RUNOFF COEFFICIENT = .5054
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.33
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   4.69
  Tc(MIN.) =   32.88
  SUBAREA AREA(ACRES) =     2.08       SUBAREA RUNOFF(CFS) =    1.10
  TOTAL AREA(ACRES) =        4.4         PEAK FLOW RATE(CFS) =       1.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.58
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    145.00 =    1559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   32.88
  RAINFALL INTENSITY(INCH/HR) =   1.04
  TOTAL STREAM AREA(ACRES) =     4.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.85

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       13.73    11.58        1.755         12.32
      2        1.85    32.88        1.044          4.39

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.38    11.58       1.755
      2       10.02    32.88       1.044

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.38   Tc(MIN.) =   11.58
  TOTAL AREA(ACRES) =       16.7
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    145.00 =    1559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   227.50  DOWNSTREAM(FEET) =   209.70
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.38
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    150.00 =    1834.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.89
  RAINFALL INTENSITY(INCH/HR) =   1.73
  TOTAL STREAM AREA(ACRES) =    16.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.38

**************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    152.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   734.00
  UPSTREAM ELEVATION(FEET) =    281.00
  DOWNSTREAM ELEVATION(FEET) =    267.70
  ELEVATION DIFFERENCE(FEET) =     13.30
  TC = 0.393*[(  734.00**3)/(    13.30)]**.2 =   12.263
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.706
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6191
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      2.74
  TOTAL AREA(ACRES) =      2.59   TOTAL RUNOFF(CFS) =      2.74

**************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  267.70  DOWNSTREAM ELEVATION(FEET) =  243.00
  STREET LENGTH(FEET) =   347.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    3.97
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.95
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.18
  STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   13.43
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.631
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6144
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    1.40
  TOTAL AREA(ACRES) =        4.0        PEAK FLOW RATE(CFS) =       4.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.72
  FLOW VELOCITY(FEET/SEC.) =  5.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    153.00 =    1081.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   233.00  DOWNSTREAM(FEET) =   212.00
  FLOW LENGTH(FEET) =   525.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.14
  PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   14.39
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    154.00 =    1606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    154.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.575
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6108
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.63   SUBAREA RUNOFF(CFS) =    2.53
  TOTAL AREA(ACRES) =        6.6   TOTAL RUNOFF(CFS) =       6.67
  TC(MIN.) =   14.39

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   212.00  DOWNSTREAM(FEET) =   209.70
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.67
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE    151.00 TO NODE    150.00 =    1652.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.572
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7553
```

```
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.91   SUBAREA RUNOFF(CFS) =    2.27
  TOTAL AREA(ACRES) =        8.5   TOTAL RUNOFF(CFS) =       8.94
  TC(MIN.) =   14.46

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.46
  RAINFALL INTENSITY(INCH/HR) =   1.57
  TOTAL STREAM AREA(ACRES) =     8.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.38    11.89        1.733         16.71
      2        8.94    14.46        1.572          8.53

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       21.72    11.89       1.733
      2       21.98    14.46       1.572

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.72   Tc(MIN.) =   11.89
  TOTAL AREA(ACRES) =       25.2
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    150.00 =    1834.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   209.70  DOWNSTREAM(FEET) =   198.00
  FLOW LENGTH(FEET) =   178.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.72
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.07
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    155.00 =    2012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.720
```

```
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3400
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.31   SUBAREA RUNOFF(CFS) =    0.77
  TOTAL AREA(ACRES) =       26.5   TOTAL RUNOFF(CFS) =      22.49
  TC(MIN.) =   12.07

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   198.00  DOWNSTREAM(FEET) =   174.50
  FLOW LENGTH(FEET) =   364.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.57
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.49
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    156.00 =    2376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    156.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.695
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6184
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    9.24   SUBAREA RUNOFF(CFS) =    9.68
  TOTAL AREA(ACRES) =       35.8   TOTAL RUNOFF(CFS) =      32.17
  TC(MIN.) =   12.43

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    157.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   174.50  DOWNSTREAM(FEET) =   152.20
  FLOW LENGTH(FEET) =   342.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.28
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.17
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   12.74
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    157.00 =    2718.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    157.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.674
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .3342
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =    1.23
  TOTAL AREA(ACRES) =       38.0   TOTAL RUNOFF(CFS) =      33.40
  TC(MIN.) =   12.74

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    158.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   152.20  DOWNSTREAM(FEET) =   140.70
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.28
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.40
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.91
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    158.00 =    2897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.663
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6165
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   12.64   SUBAREA RUNOFF(CFS) =   12.96
  TOTAL AREA(ACRES) =       50.6   TOTAL RUNOFF(CFS) =      46.36
  TC(MIN.) =   12.91

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    158.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.663
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6165
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   13.21   SUBAREA RUNOFF(CFS) =   13.54
  TOTAL AREA(ACRES) =       63.8   TOTAL RUNOFF(CFS) =      59.91
  TC(MIN.) =   12.91

****************************************************************************
  FLOW PROCESS FROM NODE    158.00 TO NODE    160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   140.70  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =   289.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.91
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE    146.00 TO NODE    160.00 =    3186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.13
  RAINFALL INTENSITY(INCH/HR) =   1.65
  TOTAL STREAM AREA(ACRES) =    63.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     59.91

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    162.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1005.00
  UPSTREAM ELEVATION(FEET) =    244.00
  DOWNSTREAM ELEVATION(FEET) =    208.30
  ELEVATION DIFFERENCE(FEET) =     35.70
  TC = 0.393*[( 1005.00**3)/(    35.70)]**.2 =   12.154
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.714
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6196
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      3.68
  TOTAL AREA(ACRES) =      3.47   TOTAL RUNOFF(CFS) =      3.68

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  208.30  DOWNSTREAM ELEVATION(FEET) =  172.00
  STREET LENGTH(FEET) =   920.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    6.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   3.81   Tc(MIN.) =   15.96
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.496
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6055
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    3.37
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       7.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.03
  FLOW VELOCITY(FEET/SEC.) =  4.23   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    163.00 =    1925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    165.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   161.00  DOWNSTREAM(FEET) =   132.50
  FLOW LENGTH(FEET) =   819.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.06
```

```
  PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =   17.33
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    165.00 =    2744.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.436
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6014
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    5.90   SUBAREA RUNOFF(CFS) =    5.10
  TOTAL AREA(ACRES) =       13.1   TOTAL RUNOFF(CFS) =      12.15
  TC(MIN.) =   17.33

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    166.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   132.50  DOWNSTREAM(FEET) =   130.90
  FLOW LENGTH(FEET) =   118.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.03
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.15
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   17.57
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    166.00 =    2862.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    166.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.426
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6007
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =    1.58
  TOTAL AREA(ACRES) =       14.9   TOTAL RUNOFF(CFS) =      13.73
  TC(MIN.) =   17.57

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    167.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   130.90  DOWNSTREAM(FEET) =   127.00
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.57
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.73
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   18.08
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    167.00 =    3122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    167.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.406
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5993
  SOIL CLASSIFICATION IS "A"
```

```
  SUBAREA AREA(ACRES) =    2.09   SUBAREA RUNOFF(CFS) =    1.76
  TOTAL AREA(ACRES) =       17.0   TOTAL RUNOFF(CFS) =      15.49
  TC(MIN.) =   18.08

****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    168.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   127.00  DOWNSTREAM(FEET) =   124.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.37
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.49
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   18.38
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    168.00 =    3292.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    168.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.395
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5984
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.78   SUBAREA RUNOFF(CFS) =    1.49
  TOTAL AREA(ACRES) =       18.8   TOTAL RUNOFF(CFS) =      16.98
  TC(MIN.) =   18.38

****************************************************************************
  FLOW PROCESS FROM NODE    168.00 TO NODE    160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   124.00  DOWNSTREAM(FEET) =   122.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.95
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.98
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   18.44
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    160.00 =    3342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.392
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .5983
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    7.55   SUBAREA RUNOFF(CFS) =    6.29
  TOTAL AREA(ACRES) =       26.4   TOTAL RUNOFF(CFS) =      23.26
  TC(MIN.) =   18.44

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.392
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7491
```

```
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.72   SUBAREA RUNOFF(CFS) =    2.84
  TOTAL AREA(ACRES) =       29.1   TOTAL RUNOFF(CFS) =      26.10
  TC(MIN.) =   18.44

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.44
  RAINFALL INTENSITY(INCH/HR) =   1.39
  TOTAL STREAM AREA(ACRES) =    29.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       59.91    13.13        1.649         63.84
      2       26.10    18.44        1.392         29.07

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       78.49    13.13       1.649
      2       76.69    18.44       1.392

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      78.49   Tc(MIN.) =   13.13
  TOTAL AREA(ACRES) =       92.9
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    160.00 =    3342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   122.00  DOWNSTREAM(FEET) =   110.00
  FLOW LENGTH(FEET) =   431.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.42
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      78.49
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    140.00 =    3773.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.622
```

```
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7569
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    2.61   SUBAREA RUNOFF(CFS) =    3.20
  TOTAL AREA(ACRES) =       95.5   TOTAL RUNOFF(CFS) =      81.70
  TC(MIN.) =   13.57

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       81.70    13.57       1.622       95.52
  LONGEST FLOWPATH FROM NODE    161.00 TO NODE    140.00 =    3773.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       83.74    22.26       1.268      121.10
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    140.00 =    5032.00 FEET.

 ********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 *************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     132.74      13.57        1.622
      2     147.59      22.26        1.268

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     147.59   Tc(MIN.) =   22.26
  TOTAL AREA(ACRES) =      216.6

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    170.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   110.00  DOWNSTREAM(FEET) =   107.00
  FLOW LENGTH(FEET) =  1097.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  50.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     147.59
  PIPE TRAVEL TIME(MIN.) =   2.30    Tc(MIN.) =   24.56
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    170.00 =    6129.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.207
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7422
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.62   SUBAREA RUNOFF(CFS) =    3.24
  TOTAL AREA(ACRES) =      220.2   TOTAL RUNOFF(CFS) =     150.83
  TC(MIN.) =   24.56

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    175.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   107.00  DOWNSTREAM(FEET) =    78.00
  FLOW LENGTH(FEET) =   926.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.32
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     150.83
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   25.32
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    175.00 =    7055.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.189
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7415
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.31   SUBAREA RUNOFF(CFS) =    2.92
  TOTAL AREA(ACRES) =      223.5   TOTAL RUNOFF(CFS) =     153.75
  TC(MIN.) =   25.32

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.00  DOWNSTREAM(FEET) =    75.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.09
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     153.75
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   25.38
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    180.00 =    7130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    181.00 TO NODE    182.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
```

```
  UPSTREAM ELEVATION(FEET) =    175.00
  DOWNSTREAM ELEVATION(FEET) =    138.30
  ELEVATION DIFFERENCE(FEET) =     36.70
  TC = 0.393*[(  979.00**3)/(    36.70)]**.2 =   11.898
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.732
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6207
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      3.55
  TOTAL AREA(ACRES) =      3.30   TOTAL RUNOFF(CFS) =      3.55

****************************************************************************
  FLOW PROCESS FROM NODE    182.00 TO NODE    183.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  138.30  DOWNSTREAM ELEVATION(FEET) =   95.50
  STREET LENGTH(FEET) =  1112.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    6.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.17
  STREET FLOW TRAVEL TIME(MIN.) =   4.68   Tc(MIN.) =   16.58
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.468
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6036
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    3.46
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       7.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.03
  FLOW VELOCITY(FEET/SEC.) =  4.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    183.00 =    2091.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    184.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    85.50  DOWNSTREAM(FEET) =    85.20
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.00
  PIPE TRAVEL TIME(MIN.) =    0.14    Tc(MIN.) =   16.72
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    184.00 =    2136.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.462
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6032
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.56   SUBAREA RUNOFF(CFS) =    4.02
  TOTAL AREA(ACRES) =       11.8   TOTAL RUNOFF(CFS) =      11.03
  TC(MIN.) =   16.72

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    185.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    85.20  DOWNSTREAM(FEET) =    80.00
  FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.03
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   17.25
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    185.00 =    2416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.439
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7508
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.71   SUBAREA RUNOFF(CFS) =    1.85
  TOTAL AREA(ACRES) =       13.5   TOTAL RUNOFF(CFS) =      12.87
  TC(MIN.) =   17.25

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    186.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    80.00  DOWNSTREAM(FEET) =    78.40
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.90
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.87
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   18.03
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    186.00 =    2691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    186.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.03
  RAINFALL INTENSITY(INCH/HR) =   1.41
  TOTAL STREAM AREA(ACRES) =    13.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.87

****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    188.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   574.00
  UPSTREAM ELEVATION(FEET) =    168.00
  DOWNSTREAM ELEVATION(FEET) =    123.00
  ELEVATION DIFFERENCE(FEET) =     45.00
  TC = 0.393*[(  574.00**3)/(    45.00)]**.2 =    8.292
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.073
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6402
  SOIL CLASSIFICATION IS "A"
  SUBAREA RUNOFF(CFS) =      6.50
  TOTAL AREA(ACRES) =      4.90   TOTAL RUNOFF(CFS) =      6.50

****************************************************************************
  FLOW PROCESS FROM NODE    188.00 TO NODE    189.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    123.00  DOWNSTREAM(FEET) =    115.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   533.00   CHANNEL SLOPE =  0.0150
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.813
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6256
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.46
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   2.57
  Tc(MIN.) =   10.86
  SUBAREA AREA(ACRES) =     7.06       SUBAREA RUNOFF(CFS) =    8.01
  TOTAL AREA(ACRES) =       12.0         PEAK FLOW RATE(CFS) =      14.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   3.83
  LONGEST FLOWPATH FROM NODE    187.00 TO NODE    189.00 =    1107.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    189.00 TO NODE    190.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    115.00  DOWNSTREAM(FEET) =    105.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   667.00   CHANNEL SLOPE =  0.0150
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.627
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6141
  SOIL CLASSIFICATION IS "A"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.21
  AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   2.64
  Tc(MIN.) =   13.50
  SUBAREA AREA(ACRES) =     6.92       SUBAREA RUNOFF(CFS) =    6.91
  TOTAL AREA(ACRES) =       18.9         PEAK FLOW RATE(CFS) =      21.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   4.52
  LONGEST FLOWPATH FROM NODE    187.00 TO NODE    190.00 =    1774.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.627
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6141
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   14.24   SUBAREA RUNOFF(CFS) =   14.22
  TOTAL AREA(ACRES) =       33.1   TOTAL RUNOFF(CFS) =      35.65
  TC(MIN.) =   13.50

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    186.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    95.00  DOWNSTREAM(FEET) =    78.40
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.65
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   13.54
  LONGEST FLOWPATH FROM NODE    187.00 TO NODE    186.00 =    1844.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    186.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.54
  RAINFALL INTENSITY(INCH/HR) =   1.62
  TOTAL STREAM AREA(ACRES) =    33.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.65

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       12.87    18.03        1.408         13.47
      2       35.65    13.54        1.624         33.12

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       45.31    13.54       1.624
      2       43.78    18.03       1.408

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      45.31   Tc(MIN.) =   13.54
  TOTAL AREA(ACRES) =       46.6
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    186.00 =    2691.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    78.40  DOWNSTREAM(FEET) =    75.40
  FLOW LENGTH(FEET) =   522.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.91
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.31
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =   14.64
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    191.00 =    3213.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.562
  MOBILE HOME PARK DEVELOPMENT RUNOFF COEFFICIENT = .7550
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    1.51   SUBAREA RUNOFF(CFS) =    1.78
  TOTAL AREA(ACRES) =       48.1   TOTAL RUNOFF(CFS) =      47.09
  TC(MIN.) =   14.64

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.40  DOWNSTREAM(FEET) =    75.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.09
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   14.75
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    180.00 =    3273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       47.09    14.75       1.556       48.10
  LONGEST FLOWPATH FROM NODE    181.00 TO NODE    180.00 =    3273.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      153.75    25.38       1.188      223.55
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    180.00 =    7130.00 FEET.

 ********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     136.49      14.75        1.556
      2     189.70      25.38        1.188

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     189.70   Tc(MIN.) =   25.38
  TOTAL AREA(ACRES) =      271.6

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    195.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    75.00  DOWNSTREAM(FEET) =    35.00
  FLOW LENGTH(FEET) =   930.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.02
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     189.70
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   26.02
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    195.00 =    8060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.173
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .2635
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =   19.95   SUBAREA RUNOFF(CFS) =    6.17
  TOTAL AREA(ACRES) =      291.6   TOTAL RUNOFF(CFS) =     195.86
  TC(MIN.) =   26.02

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.173
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .6772
  SOIL CLASSIFICATION IS "A"
  SUBAREA AREA(ACRES) =    4.13   SUBAREA RUNOFF(CFS) =    3.28
  TOTAL AREA(ACRES) =      295.7   TOTAL RUNOFF(CFS) =     199.14
  TC(MIN.) =   26.02
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      295.7  TC(MIN.) =     26.02
  PEAK FLOW RATE(CFS)   =     199.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX D –HYDROLOGY STUDY (AES UNIT HYDROGRAPH)

D.1 –100-YR EXISTING HYDROLOGY

- Loss Rate Calculations
- AES Unit Hydrograph Calcs

Synthetic Unit Hydrograph Method Loss Rate Parameter Development
Existing Condition (AMC II)
Travertine Development

Subarea	Land Use	Cover Type	Cover Quality	Area A (acres)	AMC II Runoff Index RI	Pervious Area Infiltration Rate Fp (in/hr)	Impervious Fraction A_i	Adjusted Infiltration Rate F (in/hr)	F x A	A_i x A
A	Barren	A		110.50	78	0.269	0.0	0.269	29.725	0.000
Watershed A Total Area (acres) =				110.50	Average Adjusted Infiltration Rate, F (in/hr) =				0.269	
					Low Loss Fraction =					0.900
					Lag = Rational Method (Tc/60 min) x 0.8 =					0.274
B	Barren	A		151.40	78	0.269	0.0	0.269	40.727	0.000
Watershed B Total Area (acres) =				151.40	Average Adjusted Infiltration Rate, F (in/hr) =				0.269	
					Low Loss Fraction =					0.900
					Lag = Rational Method (Tc/60 min) x 0.8 =					0.295
C	Barren	A		252.60	78	0.269	0.0	0.269	67.949	0.000
Watershed C Total Area (acres) =				252.60	Average Adjusted Infiltration Rate, F (in/hr) =				0.269	
					Low Loss Fraction =					0.900
					Lag = Rational Method (Tc/60 min) x 0.8 =					0.283

Rainfall Data (NOAA Atlas 14)	
Duration	100-Year Precipitation (inches)
1-Hour	1.56
3-Hour	2.28
6-Hour	2.89
24-Hour	4.61

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

              F L O O D   R O U T I N G   A N A L Y S I S

ACCORDING TO RIVERSIDE COUNTY FLOOD CONTORL AND WATER CONSERVATION DISTRICT
                      (RCFC&WCD) 1978 HYDROLOGY MANUAL
         (c) Copyright 1989-2015 Advanced Engineering Software (aes)
                 (Synthetic Unit Hydrograph Version 22.0)
                 Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* Travertine Development                                                   *
* Unit Hydrograph Analysis - Existing Condition - Watershed A              *
* 09-13-2021                                                               *
 **************************************************************************

  FILE NAME: TRA-XAUH.DAT
  TIME/DATE OF STUDY: 15:13 09/13/2021


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     110.500 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.274 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         USER-ENTERED RAINFALL =  1.56 INCHES
         RCFC&WCD 1-Hour Storm (5-Minute period) SELECTED
         (SLOPE OF INTENSITY-DURATION CURVE = 0.58)
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  30.414



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH         UNIT HYDROGRAPH
     NUMBER          MEAN VALUES         ORDINATES(CFS)
----------------------------------------------------------------------------
        1                2.915               38.954
        2               13.432              140.542
        3               32.620              256.420
        4               53.232              275.455
```

5	65.478	163.656
6	72.710	96.637
7	77.641	65.904
8	81.381	49.979
9	84.310	39.136
10	86.703	31.981
11	88.610	25.479
12	90.300	22.587
13	91.715	18.915
14	92.911	15.974
15	94.004	14.613
16	94.924	12.293
17	95.805	11.773
18	96.471	8.898
19	97.061	7.892
20	97.652	7.892
21	98.088	5.832
22	98.308	2.935
23	98.526	2.918
24	98.744	2.916
25	98.963	2.916
26	99.181	2.920
27	99.399	2.916
28	99.618	2.916
29	99.836	2.916
30	100.000	2.195

```
****************************************************************************
         UNIT                 UNIT            UNIT                EFFECTIVE
        PERIOD              RAINFALL       SOIL-LOSS              RAINFALL
       (NUMBER)             (INCHES)        (INCHES)              (INCHES)
----------------------------------------------------------------------------
           1                 0.0566           0.0224                0.0342
           2                 0.0604           0.0224                0.0380
           3                 0.0651           0.0224                0.0426
           4                 0.0732           0.0224                0.0508
           5                 0.0782           0.0224                0.0557
           6                 0.0913           0.0224                0.0689
           7                 0.1110           0.0224                0.0886
           8                 0.1242           0.0224                0.1018
           9                 0.2040           0.0224                0.1816
          10                 0.5310           0.0224                0.5086
          11                 0.1012           0.0224                0.0787
          12                 0.0638           0.0224                0.0414

         TOTAL STORM RAINFALL(INCHES) =  1.56
         TOTAL SOIL-LOSS(INCHES) =  0.27
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.29

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =       2.4770
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      11.8818
----------------------------------------------------------------------------
```

```
 ============================================================================

                           1 - H O U R   S T O R M
                     R U N O F F   H Y D R O G R A P H

 ============================================================================
                HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
         (Note: Time indicated is at END of Each Unit Intervals)
 ----------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
 ----------------------------------------------------------------------------
    0.083      0.0092      1.33  Q         .         .         .         .
    0.167      0.0524      6.28  Q         .         .         .         .
    0.250      0.1610     15.77  V Q       .         .         .         .
    0.333      0.3479     27.13  .V Q      .         .         .         .
    0.417      0.5980     36.31  . V Q     .         .         .         .
    0.500      0.9066     44.82  .  V Q    .         .         .         .
    0.583      1.2808     54.33  .   V  Q  .         .         .         .
    0.667      1.7359     66.08  .    V  Q .         .         .         .
    0.750      2.3086     83.15  .      V  .Q        .         .         .
    0.833      3.1389    120.56  .         V     Q   .         .         .
    0.917      4.3804    180.27  .         .   V     .   Q     .         .
    1.000      5.9696    230.75  .         .         V         Q         .
    1.083      7.4940    221.34  .         .         .    V   Q.         .
    1.167      8.5424    152.23  .         .         Q       V .         .
    1.250      9.2356    100.65  .         .  Q      .         .V        .
    1.333      9.7138     69.43  .        Q.         .         . V       .
    1.417     10.0729     52.15  .     Q   .         .         .  V      .
    1.500     10.3566     41.18  .    Q    .         .         .   V     .
    1.583     10.5884     33.67  .   Q     .         .         .    V    .
    1.667     10.7797     27.78  .  Q      .         .         .     V   .
    1.750     10.9448     23.96  .  Q      .         .         .     V   .
    1.833     11.0846     20.30  . Q       .         .         .      V  .
    1.917     11.2045     17.41  . Q       .         .         .      V  .
    2.000     11.3099     15.31  . Q       .         .         .       V .
    2.083     11.4005     13.16  .Q        .         .         .       V .
    2.167     11.4813     11.73  .Q        .         .         .       V .
    2.250     11.5472      9.56  .Q        .         .         .       V .
    2.333     11.6046      8.34  .Q        .         .         .        V.
    2.417     11.6560      7.47  Q         .         .         .        V.
    2.500     11.6961      5.82  Q         .         .         .        V.
    2.583     11.7242      4.08  Q         .         .         .        V.
    2.667     11.7494      3.65  Q         .         .         .        V.
    2.750     11.7727      3.39  Q         .         .         .        V.
    2.833     11.7951      3.24  Q         .         .         .        V.
    2.917     11.8162      3.07  Q         .         .         .        V.
    3.000     11.8359      2.85  Q         .         .         .        V.
    3.083     11.8537      2.59  Q         .         .         .        V.
    3.167     11.8691      2.23  Q         .         .         .        V.
    3.250     11.8792      1.47  Q         .         .         .        V.
    3.333     11.8812      0.29  Q         .         .         .        V.
    3.417     11.8818      0.09  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                 Duration
        Peak Flow Rate                      (minutes)
    ======================                  =========
               0%                             205.0
              10%                              90.0
              20%                              55.0
```

```
             30%                              40.0
             40%                              30.0
             50%                              25.0
             60%                              20.0
             70%                              15.0
             80%                              10.0
             90%                              10.0


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #2)

         WATERSHED AREA =     110.500 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.274 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         USER-ENTERED RAINFALL =  2.28 INCHES
         RCFC&WCD 3-Hour Storm (5-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  30.414



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                 2.915                 38.954
        2                13.432                140.542
        3                32.620                256.420
        4                53.232                275.455
        5                65.478                163.656
        6                72.710                 96.637
        7                77.641                 65.904
        8                81.381                 49.979
        9                84.310                 39.136
       10                86.703                 31.981
       11                88.610                 25.479
       12                90.300                 22.587
       13                91.715                 18.915
       14                92.911                 15.974
       15                94.004                 14.613
       16                94.924                 12.293
       17                95.805                 11.773
       18                96.471                  8.898
       19                97.061                  7.892
       20                97.652                  7.892
       21                98.088                  5.832
```

```
      22            98.308              2.935
      23            98.526              2.918
      24            98.744              2.916
      25            98.963              2.916
      26            99.181              2.920
      27            99.399              2.916
      28            99.618              2.916
      29            99.836              2.916
      30           100.000              2.195


****************************************************************************
         UNIT              UNIT            UNIT               EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS             RAINFALL
       (NUMBER)          (INCHES)        (INCHES)             (INCHES)
----------------------------------------------------------------------------
           1             0.0296           0.0224               0.0072
           2             0.0296           0.0224               0.0072
           3             0.0251           0.0224               0.0027
           4             0.0342           0.0224               0.0118
           5             0.0342           0.0224               0.0118
           6             0.0410           0.0224               0.0186
           7             0.0342           0.0224               0.0118
           8             0.0410           0.0224               0.0186
           9             0.0410           0.0224               0.0186
          10             0.0342           0.0224               0.0118
          11             0.0365           0.0224               0.0141
          12             0.0410           0.0224               0.0186
          13             0.0502           0.0224               0.0277
          14             0.0502           0.0224               0.0277
          15             0.0502           0.0224               0.0277
          16             0.0456           0.0224               0.0232
          17             0.0593           0.0224               0.0369
          18             0.0616           0.0224               0.0391
          19             0.0547           0.0224               0.0323
          20             0.0616           0.0224               0.0391
          21             0.0752           0.0224               0.0528
          22             0.0707           0.0224               0.0483
          23             0.0661           0.0224               0.0437
          24             0.0684           0.0224               0.0460
          25             0.0707           0.0224               0.0483
          26             0.0958           0.0224               0.0733
          27             0.1140           0.0224               0.0916
          28             0.0798           0.0224               0.0574
          29             0.1550           0.0224               0.1326
          30             0.1664           0.0224               0.1440
          31             0.1870           0.0224               0.1645
          32             0.1345           0.0224               0.1121
          33             0.0456           0.0224               0.0232
          34             0.0410           0.0224               0.0186
          35             0.0410           0.0224               0.0186
          36             0.0137           0.0123               0.0014

         TOTAL STORM RAINFALL(INCHES) =  2.28
         TOTAL SOIL-LOSS(INCHES) =  0.80
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.48

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =       7.3381
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      13.6499
----------------------------------------------------------------------------
```

```
============================================================================

                          3 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
----------------------------------------------------------------------------
   0.083      0.0019      0.28  Q         .         .         .         .
   0.167      0.0109      1.30  Q         .         .         .         .
   0.250      0.0313      2.97  Q         .         .         .         .
   0.333      0.0635      4.68  Q         .         .         .         .
   0.417      0.1046      5.97  VQ        .         .         .         .
   0.500      0.1599      8.02  VQ        .         .         .         .
   0.583      0.2353     10.95  V Q       .         .         .         .
   0.667      0.3278     13.43  V Q       .         .         .         .
   0.750      0.4337     15.38  .V Q      .         .         .         .
   0.833      0.5487     16.71  .V Q      .         .         .         .
   0.917      0.6708     17.72  .V Q      .         .         .         .
   1.000      0.7930     17.75  . VQ      .         .         .         .
   1.083      0.9191     18.31  . VQ      .         .         .         .
   1.167      1.0630     20.89  .  VQ     .         .         .         .
   1.250      1.2333     24.72  .  VQ     .         .         .         .
   1.333      1.4259     27.98  .   VQ    .         .         .         .
   1.417      1.6324     29.98  .   VQ    .         .         .         .
   1.500      1.8537     32.14  .    VQ   .         .         .         .
   1.583      2.0974     35.39  .     VQ  .         .         .         .
   1.667      2.3666     39.08  .     VQ  .         .         .         .
   1.750      2.6547     41.83  .      VQ .         .         .         .
   1.833      2.9669     45.33  .       VQ.         .         .         .
   1.917      3.3117     50.07  .        VQ         .         .         .
   2.000      3.6809     53.60  .         Q         .         .         .
   2.083      4.0584     54.82  .         QV        .         .         .
   2.167      4.4495     56.78  .         .Q V      .         .         .
   2.250      4.8803     62.56  .         . Q V     .         .         .
   2.333      5.3741     71.70  .         .   QV    .         .         .
   2.417      5.9420     82.46  .         .     QV  .         .         .
   2.500      6.5935     94.60  .         .       QV.         .         .
   2.583      7.3711    112.91  .         .         .VQ       .         .
   2.667      8.3061    135.76  .         .         .   V  Q  .         .
   2.750      9.3064    145.24  .         .         .      V Q.         .
   2.833     10.2285    133.88  .         .         .     Q  V.         .
   2.917     10.9551    105.51  .         .         .Q        . V       .
   3.000     11.4871     77.25  .         .    Q    .         .  V      .
   3.083     11.8931     58.95  .         .Q        .         .   V     .
   3.167     12.2070     45.58  .        Q.         .         .    V    .
   3.250     12.4464     34.76  .     Q   .         .         .     V   .
   3.333     12.6365     27.61  .    Q    .         .         .      V  .
   3.417     12.7928     22.69  .   Q     .         .         .      V  .
   3.500     12.9238     19.03  .  Q      .         .         .      V  .
   3.583     13.0356     16.24  .  Q      .         .         .       V .
   3.667     13.1309     13.83  . Q       .         .         .       V .
   3.750     13.2138     12.04  . Q       .         .         .       V .
   3.833     13.2856     10.42  . Q       .         .         .       V .
   3.917     13.3466      8.86  .Q        .         .         .        V.
   4.000     13.3985      7.55  .Q        .         .         .        V.
   4.083     13.4428      6.43  .Q        .         .         .        V.
   4.167     13.4800      5.39  .Q        .         .         .        V.
   4.250     13.5103      4.40  Q         .         .         .        V.
   4.333     13.5342      3.47  Q         .         .         .        V.
```

```
    4.417     13.5545      2.95  Q         .         .         .        V.
    4.500     13.5731      2.70  Q         .         .         .        V.
    4.583     13.5900      2.45  Q         .         .         .        V.
    4.667     13.6049      2.17  Q         .         .         .        V.
    4.750     13.6181      1.92  Q         .         .         .        V.
    4.833     13.6298      1.70  Q         .         .         .        V.
    4.917     13.6388      1.30  Q         .         .         .        V.
    5.000     13.6448      0.87  Q         .         .         .        V.
    5.083     13.6477      0.43  Q         .         .         .        V.
    5.167     13.6489      0.16  Q         .         .         .        V.
    5.250     13.6495      0.10  Q         .         .         .        V.
    5.333     13.6498      0.04  Q         .         .         .        V.
    5.417     13.6499      0.00  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             325.0
              10%                             175.0
              20%                             115.0
              30%                              85.0
              40%                              55.0
              50%                              40.0
              60%                              30.0
              70%                              25.0
              80%                              15.0
              90%                              15.0


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     30.00 IS CODE =   1
 ----------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
 ============================================================================

       (UNIT-HYDROGRAPH ADDED TO STREAM #3)

          WATERSHED AREA =     110.500 ACRES
          BASEFLOW =   0.000 CFS/SQUARE-MILE
          *USER ENTERED "LAG" TIME =    0.274 HOURS
           CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
           THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
           MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
          VALLEY S-GRAPH SELECTED
          UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
          LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
          USER-ENTERED RAINFALL =  2.89 INCHES
          RCFC&WCD 6-Hour Storm (5-Minute period) SELECTED
          *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


          UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
          UNIT INTERVAL PERCENTAGE OF LAG-TIME =  30.414
```

```
============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                2.915               38.954
        2               13.432              140.542
        3               32.620              256.420
        4               53.232              275.455
        5               65.478              163.656
        6               72.710               96.637
        7               77.641               65.904
        8               81.381               49.979
        9               84.310               39.136
       10               86.703               31.981
       11               88.610               25.479
       12               90.300               22.587
       13               91.715               18.915
       14               92.911               15.974
       15               94.004               14.613
       16               94.924               12.293
       17               95.805               11.773
       18               96.471                8.898
       19               97.061                7.892
       20               97.652                7.892
       21               98.088                5.832
       22               98.308                2.935
       23               98.526                2.918
       24               98.744                2.916
       25               98.963                2.916
       26               99.181                2.920
       27               99.399                2.916
       28               99.618                2.916
       29               99.836                2.916
       30              100.000                2.195
```

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0145          0.0130              0.0014
           2             0.0173          0.0156              0.0017
           3             0.0173          0.0156              0.0017
           4             0.0173          0.0156              0.0017
           5             0.0173          0.0156              0.0017
           6             0.0202          0.0182              0.0020
           7             0.0202          0.0182              0.0020
           8             0.0202          0.0182              0.0020
           9             0.0202          0.0182              0.0020
          10             0.0202          0.0182              0.0020
          11             0.0202          0.0182              0.0020
          12             0.0231          0.0208              0.0023
          13             0.0231          0.0208              0.0023
          14             0.0231          0.0208              0.0023
          15             0.0231          0.0208              0.0023
          16             0.0231          0.0208              0.0023
          17             0.0231          0.0208              0.0023
          18             0.0231          0.0208              0.0023
          19             0.0231          0.0208              0.0023
          20             0.0231          0.0208              0.0023
          21             0.0231          0.0208              0.0023
          22             0.0231          0.0208              0.0023
          23             0.0231          0.0208              0.0023
          24             0.0260          0.0224              0.0036
          25             0.0231          0.0208              0.0023
          26             0.0260          0.0224              0.0036
          27             0.0260          0.0224              0.0036
          28             0.0260          0.0224              0.0036
          29             0.0260          0.0224              0.0036
          30             0.0260          0.0224              0.0036
          31             0.0260          0.0224              0.0036
          32             0.0260          0.0224              0.0036
          33             0.0289          0.0224              0.0065
          34             0.0289          0.0224              0.0065
          35             0.0289          0.0224              0.0065
          36             0.0289          0.0224              0.0065
          37             0.0289          0.0224              0.0065
          38             0.0318          0.0224              0.0094
          39             0.0318          0.0224              0.0094
          40             0.0318          0.0224              0.0094
          41             0.0347          0.0224              0.0123
          42             0.0376          0.0224              0.0152
          43             0.0405          0.0224              0.0180
          44             0.0405          0.0224              0.0180
          45             0.0434          0.0224              0.0209
          46             0.0434          0.0224              0.0209
          47             0.0462          0.0224              0.0238
          48             0.0462          0.0224              0.0238
          49             0.0491          0.0224              0.0267
          50             0.0520          0.0224              0.0296
          51             0.0549          0.0224              0.0325
          52             0.0578          0.0224              0.0354
          53             0.0607          0.0224              0.0383
          54             0.0607          0.0224              0.0383
          55             0.0636          0.0224              0.0412
          56             0.0665          0.0224              0.0441
          57             0.0694          0.0224              0.0469
          58             0.0694          0.0224              0.0469
```

```
          59             0.0723           0.0224              0.0498
          60             0.0751           0.0224              0.0527
          61             0.0896           0.0224              0.0672
          62             0.1040           0.0224              0.0816
          63             0.1127           0.0224              0.0903
          64             0.1214           0.0224              0.0990
          65             0.1358           0.0224              0.1134
          66             0.1618           0.0224              0.1394
          67             0.0549           0.0224              0.0325
          68             0.0260           0.0224              0.0036
          69             0.0173           0.0156              0.0017
          70             0.0145           0.0130              0.0014
          71             0.0087           0.0078              0.0009
          72             0.0058           0.0052              0.0006

         TOTAL STORM RAINFALL(INCHES) =  2.89
         TOTAL SOIL-LOSS(INCHES) =  1.48
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.41

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      13.6571
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      12.9483
----------------------------------------------------------------------------
```

```
============================================================================

                          6 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
----------------------------------------------------------------------------
   0.083      0.0004      0.06  Q         .         .         .         .
   0.167      0.0023      0.27  Q         .         .         .         .
   0.250      0.0069      0.68  Q         .         .         .         .
   0.333      0.0149      1.15  Q         .         .         .         .
   0.417      0.0250      1.47  Q         .         .         .         .
   0.500      0.0365      1.67  Q         .         .         .         .
   0.583      0.0491      1.83  Q         .         .         .         .
   0.667      0.0629      2.00  Q         .         .         .         .
   0.750      0.0777      2.15  Q         .         .         .         .
   0.833      0.0932      2.25  Q         .         .         .         .
   0.917      0.1092      2.33  Q         .         .         .         .
   1.000      0.1257      2.40  Q         .         .         .         .
   1.083      0.1428      2.49  Q         .         .         .         .
   1.167      0.1607      2.60  Q         .         .         .         .
   1.250      0.1794      2.71  Q         .         .         .         .
   1.333      0.1987      2.79  Q         .         .         .         .
   1.417      0.2183      2.85  Q         .         .         .         .
   1.500      0.2382      2.89  Q         .         .         .         .
   1.583      0.2583      2.92  Q         .         .         .         .
   1.667      0.2786      2.95  Q         .         .         .         .
   1.750      0.2990      2.97  Q         .         .         .         .
   1.833      0.3196      2.99  Q         .         .         .         .
   1.917      0.3403      3.00  QV        .         .         .         .
   2.000      0.3614      3.07  QV        .         .         .         .
   2.083      0.3835      3.21  QV        .         .         .         .
   2.167      0.4071      3.42  QV        .         .         .         .
   2.250      0.4321      3.63  QV        .         .         .         .
   2.333      0.4584      3.83  QV        .         .         .         .
   2.417      0.4867      4.10  QV        .         .         .         .
   2.500      0.5162      4.28  QV        .         .         .         .
   2.583      0.5464      4.39  QV        .         .         .         .
   2.667      0.5771      4.46  QV        .         .         .         .
   2.750      0.6090      4.63  QV        .         .         .         .
   2.833      0.6439      5.08  .Q        .         .         .         .
   2.917      0.6843      5.86  .QV       .         .         .         .
   3.000      0.7303      6.68  .QV       .         .         .         .
   3.083      0.7798      7.18  .QV       .         .         .         .
   3.167      0.8321      7.60  .QV       .         .         .         .
   3.250      0.8886      8.21  .QV       .         .         .         .
   3.333      0.9514      9.12  .QV       .         .         .         .
   3.417      1.0213     10.15  . QV      .         .         .         .
   3.500      1.0988     11.25  . QV      .         .         .         .
   3.583      1.1875     12.87  . QV      .         .         .         .
   3.667      1.2913     15.08  .  Q      .         .         .         .
   3.750      1.4112     17.41  .  QV     .         .         .         .
   3.833      1.5457     19.53  .  QV     .         .         .         .
   3.917      1.6935     21.46  .   QV    .         .         .         .
   4.000      1.8546     23.39  .   QV    .         .         .         .
   4.083      2.0287     25.27  .    QV   .         .         .         .
   4.167      2.2167     27.30  .    QV   .         .         .         .
   4.250      2.4204     29.57  .    Q V  .         .         .         .
   4.333      2.6432     32.35  .     Q V .         .         .         .
```

```
    4.417      2.8872     35.43  .      QV .         .         .         .
    4.500      3.1529     38.58  .      Q V.         .         .         .
    4.583      3.4390     41.54  .       Q V         .         .         .
    4.667      3.7437     44.25  .       Q .V        .         .         .
    4.750      4.0673     46.98  .        Q. V       .         .         .
    4.833      4.4115     49.98  .        Q.  V      .         .         .
    4.917      4.7759     52.91  .         Q   V     .         .         .
    5.000      5.1591     55.64  .         .Q   V    .         .         .
    5.083      5.5643     58.84  .         .Q     V  .         .         .
    5.167      6.0054     64.04  .         . Q     V .         .         .
    5.250      6.5027     72.22  .         .   Q     V         .         .
    5.333      7.0736     82.89  .         .     Q   .V        .         .
    5.417      7.7228     94.27  .         .       Q .  V      .         .
    5.500      8.4563    106.50  .         .         .Q    V   .         .
    5.583      9.2588    116.52  .         .         .  Q    V .         .
    5.667     10.0543    115.50  .         .         .  Q      .V        .
    5.750     10.7200     96.65  .         .        Q.         .  V      .
    5.833     11.1855     67.60  .         .  Q      .         .   V     .
    5.917     11.5093     47.01  .        Q.         .         .    V    .
    6.000     11.7524     35.30  .      Q  .         .         .     V   .
    6.083     11.9457     28.07  .    Q    .         .         .     V   .
    6.167     12.1033     22.88  .   Q     .         .         .      V  .
    6.250     12.2339     18.97  .  Q      .         .         .      V  .
    6.333     12.3432     15.88  .  Q      .         .         .       V .
    6.417     12.4368     13.58  . Q       .         .         .       V .
    6.500     12.5168     11.62  . Q       .         .         .       V .
    6.583     12.5855      9.99  .Q        .         .         .       V .
    6.667     12.6452      8.66  .Q        .         .         .        V.
    6.750     12.6964      7.44  .Q        .         .         .        V.
    6.833     12.7403      6.38  .Q        .         .         .        V.
    6.917     12.7768      5.29  .Q        .         .         .        V.
    7.000     12.8075      4.46  Q         .         .         .        V.
    7.083     12.8335      3.77  Q         .         .         .        V.
    7.167     12.8542      3.01  Q         .         .         .        V.
    7.250     12.8706      2.39  Q         .         .         .        V.
    7.333     12.8854      2.14  Q         .         .         .        V.
    7.417     12.8990      1.98  Q         .         .         .        V.
    7.500     12.9114      1.81  Q         .         .         .        V.
    7.583     12.9224      1.59  Q         .         .         .        V.
    7.667     12.9317      1.34  Q         .         .         .        V.
    7.750     12.9391      1.07  Q         .         .         .        V.
    7.833     12.9444      0.77  Q         .         .         .        V.
    7.917     12.9473      0.42  Q         .         .         .        V.
    8.000     12.9480      0.10  Q         .         .         .        V.
    8.083     12.9481      0.02  Q         .         .         .        V.
    8.167     12.9482      0.01  Q         .         .         .        V.
    8.250     12.9483      0.01  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                 Duration
       Peak Flow Rate                      (minutes)
   =======================                 =========
             0%                              495.0
            10%                              175.0
            20%                              130.0
            30%                              100.0
            40%                               75.0
            50%                               50.0
            60%                               35.0
            70%                               30.0
            80%                               25.0
            90%                               15.0


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #4)

         WATERSHED AREA =     110.500 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.274 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         MINIMUM SOIL-LOSS RATE(INCH/HOUR) =   0.134
         USER-ENTERED RAINFALL =  4.61 INCHES
         RCFC&WCD 24-Hour Storm (15-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =  15.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  91.241



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH         UNIT HYDROGRAPH
     NUMBER          MEAN VALUES         ORDINATES(CFS)
----------------------------------------------------------------------------
        1               16.322                72.707
        2               63.807               211.522
        3               81.111                77.082
        4               88.537                33.082
        5               92.877                19.329
        6               95.733                12.725
        7               97.600                 8.318
        8               98.526                 4.124
        9               99.181                 2.916
       10               99.672                 2.190
       11               99.918                 1.095
       12              100.000                 0.365
```

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0092           0.0083              0.0009
           2             0.0138           0.0124              0.0014
           3             0.0138           0.0124              0.0014
           4             0.0184           0.0166              0.0018
           5             0.0138           0.0124              0.0014
           6             0.0138           0.0124              0.0014
           7             0.0138           0.0124              0.0014
           8             0.0184           0.0166              0.0018
           9             0.0184           0.0166              0.0018
          10             0.0184           0.0166              0.0018
          11             0.0231           0.0207              0.0023
          12             0.0231           0.0207              0.0023
          13             0.0231           0.0207              0.0023
          14             0.0231           0.0207              0.0023
          15             0.0231           0.0207              0.0023
          16             0.0277           0.0249              0.0028
          17             0.0277           0.0249              0.0028
          18             0.0323           0.0290              0.0032
          19             0.0323           0.0290              0.0032
          20             0.0369           0.0332              0.0037
          21             0.0277           0.0249              0.0028
          22             0.0323           0.0290              0.0032
          23             0.0369           0.0332              0.0037
          24             0.0369           0.0332              0.0037
          25             0.0415           0.0373              0.0041
          26             0.0415           0.0373              0.0041
          27             0.0461           0.0415              0.0046
          28             0.0461           0.0415              0.0046
          29             0.0461           0.0415              0.0046
          30             0.0507           0.0456              0.0051
          31             0.0553           0.0498              0.0055
          32             0.0599           0.0539              0.0060
          33             0.0692           0.0622              0.0069
          34             0.0692           0.0622              0.0069
          35             0.0738           0.0664              0.0074
          36             0.0784           0.0705              0.0078
          37             0.0876           0.0745              0.0131
          38             0.0922           0.0735              0.0187
          39             0.0968           0.0724              0.0244
          40             0.1014           0.0714              0.0301
          41             0.0692           0.0622              0.0069
          42             0.0692           0.0622              0.0069
          43             0.0922           0.0683              0.0239
          44             0.0922           0.0673              0.0249
          45             0.0876           0.0663              0.0213
          46             0.0876           0.0653              0.0223
          47             0.0784           0.0644              0.0140
          48             0.0830           0.0634              0.0196
          49             0.1153           0.0625              0.0528
          50             0.1199           0.0615              0.0583
          51             0.1291           0.0606              0.0685
          52             0.1337           0.0597              0.0740
          53             0.1567           0.0588              0.0980
          54             0.1567           0.0579              0.0988
          55             0.1060           0.0570              0.0490
          56             0.1060           0.0561              0.0499
          57             0.1245           0.0553              0.0692
          58             0.1199           0.0544              0.0654
          59             0.1199           0.0536              0.0662
```

```
          60             0.1153           0.0528              0.0625
          61             0.1106           0.0520              0.0587
          62             0.1060           0.0512              0.0548
          63             0.0876           0.0504              0.0372
          64             0.0876           0.0496              0.0380
          65             0.0184           0.0166              0.0018
          66             0.0184           0.0166              0.0018
          67             0.0138           0.0124              0.0014
          68             0.0138           0.0124              0.0014
          69             0.0231           0.0207              0.0023
          70             0.0231           0.0207              0.0023
          71             0.0231           0.0207              0.0023
          72             0.0184           0.0166              0.0018
          73             0.0184           0.0166              0.0018
          74             0.0184           0.0166              0.0018
          75             0.0138           0.0124              0.0014
          76             0.0092           0.0083              0.0009
          77             0.0138           0.0124              0.0014
          78             0.0184           0.0166              0.0018
          79             0.0138           0.0124              0.0014
          80             0.0092           0.0083              0.0009
          81             0.0138           0.0124              0.0014
          82             0.0138           0.0124              0.0014
          83             0.0138           0.0124              0.0014
          84             0.0092           0.0083              0.0009
          85             0.0138           0.0124              0.0014
          86             0.0092           0.0083              0.0009
          87             0.0138           0.0124              0.0014
          88             0.0092           0.0083              0.0009
          89             0.0138           0.0124              0.0014
          90             0.0092           0.0083              0.0009
          91             0.0092           0.0083              0.0009
          92             0.0092           0.0083              0.0009
          93             0.0092           0.0083              0.0009
          94             0.0092           0.0083              0.0009
          95             0.0092           0.0083              0.0009
          96             0.0092           0.0083              0.0009

         TOTAL STORM RAINFALL(INCHES) =  4.61
         TOTAL SOIL-LOSS(INCHES) =  3.21
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.40

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      29.6044
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      12.8394
----------------------------------------------------------------------------
```

```
============================================================================

                        2 4 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

 ============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
 ----------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.       10.0      20.0      30.0      40.0
 ----------------------------------------------------------------------------
    0.083      0.0005      0.07  Q         .         .         .         .
    0.167      0.0009      0.07  Q         .         .         .         .
    0.250      0.0014      0.07  Q         .         .         .         .
    0.333      0.0034      0.30  Q         .         .         .         .
    0.417      0.0055      0.30  Q         .         .         .         .
    0.500      0.0075      0.30  Q         .         .         .         .
    0.583      0.0107      0.46  Q         .         .         .         .
    0.667      0.0139      0.46  Q         .         .         .         .
    0.750      0.0171      0.46  Q         .         .         .         .
    0.833      0.0210      0.56  Q         .         .         .         .
    0.917      0.0248      0.56  Q         .         .         .         .
    1.000      0.0287      0.56  Q         .         .         .         .
    1.083      0.0333      0.66  Q         .         .         .         .
    1.167      0.0378      0.66  Q         .         .         .         .
    1.250      0.0424      0.66  Q         .         .         .         .
    1.333      0.0466      0.62  Q         .         .         .         .
    1.417      0.0509      0.62  Q         .         .         .         .
    1.500      0.0552      0.62  Q         .         .         .         .
    1.583      0.0594      0.61  Q         .         .         .         .
    1.667      0.0636      0.61  Q         .         .         .         .
    1.750      0.0678      0.61  Q         .         .         .         .
    1.833      0.0723      0.65  Q         .         .         .         .
    1.917      0.0768      0.65  Q         .         .         .         .
    2.000      0.0812      0.65  Q         .         .         .         .
    2.083      0.0864      0.75  Q         .         .         .         .
    2.167      0.0915      0.75  Q         .         .         .         .
    2.250      0.0966      0.75  Q         .         .         .         .
    2.333      0.1020      0.78  Q         .         .         .         .
    2.417      0.1074      0.78  Q         .         .         .         .
    2.500      0.1128      0.78  Q         .         .         .         .
    2.583      0.1186      0.83  Q         .         .         .         .
    2.667      0.1243      0.83  Q         .         .         .         .
    2.750      0.1300      0.83  Q         .         .         .         .
    2.833      0.1365      0.94  Q         .         .         .         .
    2.917      0.1430      0.94  Q         .         .         .         .
    3.000      0.1494      0.94  Q         .         .         .         .
    3.083      0.1562      0.98  Q         .         .         .         .
    3.167      0.1629      0.98  Q         .         .         .         .
    3.250      0.1697      0.98  Q         .         .         .         .
    3.333      0.1766      1.00  Q         .         .         .         .
    3.417      0.1834      1.00  Q         .         .         .         .
    3.500      0.1903      1.00  Q         .         .         .         .
    3.583      0.1973      1.01  VQ        .         .         .         .
    3.667      0.2042      1.01  VQ        .         .         .         .
    3.750      0.2112      1.01  VQ        .         .         .         .
    3.833      0.2184      1.05  VQ        .         .         .         .
    3.917      0.2256      1.05  VQ        .         .         .         .
    4.000      0.2329      1.05  VQ        .         .         .         .
    4.083      0.2408      1.15  VQ        .         .         .         .
    4.167      0.2487      1.15  VQ        .         .         .         .
    4.250      0.2567      1.15  VQ        .         .         .         .
    4.333      0.2651      1.22  VQ        .         .         .         .
    4.417      0.2735      1.22  VQ        .         .         .         .
```

```
 ----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       10.0      20.0      30.0      40.0
----------------------------------------------------------------------------

   4.500      0.2819      1.22  VQ        .         .         .         .
   4.583      0.2912      1.34  VQ        .         .         .         .
   4.667      0.3004      1.34  VQ        .         .         .         .
   4.750      0.3096      1.34  VQ        .         .         .         .
   4.833      0.3193      1.42  VQ        .         .         .         .
   4.917      0.3291      1.42   Q        .         .         .         .
   5.000      0.3389      1.42   Q        .         .         .         .
   5.083      0.3490      1.47  .Q        .         .         .         .
   5.167      0.3591      1.47  .Q        .         .         .         .
   5.250      0.3692      1.47  .Q        .         .         .         .
   5.333      0.3786      1.36  .Q        .         .         .         .
   5.417      0.3879      1.36  .Q        .         .         .         .
   5.500      0.3972      1.36  .Q        .         .         .         .
   5.583      0.4071      1.44  .Q        .         .         .         .
   5.667      0.4171      1.44  .Q        .         .         .         .
   5.750      0.4270      1.44  .Q        .         .         .         .
   5.833      0.4377      1.56  .Q        .         .         .         .
   5.917      0.4484      1.56  .Q        .         .         .         .
   6.000      0.4591      1.56  .Q        .         .         .         .
   6.083      0.4703      1.63  .Q        .         .         .         .
   6.167      0.4816      1.63  .Q        .         .         .         .
   6.250      0.4928      1.63  .Q        .         .         .         .
   6.333      0.5048      1.75  .Q        .         .         .         .
   6.417      0.5169      1.75  .Q        .         .         .         .
   6.500      0.5289      1.75  .Q        .         .         .         .
   6.583      0.5415      1.83  .Q        .         .         .         .
   6.667      0.5540      1.83  .Q        .         .         .         .
   6.750      0.5666      1.83  .Q        .         .         .         .
   6.833      0.5800      1.95  .Q        .         .         .         .
   6.917      0.5934      1.95  .Q        .         .         .         .
   7.000      0.6068      1.95  .Q        .         .         .         .
   7.083      0.6205      1.99  .Q        .         .         .         .
   7.167      0.6343      1.99  .Q        .         .         .         .
   7.250      0.6480      1.99  .QV       .         .         .         .
   7.333      0.6622      2.05  . Q       .         .         .         .
   7.417      0.6763      2.05  . Q       .         .         .         .
   7.500      0.6904      2.05  . Q       .         .         .         .
   7.583      0.7055      2.20  . Q       .         .         .         .
   7.667      0.7207      2.20  . Q       .         .         .         .
   7.750      0.7358      2.20  . Q       .         .         .         .
   7.833      0.7521      2.37  . Q       .         .         .         .
   7.917      0.7685      2.37  . Q       .         .         .         .
   8.000      0.7848      2.37  . Q       .         .         .         .
   8.083      0.8027      2.59  . Q       .         .         .         .
   8.167      0.8205      2.59  . Q       .         .         .         .
   8.250      0.8384      2.59  . Q       .         .         .         .
   8.333      0.8580      2.85  . Q       .         .         .         .
   8.417      0.8776      2.85  . Q       .         .         .         .
   8.500      0.8973      2.85  . Q       .         .         .         .
   8.583      0.9179      2.99  . Q       .         .         .         .
   8.667      0.9384      2.99  . Q       .         .         .         .
   8.750      0.9590      2.99  . Q       .         .         .         .
   8.833      0.9808      3.17  .  Q      .         .         .         .
   8.917      1.0027      3.17  .  Q      .         .         .         .
   9.000      1.0245      3.17  .  Q      .         .         .         .
   9.083      1.0500      3.71  .  Q      .         .         .         .
   9.167      1.0756      3.71  .  Q      .         .         .         .
   9.250      1.1012      3.71  .  Q      .         .         .         .
   9.333      1.1377      5.30  .  V Q    .         .         .         .
   9.417      1.1742      5.30  .  V Q    .         .         .         .
```

```
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       10.0      20.0      30.0      40.0
----------------------------------------------------------------------------
   9.500      1.2108      5.30  .  V Q    .         .         .         .
   9.583      1.2614      7.35  .  V   Q  .         .         .         .
   9.667      1.3121      7.35  .   V  Q  .         .         .         .
   9.750      1.3627      7.35  .   V  Q  .         .         .         .
   9.833      1.4288      9.59  .   V    Q.         .         .         .
   9.917      1.4949      9.59  .   V    Q.         .         .         .
  10.000      1.5610      9.59  .   V    Q.         .         .         .
  10.083      1.6288      9.85  .    V   Q.         .         .         .
  10.167      1.6966      9.85  .    V   Q.         .         .         .
  10.250      1.7644      9.85  .    V   Q.         .         .         .
  10.333      1.8041      5.76  .    Q    .         .         .         .
  10.417      1.8437      5.76  .    Q    .         .         .         .
  10.500      1.8834      5.76  .    Q    .         .         .         .
  10.583      1.9221      5.63  .    Q    .         .         .         .
  10.667      1.9609      5.63  .    QV   .         .         .         .
  10.750      1.9996      5.63  .    QV   .         .         .         .
  10.833      2.0601      8.78  .     V Q .         .         .         .
  10.917      2.1205      8.78  .     V Q .         .         .         .
  11.000      2.1810      8.78  .     V Q .         .         .         .
  11.083      2.2481      9.75  .      V Q.         .         .         .
  11.167      2.3152      9.75  .      V Q.         .         .         .
  11.250      2.3824      9.75  .      V Q.         .         .         .
  11.333      2.4478      9.50  .      V Q.         .         .         .
  11.417      2.5131      9.50  .      V Q.         .         .         .
  11.500      2.5785      9.50  .       VQ.         .         .         .
  11.583      2.6409      9.05  .       VQ.         .         .         .
  11.667      2.7032      9.05  .       VQ.         .         .         .
  11.750      2.7655      9.05  .       VQ.         .         .         .
  11.833      2.8196      7.84  .      QV .         .         .         .
  11.917      2.8736      7.84  .      QV .         .         .         .
  12.000      2.9276      7.84  .      Q V.         .         .         .
  12.083      3.0024     10.87  .        VQ         .         .         .
  12.167      3.0773     10.87  .        VQ         .         .         .
  12.250      3.1521     10.87  .        VQ         .         .         .
  12.333      3.2793     18.46  .         V       Q .         .         .
  12.417      3.4064     18.46  .         V       Q .         .         .
  12.500      3.5336     18.46  .          V      Q .         .         .
  12.583      3.6918     22.97  .         .V        . Q       .         .
  12.667      3.8500     22.97  .         .V        . Q       .         .
  12.750      4.0082     22.97  .         . V       . Q       .         .
  12.833      4.1947     27.07  .         .  V      .      Q  .         .
  12.917      4.3811     27.07  .         .  V      .      Q  .         .
  13.000      4.5675     27.07  .         .   V     .      Q  .         .
  13.083      4.7852     31.61  .         .   V     .         .Q        .
  13.167      5.0029     31.61  .         .    V    .         .Q        .
  13.250      5.2206     31.61  .         .     V   .         .Q        .
  13.333      5.4826     38.04  .         .      V  .         .       Q .
  13.417      5.7446     38.04  .         .      V  .         .       Q .
  13.500      6.0066     38.04  .         .       V .         .       Q .
  13.583      6.2626     37.18  .         .        V.         .      Q  .
  13.667      6.5187     37.18  .         .         V         .      Q  .
  13.750      6.7747     37.18  .         .          V        .      Q  .
  13.833      6.9674     27.98  .         .         .V      Q  .         .
  13.917      7.1601     27.98  .         .         . V     Q  .         .
  14.000      7.3528     27.98  .         .         . V     Q  .         .
  14.083      7.5352     26.49  .         .         .  V  Q   .         .
  14.167      7.7177     26.49  .         .         .   V Q   .         .
  14.250      7.9002     26.49  .         .         .   V Q   .         .
  14.333      8.1014     29.22  .         .         .    V   Q.         .
  14.417      8.3027     29.22  .         .         .    V   Q.         .
  14.500      8.5039     29.22  .         .         .     V  Q.         .
```

```
----------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.       10.0      20.0      30.0      40.0
 ----------------------------------------------------------------------------
   14.583      8.7061     29.35  .         .         .      V Q.         .
   14.667      8.9082     29.35  .         .         .      V Q.         .
   14.750      9.1104     29.35  .         .         .       VQ.         .
   14.833      9.3111     29.15  .         .         .        Q.         .
   14.917      9.5119     29.15  .         .         .        Q.         .
   15.000      9.7126     29.15  .         .         .        QV         .
   15.083      9.9060     28.08  .         .         .       Q V         .
   15.167     10.0993     28.08  .         .         .       Q  V        .
   15.250     10.2927     28.08  .         .         .       Q   V       .
   15.333     10.4770     26.77  .         .         .     Q   . V       .
   15.417     10.6614     26.77  .         .         .     Q   .  V      .
   15.500     10.8458     26.77  .         .         .     Q   .  V      .
   15.583     11.0130     24.28  .         .         .   Q     .   V     .
   15.667     11.1802     24.28  .         .         .   Q     .   V     .
   15.750     11.3474     24.28  .         .         .   Q     .    V    .
   15.833     11.4856     20.07  .         .         Q         .    V    .
   15.917     11.6238     20.07  .         .         Q         .     V   .
   16.000     11.7620     20.07  .         .         Q         .     V   .
   16.083     11.8721     15.99  .         .    Q    .         .     V   .
   16.167     11.9823     15.99  .         .    Q    .         .      V  .
   16.250     12.0924     15.99  .         .    Q    .         .      V  .
   16.333     12.1454      7.69  .      Q  .         .         .      V  .
   16.417     12.1984      7.69  .      Q  .         .         .       V .
   16.500     12.2513      7.69  .      Q  .         .         .       V .
   16.583     12.2822      4.48  .   Q     .         .         .       V .
   16.667     12.3131      4.48  .   Q     .         .         .       V .
   16.750     12.3439      4.48  .   Q     .         .         .       V .
   16.833     12.3641      2.92  . Q       .         .         .       V .
   16.917     12.3842      2.92  . Q       .         .         .       V .
   17.000     12.4043      2.92  . Q       .         .         .       V .
   17.083     12.4187      2.09  . Q       .         .         .       V .
   17.167     12.4331      2.09  . Q       .         .         .       V .
   17.250     12.4474      2.09  . Q       .         .         .       V .
   17.333     12.4593      1.72  .Q        .         .         .       V .
   17.417     12.4711      1.72  .Q        .         .         .       V .
   17.500     12.4829      1.72  .Q        .         .         .       V .
   17.583     12.4927      1.42  .Q        .         .         .       V .
   17.667     12.5024      1.42  .Q        .         .         .       V .
   17.750     12.5122      1.42  .Q        .         .         .       V .
   17.833     12.5205      1.22  .Q        .         .         .        V.
   17.917     12.5289      1.22  .Q        .         .         .        V.
   18.000     12.5373      1.22  .Q        .         .         .        V.
   18.083     12.5442      1.01  .Q        .         .         .        V.
   18.167     12.5512      1.01  .Q        .         .         .        V.
   18.250     12.5581      1.01  .Q        .         .         .        V.
   18.333     12.5643      0.90  Q         .         .         .        V.
   18.417     12.5705      0.90  Q         .         .         .        V.
   18.500     12.5767      0.90  Q         .         .         .        V.
   18.583     12.5823      0.82  Q         .         .         .        V.
   18.667     12.5879      0.82  Q         .         .         .        V.
   18.750     12.5936      0.82  Q         .         .         .        V.
   18.833     12.5981      0.67  Q         .         .         .        V.
   18.917     12.6027      0.67  Q         .         .         .        V.
   19.000     12.6073      0.67  Q         .         .         .        V.
   19.083     12.6112      0.56  Q         .         .         .        V.
   19.167     12.6151      0.56  Q         .         .         .        V.
   19.250     12.6189      0.56  Q         .         .         .        V.
   19.333     12.6234      0.64  Q         .         .         .        V.
   19.417     12.6278      0.64  Q         .         .         .        V.
   19.500     12.6322      0.64  Q         .         .         .        V.
   19.583     12.6371      0.72  Q         .         .         .        V.
```

```
-----------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.        10.0      20.0      30.0      40.0
 -----------------------------------------------------------------------------
   19.667     12.6420      0.72  Q         .         .         .        V.
   19.750     12.6470      0.72  Q         .         .         .        V.
   19.833     12.6512      0.62  Q         .         .         .        V.
   19.917     12.6555      0.62  Q         .         .         .        V.
   20.000     12.6598      0.62  Q         .         .         .        V.
   20.083     12.6635      0.53  Q         .         .         .        V.
   20.167     12.6671      0.53  Q         .         .         .        V.
   20.250     12.6708      0.53  Q         .         .         .        V.
   20.333     12.6749      0.59  Q         .         .         .        V.
   20.417     12.6789      0.59  Q         .         .         .        V.
   20.500     12.6830      0.59  Q         .         .         .        V.
   20.583     12.6871      0.61  Q         .         .         .        V.
   20.667     12.6913      0.61  Q         .         .         .        V.
   20.750     12.6955      0.61  Q         .         .         .        V.
   20.833     12.6995      0.58  Q         .         .         .        V.
   20.917     12.7034      0.58  Q         .         .         .        V.
   21.000     12.7074      0.58  Q         .         .         .        V.
   21.083     12.7110      0.51  Q         .         .         .        V.
   21.167     12.7145      0.51  Q         .         .         .        V.
   21.250     12.7180      0.51  Q         .         .         .        V.
   21.333     12.7218      0.54  Q         .         .         .        V.
   21.417     12.7255      0.54  Q         .         .         .        V.
   21.500     12.7293      0.54  Q         .         .         .        V.
   21.583     12.7327      0.50  Q         .         .         .        V.
   21.667     12.7362      0.50  Q         .         .         .        V.
   21.750     12.7396      0.50  Q         .         .         .        V.
   21.833     12.7434      0.54  Q         .         .         .        V.
   21.917     12.7471      0.54  Q         .         .         .        V.
   22.000     12.7508      0.54  Q         .         .         .        V.
   22.083     12.7542      0.50  Q         .         .         .        V.
   22.167     12.7576      0.50  Q         .         .         .        V.
   22.250     12.7610      0.50  Q         .         .         .        V.
   22.333     12.7647      0.53  Q         .         .         .        V.
   22.417     12.7684      0.53  Q         .         .         .        V.
   22.500     12.7720      0.53  Q         .         .         .        V.
   22.583     12.7752      0.46  Q         .         .         .        V.
   22.667     12.7784      0.46  Q         .         .         .        V.
   22.750     12.7816      0.46  Q         .         .         .        V.
   22.833     12.7846      0.44  Q         .         .         .        V.
   22.917     12.7876      0.44  Q         .         .         .        V.
   23.000     12.7906      0.44  Q         .         .         .        V.
   23.083     12.7935      0.43  Q         .         .         .        V.
   23.166     12.7964      0.43  Q         .         .         .        V.
   23.250     12.7994      0.43  Q         .         .         .        V.
   23.333     12.8023      0.42  Q         .         .         .        V.
   23.416     12.8051      0.42  Q         .         .         .        V.
   23.500     12.8080      0.42  Q         .         .         .        V.
   23.583     12.8109      0.42  Q         .         .         .        V.
   23.666     12.8138      0.42  Q         .         .         .        V.
   23.750     12.8166      0.42  Q         .         .         .        V.
   23.833     12.8195      0.41  Q         .         .         .        V.
   23.916     12.8223      0.41  Q         .         .         .        V.
   24.000     12.8252      0.41  Q         .         .         .        V.
   24.083     12.8276      0.35  Q         .         .         .        V.
   24.166     12.8300      0.35  Q         .         .         .        V.
   24.250     12.8323      0.35  Q         .         .         .        V.
   24.333     12.8334      0.15  Q         .         .         .        V.
   24.416     12.8344      0.15  Q         .         .         .        V.
   24.500     12.8354      0.15  Q         .         .         .        V.
   24.583     12.8360      0.08  Q         .         .         .        V.
   24.666     12.8365      0.08  Q         .         .         .        V.
```

```
   24.750     12.8370      0.08  Q         .         .         .        V.
   24.833     12.8374      0.05  Q         .         .         .        V.
   24.916     12.8377      0.05  Q         .         .         .        V.
   25.000     12.8380      0.05  Q         .         .         .        V.
   25.083     12.8382      0.03  Q         .         .         .        V.
   25.166     12.8384      0.03  Q         .         .         .        V.
   25.250     12.8386      0.03  Q         .         .         .        V.
   25.333     12.8387      0.02  Q         .         .         .        V.
   25.416     12.8389      0.02  Q         .         .         .        V.
   25.500     12.8390      0.02  Q         .         .         .        V.
   25.583     12.8390      0.01  Q         .         .         .        V.
   25.666     12.8391      0.01  Q         .         .         .        V.
   25.750     12.8392      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                            1545.0
              10%                             450.0
              20%                             375.0
              30%                             240.0
              40%                             240.0
              50%                             210.0
              60%                             195.0
              70%                             150.0
              80%                              45.0
              90%                              30.0
 ============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

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

              F L O O D   R O U T I N G   A N A L Y S I S

ACCORDING TO RIVERSIDE COUNTY FLOOD CONTORL AND WATER CONSERVATION DISTRICT
                     (RCFC&WCD) 1978 HYDROLOGY MANUAL
         (c) Copyright 1989-2015 Advanced Engineering Software (aes)
                 (Synthetic Unit Hydrograph Version 22.0)
                 Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:


 ************************** DESCRIPTION OF STUDY **************************
* Travertine Development                                                   *
* Unit Hydrograph Analysis - Existing Condition - Watershed B              *
* 09-13-2021                                                               *
 **************************************************************************

  FILE NAME: TRA-XBUH.DAT
  TIME/DATE OF STUDY: 15:21 09/13/2021


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     151.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.295 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         USER-ENTERED RAINFALL =  1.56 INCHES
         RCFC&WCD 1-Hour Storm (5-Minute period) SELECTED
         (SLOPE OF INTENSITY-DURATION CURVE = 0.58)
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  28.249
```

```
============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                 2.644                 48.388
        2                11.822                167.923
        3                28.750                309.760
        4                48.757                366.082
        5                62.350                248.722
        6                70.275                145.008
        7                75.577                 97.012
        8                79.510                 71.973
        9                82.607                 56.668
       10                85.156                 46.635
       11                87.226                 37.872
       12                88.933                 31.238
       13                90.467                 28.064
       14                91.769                 23.830
       15                92.874                 20.224
       16                93.901                 18.791
       17                94.768                 15.856
       18                95.599                 15.202
       19                96.283                 12.532
       20                96.832                 10.037
       21                97.381                 10.037
       22                97.905                  9.602
       23                98.177                  4.964
       24                98.379                  3.707
       25                98.582                  3.709
       26                98.785                  3.712
       27                98.988                  3.709
       28                99.190                  3.709
       29                99.393                  3.709
       30                99.596                  3.709
       31                99.798                  3.709
       32               100.000                  3.689
```

```
****************************************************************************
         UNIT              UNIT           UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS           RAINFALL
       (NUMBER)          (INCHES)        (INCHES)           (INCHES)
----------------------------------------------------------------------------
           1             0.0566          0.0224              0.0342
           2             0.0604          0.0224              0.0380
           3             0.0651          0.0224              0.0426
           4             0.0732          0.0224              0.0508
           5             0.0782          0.0224              0.0557
           6             0.0913          0.0224              0.0689
           7             0.1110          0.0224              0.0886
           8             0.1242          0.0224              0.1018
           9             0.2040          0.0224              0.1816
          10             0.5310          0.0224              0.5086
          11             0.1012          0.0224              0.0787
          12             0.0638          0.0224              0.0414

         TOTAL STORM RAINFALL(INCHES) =  1.56
         TOTAL SOIL-LOSS(INCHES) =  0.27
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.29

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =       3.3916
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      16.2690
----------------------------------------------------------------------------
```

```
============================================================================

                          1 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      100.0     200.0     300.0     400.0
----------------------------------------------------------------------------
   0.083      0.0114      1.65  Q         .         .         .         .
   0.167      0.0636      7.58  Q         .         .         .         .
   0.250      0.1946     19.03  VQ        .         .         .         .
   0.333      0.4281     33.90  .V Q      .         .         .         .
   0.417      0.7508     46.85  .V  Q     .         .         .         .
   0.500      1.1534     58.46  . V  Q    .         .         .         .
   0.583      1.6435     71.16  .   V  Q  .         .         .         .
   0.667      2.2393     86.52  .    V  Q .         .         .         .
   0.750      2.9871    108.58  .      V  Q         .         .         .
   0.833      4.0617    156.03  .        V.    Q    .         .         .
   0.917      5.6409    229.30  .         .  V      . Q       .         .
   1.000      7.6759    295.48  .         .       V .        Q.         .
   1.083      9.7441    300.30  .         .         .  V      Q         .
   1.167     11.2756    222.38  .         .         . Q    V  .         .
   1.250     12.2961    148.16  .         .   Q     .         V         .
   1.333     13.0001    102.23  .         Q         .         .V        .
   1.417     13.5214     75.69  .      Q  .         .         .  V      .
   1.500     13.9333     59.81  .    Q    .         .         .   V     .
   1.583     14.2715     49.11  .   Q     .         .         .    V    .
   1.667     14.5514     40.63  .   Q     .         .         .    V    .
   1.750     14.7878     34.32  .  Q      .         .         .     V   .
   1.833     14.9949     30.07  .  Q      .         .         .     V   .
   1.917     15.1728     25.83  . Q       .         .         .      V  .
   2.000     15.3267     22.36  . Q       .         .         .      V  .
   2.083     15.4637     19.89  .Q        .         .         .       V .
   2.167     15.5823     17.21  .Q        .         .         .       V .
   2.250     15.6890     15.50  .Q        .         .         .       V .
   2.333     15.7791     13.09  .Q        .         .         .       V .
   2.417     15.8551     11.04  .Q        .         .         .       V .
   2.500     15.9245     10.07  .Q        .         .         .        V.
   2.583     15.9849      8.77  Q         .         .         .        V.
   2.667     16.0273      6.15  Q         .         .         .        V.
   2.750     16.0617      5.00  Q         .         .         .        V.
   2.833     16.0932      4.57  Q         .         .         .        V.
   2.917     16.1233      4.36  Q         .         .         .        V.
   3.000     16.1520      4.17  Q         .         .         .        V.
   3.083     16.1793      3.97  Q         .         .         .        V.
   3.167     16.2049      3.71  Q         .         .         .        V.
   3.250     16.2282      3.38  Q         .         .         .        V.
   3.333     16.2488      3.00  Q         .         .         .        V.
   3.417     16.2648      2.32  Q         .         .         .        V.
   3.500     16.2679      0.44  Q         .         .         .        V.
   3.583     16.2689      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                 Duration
       Peak Flow Rate                      (minutes)
   =======================                 =========
             0%                              215.0
            10%                               95.0
            20%                               55.0
            30%                               40.0
            40%                               30.0
            50%                               25.0
            60%                               20.0
            70%                               20.0
            80%                               10.0
            90%                               10.0


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #2)

         WATERSHED AREA =     151.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.295 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         USER-ENTERED RAINFALL =  2.28 INCHES
         RCFC&WCD 3-Hour Storm (5-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  28.249
```

```
=============================================================================
                      UNIT HYDROGRAPH DETERMINATION

-----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
-----------------------------------------------------------------------------
        1                 2.644                 48.388
        2                11.822                167.923
        3                28.750                309.760
        4                48.757                366.082
        5                62.350                248.722
        6                70.275                145.008
        7                75.577                 97.012
        8                79.510                 71.973
        9                82.607                 56.668
       10                85.156                 46.635
       11                87.226                 37.872
       12                88.933                 31.238
       13                90.467                 28.064
       14                91.769                 23.830
       15                92.874                 20.224
       16                93.901                 18.791
       17                94.768                 15.856
       18                95.599                 15.202
       19                96.283                 12.532
       20                96.832                 10.037
       21                97.381                 10.037
       22                97.905                  9.602
       23                98.177                  4.964
       24                98.379                  3.707
       25                98.582                  3.709
       26                98.785                  3.712
       27                98.988                  3.709
       28                99.190                  3.709
       29                99.393                  3.709
       30                99.596                  3.709
       31                99.798                  3.709
       32               100.000                  3.689
```

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0296           0.0224              0.0072
           2             0.0296           0.0224              0.0072
           3             0.0251           0.0224              0.0027
           4             0.0342           0.0224              0.0118
           5             0.0342           0.0224              0.0118
           6             0.0410           0.0224              0.0186
           7             0.0342           0.0224              0.0118
           8             0.0410           0.0224              0.0186
           9             0.0410           0.0224              0.0186
          10             0.0342           0.0224              0.0118
          11             0.0365           0.0224              0.0141
          12             0.0410           0.0224              0.0186
          13             0.0502           0.0224              0.0277
          14             0.0502           0.0224              0.0277
          15             0.0502           0.0224              0.0277
          16             0.0456           0.0224              0.0232
          17             0.0593           0.0224              0.0369
          18             0.0616           0.0224              0.0391
          19             0.0547           0.0224              0.0323
          20             0.0616           0.0224              0.0391
          21             0.0752           0.0224              0.0528
          22             0.0707           0.0224              0.0483
          23             0.0661           0.0224              0.0437
          24             0.0684           0.0224              0.0460
          25             0.0707           0.0224              0.0483
          26             0.0958           0.0224              0.0733
          27             0.1140           0.0224              0.0916
          28             0.0798           0.0224              0.0574
          29             0.1550           0.0224              0.1326
          30             0.1664           0.0224              0.1440
          31             0.1870           0.0224              0.1645
          32             0.1345           0.0224              0.1121
          33             0.0456           0.0224              0.0232
          34             0.0410           0.0224              0.0186
          35             0.0410           0.0224              0.0186
          36             0.0137           0.0123              0.0014

         TOTAL STORM RAINFALL(INCHES) =  2.28
         TOTAL SOIL-LOSS(INCHES) =  0.80
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.48

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      10.0475
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      18.6898
----------------------------------------------------------------------------
```

```
============================================================================

                          3 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
----------------------------------------------------------------------------
   0.083      0.0024      0.35  Q         .         .         .         .
   0.167      0.0132      1.56  Q         .         .         .         .
   0.250      0.0378      3.58  Q         .         .         .         .
   0.333      0.0784      5.90  VQ        .         .         .         .
   0.417      0.1323      7.81  VQ        .         .         .         .
   0.500      0.2035     10.35  V Q       .         .         .         .
   0.583      0.3005     14.07  V Q       .         .         .         .
   0.667      0.4210     17.50  V  Q      .         .         .         .
   0.750      0.5609     20.32  .V  Q     .         .         .         .
   0.833      0.7138     22.20  .V  Q     .         .         .         .
   0.917      0.8766     23.63  .V  Q     .         .         .         .
   1.000      1.0420     24.02  . V Q     .         .         .         .
   1.083      1.2121     24.70  . V Q     .         .         .         .
   1.167      1.4030     27.71  .  V Q    .         .         .         .
   1.250      1.6269     32.51  .  V  Q   .         .         .         .
   1.333      1.8820     37.04  .   V  Q  .         .         .         .
   1.417      2.1582     40.11  .   V   Q .         .         .         .
   1.500      2.4550     43.09  .    V  Q .         .         .         .
   1.583      2.7794     47.11  .    V   Q.         .         .         .
   1.667      3.1371     51.95  .     V   Q         .         .         .
   1.750      3.5237     56.12  .      V  .Q        .         .         .
   1.833      3.9414     60.66  .       V . Q       .         .         .
   1.917      4.4003     66.64  .        V.  Q      .         .         .
   2.000      4.8943     71.73  .         V   Q     .         .         .
   2.083      5.4043     74.06  .         .V  Q     .         .         .
   2.167      5.9325     76.69  .         . V  Q    .         .         .
   2.250      6.5093     83.75  .         .  V  Q   .         .         .
   2.333      7.1632     94.94  .         .    V  Q .         .         .
   2.417      7.9156    109.25  .         .     V   .Q        .         .
   2.500      8.7829    125.94  .         .       V .    Q    .         .
   2.583      9.8070    148.69  .         .         V        Q.         .
   2.667     11.0331    178.03  .         .         .  V      .    Q    .
   2.750     12.3655    193.47  .         .         .     V   .       Q .
   2.833     13.6281    183.32  .         .         .        V.     Q   .
   2.917     14.6618    150.10  .         .         .         QV        .
   3.000     15.4331    111.99  .         .         . Q       .  V      .
   3.083     16.0181     84.94  .         .     Q   .         .   V     .
   3.167     16.4739     66.19  .         .  Q      .         .    V    .
   3.250     16.8267     51.23  .         Q         .         .     V   .
   3.333     17.1058     40.51  .       Q .         .         .     V   .
   3.417     17.3354     33.34  .     Q   .         .         .      V  .
   3.500     17.5289     28.09  .    Q    .         .         .      V  .
   3.583     17.6943     24.02  .   Q     .         .         .      V  .
   3.667     17.8376     20.81  .   Q     .         .         .       V .
   3.750     17.9611     17.92  .  Q      .         .         .       V .
   3.833     18.0692     15.71  .  Q      .         .         .       V .
   3.917     18.1644     13.82  . Q       .         .         .       V .
   4.000     18.2468     11.96  . Q       .         .         .        V.
   4.083     18.3174     10.24  . Q       .         .         .        V.
   4.167     18.3783      8.85  .Q        .         .         .        V.
   4.250     18.4304      7.57  .Q        .         .         .        V.
   4.333     18.4745      6.39  .Q        .         .         .        V.
   4.417     18.5096      5.11  .Q        .         .         .        V.
```

```
    4.500     18.5382      4.14  Q         .         .         .       V.
    4.583     18.5638      3.72  Q         .         .         .       V.
    4.667     18.5874      3.43  Q         .         .         .       V.
    4.750     18.6090      3.14  Q         .         .         .       V.
    4.833     18.6285      2.83  Q         .         .         .       V.
    4.917     18.6457      2.49  Q         .         .         .       V.
    5.000     18.6614      2.28  Q         .         .         .       V.
    5.083     18.6737      1.79  Q         .         .         .       V.
    5.167     18.6823      1.25  Q         .         .         .       V.
    5.250     18.6867      0.64  Q         .         .         .       V.
    5.333     18.6883      0.23  Q         .         .         .       V.
    5.417     18.6893      0.14  Q         .         .         .       V.
    5.500     18.6898      0.07  Q         .         .         .       V.
    5.583     18.6898      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             335.0
              10%                             180.0
              20%                             120.0
              30%                              85.0
              40%                              55.0
              50%                              40.0
              60%                              30.0
              70%                              25.0
              80%                              15.0
              90%                              15.0


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     40.00 IS CODE =   1
 ----------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
 ============================================================================

       (UNIT-HYDROGRAPH ADDED TO STREAM #3)

          WATERSHED AREA =     151.300 ACRES
          BASEFLOW =   0.000 CFS/SQUARE-MILE
          *USER ENTERED "LAG" TIME =    0.295 HOURS
           CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
           THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
           MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
          VALLEY S-GRAPH SELECTED
          UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
          LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
          USER-ENTERED RAINFALL =  2.89 INCHES
          RCFC&WCD 6-Hour Storm (5-Minute period) SELECTED
          *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


          UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
          UNIT INTERVAL PERCENTAGE OF LAG-TIME =  28.249



 ============================================================================
                       UNIT HYDROGRAPH DETERMINATION
```

```
----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                 2.644                 48.388
        2                11.822                167.923
        3                28.750                309.760
        4                48.757                366.082
        5                62.350                248.722
        6                70.275                145.008
        7                75.577                 97.012
        8                79.510                 71.973
        9                82.607                 56.668
       10                85.156                 46.635
       11                87.226                 37.872
       12                88.933                 31.238
       13                90.467                 28.064
       14                91.769                 23.830
       15                92.874                 20.224
       16                93.901                 18.791
       17                94.768                 15.856
       18                95.599                 15.202
       19                96.283                 12.532
       20                96.832                 10.037
       21                97.381                 10.037
       22                97.905                  9.602
       23                98.177                  4.964
       24                98.379                  3.707
       25                98.582                  3.709
       26                98.785                  3.712
       27                98.988                  3.709
       28                99.190                  3.709
       29                99.393                  3.709
       30                99.596                  3.709
       31                99.798                  3.709
       32               100.000                  3.689
```

```
***************************************************************************
         UNIT              UNIT           UNIT              EFFECTIVE
        PERIOD           RAINFALL      SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)       (INCHES)            (INCHES)
---------------------------------------------------------------------------
           1             0.0145          0.0130              0.0014
           2             0.0173          0.0156              0.0017
           3             0.0173          0.0156              0.0017
           4             0.0173          0.0156              0.0017
           5             0.0173          0.0156              0.0017
           6             0.0202          0.0182              0.0020
           7             0.0202          0.0182              0.0020
           8             0.0202          0.0182              0.0020
           9             0.0202          0.0182              0.0020
          10             0.0202          0.0182              0.0020
          11             0.0202          0.0182              0.0020
          12             0.0231          0.0208              0.0023
          13             0.0231          0.0208              0.0023
          14             0.0231          0.0208              0.0023
          15             0.0231          0.0208              0.0023
          16             0.0231          0.0208              0.0023
          17             0.0231          0.0208              0.0023
          18             0.0231          0.0208              0.0023
          19             0.0231          0.0208              0.0023
          20             0.0231          0.0208              0.0023
          21             0.0231          0.0208              0.0023
          22             0.0231          0.0208              0.0023
          23             0.0231          0.0208              0.0023
          24             0.0260          0.0224              0.0036
          25             0.0231          0.0208              0.0023
          26             0.0260          0.0224              0.0036
          27             0.0260          0.0224              0.0036
          28             0.0260          0.0224              0.0036
          29             0.0260          0.0224              0.0036
          30             0.0260          0.0224              0.0036
          31             0.0260          0.0224              0.0036
          32             0.0260          0.0224              0.0036
          33             0.0289          0.0224              0.0065
          34             0.0289          0.0224              0.0065
          35             0.0289          0.0224              0.0065
          36             0.0289          0.0224              0.0065
          37             0.0289          0.0224              0.0065
          38             0.0318          0.0224              0.0094
          39             0.0318          0.0224              0.0094
          40             0.0318          0.0224              0.0094
          41             0.0347          0.0224              0.0123
          42             0.0376          0.0224              0.0152
          43             0.0405          0.0224              0.0180
          44             0.0405          0.0224              0.0180
          45             0.0434          0.0224              0.0209
          46             0.0434          0.0224              0.0209
          47             0.0462          0.0224              0.0238
          48             0.0462          0.0224              0.0238
          49             0.0491          0.0224              0.0267
          50             0.0520          0.0224              0.0296
          51             0.0549          0.0224              0.0325
          52             0.0578          0.0224              0.0354
          53             0.0607          0.0224              0.0383
          54             0.0607          0.0224              0.0383
          55             0.0636          0.0224              0.0412
          56             0.0665          0.0224              0.0441
          57             0.0694          0.0224              0.0469
          58             0.0694          0.0224              0.0469
```

```
          59             0.0723           0.0224              0.0498
          60             0.0751           0.0224              0.0527
          61             0.0896           0.0224              0.0672
          62             0.1040           0.0224              0.0816
          63             0.1127           0.0224              0.0903
          64             0.1214           0.0224              0.0990
          65             0.1358           0.0224              0.1134
          66             0.1618           0.0224              0.1394
          67             0.0549           0.0224              0.0325
          68             0.0260           0.0224              0.0036
          69             0.0173           0.0156              0.0017
          70             0.0145           0.0130              0.0014
          71             0.0087           0.0078              0.0009
          72             0.0058           0.0052              0.0006

         TOTAL STORM RAINFALL(INCHES) =  2.89
         TOTAL SOIL-LOSS(INCHES) =  1.48
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.41

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      18.6997
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      17.7292
----------------------------------------------------------------------------
```

```
============================================================================

                          6 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
----------------------------------------------------------------------------
   0.083      0.0005      0.07  Q         .         .         .         .
   0.167      0.0027      0.33  Q         .         .         .         .
   0.250      0.0084      0.82  Q         .         .         .         .
   0.333      0.0183      1.44  Q         .         .         .         .
   0.417      0.0315      1.91  Q         .         .         .         .
   0.500      0.0466      2.20  Q         .         .         .         .
   0.583      0.0634      2.43  Q         .         .         .         .
   0.667      0.0816      2.65  Q         .         .         .         .
   0.750      0.1014      2.86  Q         .         .         .         .
   0.833      0.1221      3.02  Q         .         .         .         .
   0.917      0.1437      3.13  Q         .         .         .         .
   1.000      0.1659      3.23  Q         .         .         .         .
   1.083      0.1889      3.35  Q         .         .         .         .
   1.167      0.2130      3.49  Q         .         .         .         .
   1.250      0.2381      3.65  Q         .         .         .         .
   1.333      0.2641      3.76  Q         .         .         .         .
   1.417      0.2905      3.84  Q         .         .         .         .
   1.500      0.3175      3.91  Q         .         .         .         .
   1.583      0.3447      3.96  Q         .         .         .         .
   1.667      0.3722      4.00  Q         .         .         .         .
   1.750      0.4000      4.03  Q         .         .         .         .
   1.833      0.4280      4.07  Q         .         .         .         .
   1.917      0.4562      4.09  QV        .         .         .         .
   2.000      0.4849      4.17  QV        .         .         .         .
   2.083      0.5148      4.34  QV        .         .         .         .
   2.167      0.5465      4.60  QV        .         .         .         .
   2.250      0.5802      4.90  QV        .         .         .         .
   2.333      0.6157      5.16  .Q        .         .         .         .
   2.417      0.6537      5.51  .Q        .         .         .         .
   2.500      0.6934      5.78  .Q        .         .         .         .
   2.583      0.7343      5.94  .Q        .         .         .         .
   2.667      0.7760      6.05  .Q        .         .         .         .
   2.750      0.8193      6.28  .Q        .         .         .         .
   2.833      0.8663      6.83  .Q        .         .         .         .
   2.917      0.9199      7.78  .QV       .         .         .         .
   3.000      0.9810      8.88  .QV       .         .         .         .
   3.083      1.0474      9.64  .QV       .         .         .         .
   3.167      1.1178     10.23  . Q       .         .         .         .
   3.250      1.1938     11.02  . Q       .         .         .         .
   3.333      1.2774     12.15  . Q       .         .         .         .
   3.417      1.3707     13.54  . QV      .         .         .         .
   3.500      1.4742     15.03  .  Q      .         .         .         .
   3.583      1.5920     17.10  .  Q      .         .         .         .
   3.667      1.7292     19.92  .  Q      .         .         .         .
   3.750      1.8878     23.04  .   Q     .         .         .         .
   3.833      2.0666     25.96  .   VQ    .         .         .         .
   3.917      2.2637     28.62  .    Q    .         .         .         .
   4.000      2.4788     31.24  .    VQ   .         .         .         .
   4.083      2.7115     33.78  .     Q   .         .         .         .
   4.167      2.9630     36.52  .     VQ  .         .         .         .
   4.250      3.2354     39.56  .      Q  .         .         .         .
   4.333      3.5329     43.19  .      VQ .         .         .         .
```

```
    4.417      3.8587     47.30  .       VQ.         .         .         .
    4.500      4.2136     51.54  .        VQ         .         .         .
    4.583      4.5965     55.59  .         VQ        .         .         .
    4.667      5.0053     59.36  .         .Q        .         .         .
    4.750      5.4396     63.06  .         . Q       .         .         .
    4.833      5.9014     67.05  .         .  Q      .         .         .
    4.917      6.3908     71.06  .         .   Q     .         .         .
    5.000      6.9062     74.85  .         .   QV    .         .         .
    5.083      7.4513     79.14  .         .    QV   .         .         .
    5.167      8.0423     85.82  .         .      QV .         .         .
    5.250      8.7045     96.15  .         .        Q.         .         .
    5.333      9.4617    109.94  .         .         .Q        .         .
    5.417     10.3239    125.19  .         .         .  V Q    .         .
    5.500     11.2992    141.62  .         .         .    V  Q .         .
    5.583     12.3674    155.09  .         .         .      V  .Q        .
    5.667     13.4402    155.77  .         .         .         VQ        .
    5.750     14.3733    135.48  .         .         .      Q  . V       .
    5.833     15.0563     99.18  .         .        Q.         .  V      .
    5.917     15.5342     69.38  .         .  Q      .         .    V    .
    6.000     15.8904     51.73  .         Q         .         .    V    .
    6.083     16.1728     41.01  .       Q .         .         .     V   .
    6.167     16.4042     33.59  .     Q   .         .         .      V  .
    6.250     16.5969     27.99  .    Q    .         .         .      V  .
    6.333     16.7590     23.53  .   Q     .         .         .      V  .
    6.417     16.8973     20.08  .   Q     .         .         .       V .
    6.500     17.0174     17.44  .  Q      .         .         .       V .
    6.583     17.1214     15.10  .  Q      .         .         .       V .
    6.667     17.2118     13.12  . Q       .         .         .       V .
    6.750     17.2910     11.51  . Q       .         .         .        V.
    6.833     17.3599     10.01  . Q       .         .         .        V.
    6.917     17.4199      8.71  .Q        .         .         .        V.
    7.000     17.4708      7.38  .Q        .         .         .        V.
    7.083     17.5136      6.22  .Q        .         .         .        V.
    7.167     17.5505      5.36  .Q        .         .         .        V.
    7.250     17.5813      4.48  Q         .         .         .        V.
    7.333     17.6055      3.50  Q         .         .         .        V.
    7.417     17.6261      2.99  Q         .         .         .        V.
    7.500     17.6451      2.76  Q         .         .         .        V.
    7.583     17.6627      2.56  Q         .         .         .        V.
    7.667     17.6789      2.35  Q         .         .         .        V.
    7.750     17.6933      2.10  Q         .         .         .        V.
    7.833     17.7056      1.79  Q         .         .         .        V.
    7.917     17.7156      1.45  Q         .         .         .        V.
    8.000     17.7231      1.09  Q         .         .         .        V.
    8.083     17.7277      0.67  Q         .         .         .        V.
    8.167     17.7287      0.15  Q         .         .         .        V.
    8.250     17.7290      0.03  Q         .         .         .        V.
    8.333     17.7291      0.02  Q         .         .         .        V.
    8.417     17.7291      0.01  Q         .         .         .        V.
    8.500     17.7292      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             510.0
              10%                             180.0
              20%                             135.0
              30%                             100.0
              40%                              75.0
              50%                              50.0
```

```
           60%                              40.0
           70%                              30.0
           80%                              25.0
           90%                              15.0


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #4)

         WATERSHED AREA =     151.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.295 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         MINIMUM SOIL-LOSS RATE(INCH/HOUR) =   0.134
         USER-ENTERED RAINFALL =  4.61 INCHES
         RCFC&WCD 24-Hour Storm (15-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =  15.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  84.746



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH         UNIT HYDROGRAPH
     NUMBER          MEAN VALUES         ORDINATES(CFS)
----------------------------------------------------------------------------
        1               14.405                87.863
        2               60.461               280.904
        3               79.231               114.487
        4               87.105                48.022
        5               91.703                28.047
        6               94.756                18.618
        7               96.832                12.663
        8               98.154                 8.062
        9               98.785                 3.849
       10               99.362                 3.520
       11               99.745                 2.335
       12               99.936                 1.168
       13              100.000                 0.389
```

```
****************************************************************************
         UNIT              UNIT            UNIT             EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS           RAINFALL
       (NUMBER)          (INCHES)        (INCHES)           (INCHES)
----------------------------------------------------------------------------
           1             0.0092           0.0083             0.0009
           2             0.0138           0.0124             0.0014
           3             0.0138           0.0124             0.0014
           4             0.0184           0.0166             0.0018
           5             0.0138           0.0124             0.0014
           6             0.0138           0.0124             0.0014
           7             0.0138           0.0124             0.0014
           8             0.0184           0.0166             0.0018
           9             0.0184           0.0166             0.0018
          10             0.0184           0.0166             0.0018
          11             0.0231           0.0207             0.0023
          12             0.0231           0.0207             0.0023
          13             0.0231           0.0207             0.0023
          14             0.0231           0.0207             0.0023
          15             0.0231           0.0207             0.0023
          16             0.0277           0.0249             0.0028
          17             0.0277           0.0249             0.0028
          18             0.0323           0.0290             0.0032
          19             0.0323           0.0290             0.0032
          20             0.0369           0.0332             0.0037
          21             0.0277           0.0249             0.0028
          22             0.0323           0.0290             0.0032
          23             0.0369           0.0332             0.0037
          24             0.0369           0.0332             0.0037
          25             0.0415           0.0373             0.0041
          26             0.0415           0.0373             0.0041
          27             0.0461           0.0415             0.0046
          28             0.0461           0.0415             0.0046
          29             0.0461           0.0415             0.0046
          30             0.0507           0.0456             0.0051
          31             0.0553           0.0498             0.0055
          32             0.0599           0.0539             0.0060
          33             0.0692           0.0622             0.0069
          34             0.0692           0.0622             0.0069
          35             0.0738           0.0664             0.0074
          36             0.0784           0.0705             0.0078
          37             0.0876           0.0745             0.0131
          38             0.0922           0.0735             0.0187
          39             0.0968           0.0724             0.0244
          40             0.1014           0.0714             0.0301
          41             0.0692           0.0622             0.0069
          42             0.0692           0.0622             0.0069
          43             0.0922           0.0683             0.0239
          44             0.0922           0.0673             0.0249
          45             0.0876           0.0663             0.0213
          46             0.0876           0.0653             0.0223
          47             0.0784           0.0644             0.0140
          48             0.0830           0.0634             0.0196
          49             0.1153           0.0625             0.0528
          50             0.1199           0.0615             0.0583
          51             0.1291           0.0606             0.0685
          52             0.1337           0.0597             0.0740
          53             0.1567           0.0588             0.0980
          54             0.1567           0.0579             0.0988
          55             0.1060           0.0570             0.0490
          56             0.1060           0.0561             0.0499
          57             0.1245           0.0553             0.0692
          58             0.1199           0.0544             0.0654
```

```
          59             0.1199           0.0536              0.0662
          60             0.1153           0.0528              0.0625
          61             0.1106           0.0520              0.0587
          62             0.1060           0.0512              0.0548
          63             0.0876           0.0504              0.0372
          64             0.0876           0.0496              0.0380
          65             0.0184           0.0166              0.0018
          66             0.0184           0.0166              0.0018
          67             0.0138           0.0124              0.0014
          68             0.0138           0.0124              0.0014
          69             0.0231           0.0207              0.0023
          70             0.0231           0.0207              0.0023
          71             0.0231           0.0207              0.0023
          72             0.0184           0.0166              0.0018
          73             0.0184           0.0166              0.0018
          74             0.0184           0.0166              0.0018
          75             0.0138           0.0124              0.0014
          76             0.0092           0.0083              0.0009
          77             0.0138           0.0124              0.0014
          78             0.0184           0.0166              0.0018
          79             0.0138           0.0124              0.0014
          80             0.0092           0.0083              0.0009
          81             0.0138           0.0124              0.0014
          82             0.0138           0.0124              0.0014
          83             0.0138           0.0124              0.0014
          84             0.0092           0.0083              0.0009
          85             0.0138           0.0124              0.0014
          86             0.0092           0.0083              0.0009
          87             0.0138           0.0124              0.0014
          88             0.0092           0.0083              0.0009
          89             0.0138           0.0124              0.0014
          90             0.0092           0.0083              0.0009
          91             0.0092           0.0083              0.0009
          92             0.0092           0.0083              0.0009
          93             0.0092           0.0083              0.0009
          94             0.0092           0.0083              0.0009
          95             0.0092           0.0083              0.0009
          96             0.0092           0.0083              0.0009

         TOTAL STORM RAINFALL(INCHES) =  4.61
         TOTAL SOIL-LOSS(INCHES) =  3.21
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.40

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      40.5352
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      17.5801
----------------------------------------------------------------------------
```

```
============================================================================

                        2 4 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
       (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       15.0      30.0      45.0      60.0
----------------------------------------------------------------------------
   0.083      0.0006      0.08  Q         .         .         .         .
   0.167      0.0011      0.08  Q         .         .         .         .
   0.250      0.0017      0.08  Q         .         .         .         .
   0.333      0.0043      0.38  Q         .         .         .         .
   0.417      0.0069      0.38  Q         .         .         .         .
   0.500      0.0095      0.38  Q         .         .         .         .
   0.583      0.0138      0.62  Q         .         .         .         .
   0.667      0.0180      0.62  Q         .         .         .         .
   0.750      0.0223      0.62  Q         .         .         .         .
   0.833      0.0274      0.75  Q         .         .         .         .
   0.917      0.0326      0.75  Q         .         .         .         .
   1.000      0.0378      0.75  Q         .         .         .         .
   1.083      0.0439      0.89  Q         .         .         .         .
   1.167      0.0501      0.89  Q         .         .         .         .
   1.250      0.0562      0.89  Q         .         .         .         .
   1.333      0.0620      0.84  Q         .         .         .         .
   1.417      0.0678      0.84  Q         .         .         .         .
   1.500      0.0736      0.84  Q         .         .         .         .
   1.583      0.0794      0.83  Q         .         .         .         .
   1.667      0.0851      0.83  Q         .         .         .         .
   1.750      0.0908      0.83  Q         .         .         .         .
   1.833      0.0969      0.88  Q         .         .         .         .
   1.917      0.1029      0.88  Q         .         .         .         .
   2.000      0.1090      0.88  Q         .         .         .         .
   2.083      0.1159      1.01  Q         .         .         .         .
   2.167      0.1229      1.01  Q         .         .         .         .
   2.250      0.1298      1.01  Q         .         .         .         .
   2.333      0.1372      1.07  Q         .         .         .         .
   2.417      0.1445      1.07  Q         .         .         .         .
   2.500      0.1519      1.07  Q         .         .         .         .
   2.583      0.1596      1.13  Q         .         .         .         .
   2.667      0.1674      1.13  Q         .         .         .         .
   2.750      0.1752      1.13  Q         .         .         .         .
   2.833      0.1840      1.27  Q         .         .         .         .
   2.917      0.1927      1.27  Q         .         .         .         .
   3.000      0.2015      1.27  Q         .         .         .         .
   3.083      0.2107      1.33  Q         .         .         .         .
   3.167      0.2199      1.33  Q         .         .         .         .
   3.250      0.2290      1.33  Q         .         .         .         .
   3.333      0.2384      1.36  Q         .         .         .         .
   3.417      0.2478      1.36  Q         .         .         .         .
   3.500      0.2572      1.36  Q         .         .         .         .
   3.583      0.2667      1.38  Q         .         .         .         .
   3.667      0.2762      1.38  Q         .         .         .         .
   3.750      0.2856      1.38  Q         .         .         .         .
   3.833      0.2955      1.43  Q         .         .         .         .
   3.917      0.3053      1.43  Q         .         .         .         .
   4.000      0.3152      1.43  Q         .         .         .         .
   4.083      0.3259      1.57  VQ        .         .         .         .
   4.167      0.3367      1.57  VQ        .         .         .         .
   4.250      0.3475      1.57  VQ        .         .         .         .
   4.333      0.3590      1.66  VQ        .         .         .         .
```

```
4.417      0.3704      1.66  VQ        .         .         .         .
4.500      0.3819      1.66  VQ        .         .         .         .
4.583      0.3944      1.82  VQ        .         .         .         .
4.667      0.4069      1.82  VQ        .         .         .         .
4.750      0.4194      1.82  VQ        .         .         .         .
4.833      0.4327      1.93  VQ        .         .         .         .
4.917      0.4459      1.93   Q        .         .         .         .
5.000      0.4592      1.93   Q        .         .         .         .
5.083      0.4730      2.01  .Q        .         .         .         .
5.167      0.4868      2.01  .Q        .         .         .         .
5.250      0.5006      2.01  .Q        .         .         .         .
5.333      0.5134      1.86  .Q        .         .         .         .
5.417      0.5262      1.86  .Q        .         .         .         .
5.500      0.5390      1.86  .Q        .         .         .         .
5.583      0.5525      1.96  .Q        .         .         .         .
5.667      0.5660      1.96  .Q        .         .         .         .
5.750      0.5795      1.96  .Q        .         .         .         .
5.833      0.5941      2.12  .Q        .         .         .         .
5.917      0.6086      2.12  .Q        .         .         .         .
6.000      0.6232      2.12  .Q        .         .         .         .
6.083      0.6385      2.22  .Q        .         .         .         .
6.167      0.6538      2.22  .Q        .         .         .         .
6.250      0.6691      2.22  .Q        .         .         .         .
6.333      0.6855      2.38  .Q        .         .         .         .
6.417      0.7018      2.38  .Q        .         .         .         .
6.500      0.7182      2.38  .Q        .         .         .         .
6.583      0.7353      2.49  .Q        .         .         .         .
6.667      0.7524      2.49  .Q        .         .         .         .
6.750      0.7695      2.49  .Q        .         .         .         .
6.833      0.7878      2.65  .Q        .         .         .         .
6.917      0.8060      2.65  .Q        .         .         .         .
7.000      0.8242      2.65  .Q        .         .         .         .
7.083      0.8430      2.72  .Q        .         .         .         .
7.167      0.8617      2.72  .Q        .         .         .         .
7.250      0.8804      2.72  .QV       .         .         .         .
7.333      0.8997      2.80  .QV       .         .         .         .
7.417      0.9189      2.80  .QV       .         .         .         .
7.500      0.9382      2.80  .QV       .         .         .         .
7.583      0.9588      2.99  .QV       .         .         .         .
7.667      0.9793      2.99  .QV       .         .         .         .
7.750      0.9999      2.99  .QV       .         .         .         .
7.833      1.0221      3.22  . Q       .         .         .         .
7.917      1.0443      3.22  . Q       .         .         .         .
8.000      1.0665      3.22  . Q       .         .         .         .
8.083      1.0907      3.52  . Q       .         .         .         .
8.167      1.1149      3.52  . Q       .         .         .         .
8.250      1.1392      3.52  . Q       .         .         .         .
8.333      1.1658      3.87  . Q       .         .         .         .
8.417      1.1925      3.87  . Q       .         .         .         .
8.500      1.2191      3.87  . Q       .         .         .         .
8.583      1.2471      4.06  . Q       .         .         .         .
8.667      1.2751      4.06  . Q       .         .         .         .
8.750      1.3031      4.06  . Q       .         .         .         .
8.833      1.3327      4.31  . QV      .         .         .         .
8.917      1.3624      4.31  . QV      .         .         .         .
9.000      1.3920      4.31  . QV      .         .         .         .
9.083      1.4264      4.99  .  Q      .         .         .         .
9.167      1.4608      4.99  .  Q      .         .         .         .
9.250      1.4952      4.99  .  Q      .         .         .         .
9.333      1.5439      7.07  .  VQ     .         .         .         .
9.417      1.5926      7.07  .  VQ     .         .         .         .
9.500      1.6413      7.07  .  VQ     .         .         .         .
9.583      1.7089      9.81  .  V  Q   .         .         .         .
9.667      1.7765      9.81  .   V Q   .         .         .         .
```

```
 9.750      1.8441      9.81  .   V Q   .         .         .         .
 9.833      1.9325     12.83  .   V   Q .         .         .         .
 9.917      2.0208     12.83  .   V   Q .         .         .         .
10.000      2.1092     12.83  .   V   Q .         .         .         .
10.083      2.2021     13.48  .    V  Q .         .         .         .
10.167      2.2949     13.48  .    V  Q .         .         .         .
10.250      2.3877     13.48  .    V  Q .         .         .         .
10.333      2.4439      8.17  .    Q    .         .         .         .
10.417      2.5001      8.17  .    Q    .         .         .         .
10.500      2.5564      8.17  .    Q    .         .         .         .
10.583      2.6088      7.62  .    Q    .         .         .         .
10.667      2.6613      7.62  .    QV   .         .         .         .
10.750      2.7138      7.62  .    QV   .         .         .         .
10.833      2.7947     11.75  .     VQ  .         .         .         .
10.917      2.8756     11.75  .     VQ  .         .         .         .
11.000      2.9565     11.75  .     VQ  .         .         .         .
11.083      3.0478     13.25  .     V Q .         .         .         .
11.167      3.1390     13.25  .      VQ .         .         .         .
11.250      3.2303     13.25  .      VQ .         .         .         .
11.333      3.3197     12.98  .      VQ .         .         .         .
11.417      3.4091     12.98  .      VQ .         .         .         .
11.500      3.4985     12.98  .      VQ .         .         .         .
11.583      3.5842     12.45  .       Q .         .         .         .
11.667      3.6699     12.45  .       Q .         .         .         .
11.750      3.7556     12.45  .       Q .         .         .         .
11.833      3.8298     10.77  .      QV .         .         .         .
11.917      3.9040     10.77  .      QV .         .         .         .
12.000      3.9782     10.77  .      Q V.         .         .         .
12.083      4.0777     14.44  .        Q.         .         .         .
12.167      4.1771     14.44  .        Q.         .         .         .
12.250      4.2766     14.44  .        Q.         .         .         .
12.333      4.4457     24.55  .         V     Q   .         .         .
12.417      4.6148     24.55  .         V     Q   .         .         .
12.500      4.7839     24.55  .         V     Q   .         .         .
12.583      4.9963     30.84  .         .V        Q         .         .
12.667      5.2087     30.84  .         .V        Q         .         .
12.750      5.4211     30.84  .         . V       Q         .         .
12.833      5.6720     36.43  .         . V       .   Q     .         .
12.917      5.9229     36.43  .         .  V      .   Q     .         .
13.000      6.1738     36.43  .         .   V     .   Q     .         .
13.083      6.4663     42.47  .         .   V     .       Q .         .
13.167      6.7588     42.47  .         .    V    .       Q .         .
13.250      7.0513     42.47  .         .     V   .       Q .         .
13.333      7.4039     51.19  .         .     V   .         .   Q     .
13.417      7.7564     51.19  .         .      V  .         .   Q     .
13.500      8.1090     51.19  .         .       V .         .   Q     .
13.583      8.4595     50.89  .         .        V.         .  Q      .
13.667      8.8100     50.89  .         .         V         .  Q      .
13.750      9.1605     50.89  .         .         V         .  Q      .
13.833      9.4284     38.90  .         .         .V   Q    .         .
13.917      9.6963     38.90  .         .         . V  Q    .         .
14.000      9.9641     38.90  .         .         . V  Q    .         .
14.083     10.2138     36.25  .         .         .  VQ     .         .
14.167     10.4635     36.25  .         .         .  VQ     .         .
14.250     10.7131     36.25  .         .         .   Q     .         .
14.333     10.9873     39.81  .         .         .   V Q   .         .
14.417     11.2615     39.81  .         .         .    VQ   .         .
14.500     11.5356     39.81  .         .         .     Q   .         .
14.583     11.8124     40.18  .         .         .     Q   .         .
14.667     12.0891     40.18  .         .         .     QV  .         .
14.750     12.3659     40.18  .         .         .     Q V .         .
14.833     12.6413     39.99  .         .         .     Q V .         .
14.917     12.9167     39.99  .         .         .     Q  V.         .
15.000     13.1921     39.99  .         .         .     Q   V         .
```

```
15.083     13.4579     38.60  .         .         .    Q    V         .
15.167     13.7237     38.60  .         .         .    Q     V        .
15.250     13.9895     38.60  .         .         .    Q     V        .
15.333     14.2428     36.78  .         .         .   Q     . V       .
15.417     14.4961     36.78  .         .         .   Q     . V       .
15.500     14.7494     36.78  .         .         .   Q     .  V      .
15.583     14.9809     33.62  .         .         . Q       .   V     .
15.667     15.2124     33.62  .         .         . Q       .   V     .
15.750     15.4439     33.62  .         .         . Q       .    V    .
15.833     15.6367     27.98  .         .       Q .         .    V    .
15.917     15.8294     27.98  .         .       Q .         .     V   .
16.000     16.0221     27.98  .         .       Q .         .     V   .
16.083     16.1777     22.60  .         .    Q    .         .     V   .
16.167     16.3334     22.60  .         .    Q    .         .      V  .
16.250     16.4890     22.60  .         .    Q    .         .      V  .
16.333     16.5680     11.47  .      Q  .         .         .      V  .
16.417     16.6470     11.47  .      Q  .         .         .      V  .
16.500     16.7260     11.47  .      Q  .         .         .       V .
16.583     16.7722      6.71  .   Q     .         .         .       V .
16.667     16.8184      6.71  .   Q     .         .         .       V .
16.750     16.8646      6.71  .   Q     .         .         .       V .
16.833     16.8953      4.46  . Q       .         .         .       V .
16.917     16.9260      4.46  . Q       .         .         .       V .
17.000     16.9568      4.46  . Q       .         .         .       V .
17.083     16.9789      3.21  . Q       .         .         .       V .
17.167     17.0010      3.21  . Q       .         .         .       V .
17.250     17.0231      3.21  . Q       .         .         .       V .
17.333     17.0411      2.61  .Q        .         .         .       V .
17.417     17.0590      2.61  .Q        .         .         .       V .
17.500     17.0770      2.61  .Q        .         .         .       V .
17.583     17.0918      2.15  .Q        .         .         .       V .
17.667     17.1067      2.15  .Q        .         .         .       V .
17.750     17.1215      2.15  .Q        .         .         .       V .
17.833     17.1338      1.78  .Q        .         .         .       V .
17.917     17.1461      1.78  .Q        .         .         .        V.
18.000     17.1584      1.78  .Q        .         .         .        V.
18.083     17.1687      1.49  Q         .         .         .        V.
18.167     17.1789      1.49  Q         .         .         .        V.
18.250     17.1892      1.49  Q         .         .         .        V.
18.333     17.1982      1.31  Q         .         .         .        V.
18.417     17.2072      1.31  Q         .         .         .        V.
18.500     17.2162      1.31  Q         .         .         .        V.
18.583     17.2242      1.16  Q         .         .         .        V.
18.667     17.2322      1.16  Q         .         .         .        V.
18.750     17.2402      1.16  Q         .         .         .        V.
18.833     17.2467      0.94  Q         .         .         .        V.
18.917     17.2532      0.94  Q         .         .         .        V.
19.000     17.2597      0.94  Q         .         .         .        V.
19.083     17.2650      0.78  Q         .         .         .        V.
19.167     17.2704      0.78  Q         .         .         .        V.
19.250     17.2758      0.78  Q         .         .         .        V.
19.333     17.2818      0.87  Q         .         .         .        V.
19.417     17.2878      0.87  Q         .         .         .        V.
19.500     17.2938      0.87  Q         .         .         .        V.
19.583     17.3006      0.98  Q         .         .         .        V.
19.667     17.3073      0.98  Q         .         .         .        V.
19.750     17.3140      0.98  Q         .         .         .        V.
19.833     17.3200      0.86  Q         .         .         .        V.
19.917     17.3259      0.86  Q         .         .         .        V.
20.000     17.3318      0.86  Q         .         .         .        V.
20.083     17.3369      0.74  Q         .         .         .        V.
20.167     17.3420      0.74  Q         .         .         .        V.
20.250     17.3471      0.74  Q         .         .         .        V.
20.333     17.3526      0.80  Q         .         .         .        V.
```

```
20.417     17.3582      0.80  Q         .         .         .        V.
20.500     17.3637      0.80  Q         .         .         .        V.
20.583     17.3694      0.83  Q         .         .         .        V.
20.667     17.3751      0.83  Q         .         .         .        V.
20.750     17.3808      0.83  Q         .         .         .        V.
20.833     17.3863      0.80  Q         .         .         .        V.
20.917     17.3918      0.80  Q         .         .         .        V.
21.000     17.3973      0.80  Q         .         .         .        V.
21.083     17.4022      0.71  Q         .         .         .        V.
21.167     17.4070      0.71  Q         .         .         .        V.
21.250     17.4119      0.71  Q         .         .         .        V.
21.333     17.4170      0.75  Q         .         .         .        V.
21.417     17.4222      0.75  Q         .         .         .        V.
21.500     17.4273      0.75  Q         .         .         .        V.
21.583     17.4321      0.69  Q         .         .         .        V.
21.667     17.4368      0.69  Q         .         .         .        V.
21.750     17.4415      0.69  Q         .         .         .        V.
21.833     17.4466      0.74  Q         .         .         .        V.
21.917     17.4517      0.74  Q         .         .         .        V.
22.000     17.4568      0.74  Q         .         .         .        V.
22.083     17.4615      0.68  Q         .         .         .        V.
22.167     17.4662      0.68  Q         .         .         .        V.
22.250     17.4709      0.68  Q         .         .         .        V.
22.333     17.4759      0.73  Q         .         .         .        V.
22.417     17.4809      0.73  Q         .         .         .        V.
22.500     17.4860      0.73  Q         .         .         .        V.
22.583     17.4904      0.64  Q         .         .         .        V.
22.667     17.4947      0.64  Q         .         .         .        V.
22.750     17.4991      0.64  Q         .         .         .        V.
22.833     17.5033      0.60  Q         .         .         .        V.
22.917     17.5074      0.60  Q         .         .         .        V.
23.000     17.5115      0.60  Q         .         .         .        V.
23.083     17.5156      0.58  Q         .         .         .        V.
23.166     17.5196      0.58  Q         .         .         .        V.
23.250     17.5236      0.58  Q         .         .         .        V.
23.333     17.5276      0.58  Q         .         .         .        V.
23.416     17.5316      0.58  Q         .         .         .        V.
23.500     17.5355      0.58  Q         .         .         .        V.
23.583     17.5395      0.57  Q         .         .         .        V.
23.666     17.5434      0.57  Q         .         .         .        V.
23.750     17.5473      0.57  Q         .         .         .        V.
23.833     17.5513      0.57  Q         .         .         .        V.
23.916     17.5552      0.57  Q         .         .         .        V.
24.000     17.5591      0.57  Q         .         .         .        V.
24.083     17.5624      0.48  Q         .         .         .        V.
24.166     17.5658      0.48  Q         .         .         .        V.
24.250     17.5691      0.48  Q         .         .         .        V.
24.333     17.5706      0.22  Q         .         .         .        V.
24.416     17.5722      0.22  Q         .         .         .        V.
24.500     17.5737      0.22  Q         .         .         .        V.
24.583     17.5746      0.12  Q         .         .         .        V.
24.666     17.5754      0.12  Q         .         .         .        V.
24.750     17.5762      0.12  Q         .         .         .        V.
24.833     17.5767      0.07  Q         .         .         .        V.
24.916     17.5772      0.07  Q         .         .         .        V.
25.000     17.5777      0.07  Q         .         .         .        V.
25.083     17.5780      0.05  Q         .         .         .        V.
25.166     17.5783      0.05  Q         .         .         .        V.
25.250     17.5787      0.05  Q         .         .         .        V.
25.333     17.5789      0.03  Q         .         .         .        V.
25.416     17.5791      0.03  Q         .         .         .        V.
25.500     17.5793      0.03  Q         .         .         .        V.
25.583     17.5794      0.02  Q         .         .         .        V.
25.666     17.5795      0.02  Q         .         .         .        V.
```

```
   25.750     17.5796      0.02  Q         .         .         .        V.
   25.833     17.5797      0.01  Q         .         .         .        V.
   25.916     17.5798      0.01  Q         .         .         .        V.
   26.000     17.5798      0.01  Q         .         .         .        V.
   26.083     17.5799      0.01  Q         .         .         .        V.
   26.166     17.5799      0.01  Q         .         .         .        V.
   26.250     17.5800      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
              0%                             1575.0
             10%                              450.0
             20%                              375.0
             30%                              240.0
             40%                              240.0
             50%                              210.0
             60%                              195.0
             70%                              165.0
             80%                               45.0
             90%                               30.0
 ============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************

              F L O O D   R O U T I N G   A N A L Y S I S

ACCORDING TO RIVERSIDE COUNTY FLOOD CONTORL AND WATER CONSERVATION DISTRICT
                     (RCFC&WCD) 1978 HYDROLOGY MANUAL
         (c) Copyright 1989-2015 Advanced Engineering Software (aes)
                 (Synthetic Unit Hydrograph Version 22.0)
                 Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:






 ************************** DESCRIPTION OF STUDY **************************
* Travertine Development                                                   *
* Unit Hydrograph Analysis - Existing Condition - Watershed C              *
* 09-13-2021                                                               *
 **************************************************************************

  FILE NAME: TRA-XCUH.DAT
  TIME/DATE OF STUDY: 15:28 09/13/2021


****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    400.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     252.600 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.283 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         USER-ENTERED RAINFALL =  1.56 INCHES
         RCFC&WCD 1-Hour Storm (5-Minute period) SELECTED
         (SLOPE OF INTENSITY-DURATION CURVE = 0.58)
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  29.446
```

```
============================================================================
                       UNIT HYDROGRAPH DETERMINATION

 ---------------------------------------------------------------------------
     INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
      NUMBER          MEAN VALUES          ORDINATES(CFS)
 ---------------------------------------------------------------------------
         1                 2.792                 85.306
         2                12.696                302.535
         3                30.896                555.990
         4                51.304                623.453
         5                64.121                391.548
         6                71.690                231.212
         7                76.748                154.526
         8                80.584                117.160
         9                83.576                 91.415
        10                86.031                 74.999
        11                88.014                 60.594
        12                89.721                 52.123
        13                91.167                 44.168
        14                92.425                 38.452
        15                93.517                 33.356
        16                94.483                 29.504
        17                95.349                 26.457
        18                96.133                 23.936
        19                96.714                 17.758
        20                97.286                 17.466
        21                97.846                 17.126
        22                98.158                  9.540
        23                98.370                  6.460
        24                98.581                  6.460
        25                98.793                  6.451
        26                99.004                  6.460
        27                99.215                  6.451
        28                99.426                  6.451
        29                99.638                  6.451
        30                99.849                  6.451
        31               100.000                  4.621
```

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1              0.0566          0.0224              0.0342
           2              0.0604          0.0224              0.0380
           3              0.0651          0.0224              0.0426
           4              0.0732          0.0224              0.0508
           5              0.0782          0.0224              0.0557
           6              0.0913          0.0224              0.0689
           7              0.1110          0.0224              0.0886
           8              0.1242          0.0224              0.1018
           9              0.2040          0.0224              0.1816
          10              0.5310          0.0224              0.5086
          11              0.1012          0.0224              0.0787
          12              0.0638          0.0224              0.0414

         TOTAL STORM RAINFALL(INCHES) =  1.56
         TOTAL SOIL-LOSS(INCHES) =  0.27
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.29

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =       5.6624
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      27.1615
----------------------------------------------------------------------------
```

```
============================================================================

                           1 - H O U R   S T O R M
                     R U N O F F   H Y D R O G R A P H

 ============================================================================
                HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
         (Note: Time indicated is at END of Each Unit Intervals)
 ----------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.      150.0     300.0     450.0     600.0
 ----------------------------------------------------------------------------
    0.083      0.0201      2.92  Q         .         .         .         .
    0.167      0.1136     13.58  Q         .         .         .         .
    0.250      0.3487     34.14  V Q       .         .         .         .
    0.333      0.7597     59.67  .V Q      .         .         .         .
    0.417      1.3170     80.92  .V   Q    .         .         .         .
    0.500      2.0082    100.36  . V   Q   .         .         .         .
    0.583      2.8473    121.84  .   V   Q .         .         .         .
    0.667      3.8677    148.17  .    V   Q.         .         .         .
    0.750      5.1503    186.23  .      V  . Q       .         .         .
    0.833      7.0023    268.90  .         V      Q  .         .         .
    0.917      9.7503    399.01  .         .   V     .     Q   .         .
    1.000     13.2819    512.79  .         .        V.         .   Q     .
    1.083     16.7583    504.77  .         .         .   V     .  Q      .
    1.167     19.2247    358.13  .         .         . Q    V .         .
    1.250     20.8639    238.01  .         .    Q    .         V         .
    1.333     21.9898    163.48  .         Q         .         . V       .
    1.417     22.8327    122.39  .       Q .         .         .  V      .
    1.500     23.4972     96.49  .     Q   .         .         .   V     .
    1.583     24.0417     79.07  .    Q    .         .         .    V    .
    1.667     24.4925     65.46  .   Q     .         .         .     V   .
    1.750     24.8782     56.01  .  Q      .         .         .     V   .
    1.833     25.2078     47.85  .  Q      .         .         .      V  .
    1.917     25.4932     41.44  . Q       .         .         .      V  .
    2.000     25.7406     35.93  . Q       .         .         .      V  .
    2.083     25.9571     31.42  . Q       .         .         .       V .
    2.167     26.1474     27.64  .Q        .         .         .       V .
    2.250     26.3133     24.09  .Q        .         .         .       V .
    2.333     26.4486     19.65  .Q        .         .         .       V .
    2.417     26.5712     17.80  .Q        .         .         .        V.
    2.500     26.6790     15.66  .Q        .         .         .        V.
    2.583     26.7557     11.14  Q         .         .         .        V.
    2.667     26.8159      8.73  Q         .         .         .        V.
    2.750     26.8704      7.92  Q         .         .         .        V.
    2.833     26.9220      7.50  Q         .         .         .        V.
    2.917     26.9714      7.16  Q         .         .         .        V.
    3.000     27.0180      6.78  Q         .         .         .        V.
    3.083     27.0614      6.29  Q         .         .         .        V.
    3.167     27.1006      5.70  Q         .         .         .        V.
    3.250     27.1343      4.90  Q         .         .         .        V.
    3.333     27.1558      3.13  Q         .         .         .        V.
    3.417     27.1602      0.63  Q         .         .         .        V.
    3.500     27.1615      0.19  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                 Duration
        Peak Flow Rate                      (minutes)
    ======================                  =========
              0%                              210.0
             10%                               90.0
             20%                               55.0
```

```
             30%                                 40.0
             40%                                 30.0
             50%                                 25.0
             60%                                 20.0
             70%                                 15.0
             80%                                 10.0
             90%                                 10.0


****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    400.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #2)

         WATERSHED AREA =     252.600 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.283 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         USER-ENTERED RAINFALL =  2.28 INCHES
         RCFC&WCD 3-Hour Storm (5-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  29.446
```

```
============================================================================
                       UNIT HYDROGRAPH DETERMINATION

 ----------------------------------------------------------------------------
     INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
      NUMBER          MEAN VALUES          ORDINATES(CFS)
 ----------------------------------------------------------------------------
         1                 2.792                 85.306
         2                12.696                302.535
         3                30.896                555.990
         4                51.304                623.453
         5                64.121                391.548
         6                71.690                231.212
         7                76.748                154.526
         8                80.584                117.160
         9                83.576                 91.415
        10                86.031                 74.999
        11                88.014                 60.594
        12                89.721                 52.123
        13                91.167                 44.168
        14                92.425                 38.452
        15                93.517                 33.356
        16                94.483                 29.504
        17                95.349                 26.457
        18                96.133                 23.936
        19                96.714                 17.758
        20                97.286                 17.466
        21                97.846                 17.126
        22                98.158                  9.540
        23                98.370                  6.460
        24                98.581                  6.460
        25                98.793                  6.451
        26                99.004                  6.460
        27                99.215                  6.451
        28                99.426                  6.451
        29                99.638                  6.451
        30                99.849                  6.451
        31               100.000                  4.621
```

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1              0.0296           0.0224              0.0072
           2              0.0296           0.0224              0.0072
           3              0.0251           0.0224              0.0027
           4              0.0342           0.0224              0.0118
           5              0.0342           0.0224              0.0118
           6              0.0410           0.0224              0.0186
           7              0.0342           0.0224              0.0118
           8              0.0410           0.0224              0.0186
           9              0.0410           0.0224              0.0186
          10              0.0342           0.0224              0.0118
          11              0.0365           0.0224              0.0141
          12              0.0410           0.0224              0.0186
          13              0.0502           0.0224              0.0277
          14              0.0502           0.0224              0.0277
          15              0.0502           0.0224              0.0277
          16              0.0456           0.0224              0.0232
          17              0.0593           0.0224              0.0369
          18              0.0616           0.0224              0.0391
          19              0.0547           0.0224              0.0323
          20              0.0616           0.0224              0.0391
          21              0.0752           0.0224              0.0528
          22              0.0707           0.0224              0.0483
          23              0.0661           0.0224              0.0437
          24              0.0684           0.0224              0.0460
          25              0.0707           0.0224              0.0483
          26              0.0958           0.0224              0.0733
          27              0.1140           0.0224              0.0916
          28              0.0798           0.0224              0.0574
          29              0.1550           0.0224              0.1326
          30              0.1664           0.0224              0.1440
          31              0.1870           0.0224              0.1645
          32              0.1345           0.0224              0.1121
          33              0.0456           0.0224              0.0232
          34              0.0410           0.0224              0.0186
          35              0.0410           0.0224              0.0186
          36              0.0137           0.0123              0.0014

         TOTAL STORM RAINFALL(INCHES) =  2.28
         TOTAL SOIL-LOSS(INCHES) =  0.80
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.48

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      16.7746
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      31.2032
----------------------------------------------------------------------------
```

```
============================================================================

                          3 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      100.0     200.0     300.0     400.0
----------------------------------------------------------------------------
   0.083      0.0042      0.62  Q         .         .         .         .
   0.167      0.0235      2.80  Q         .         .         .         .
   0.250      0.0678      6.43  Q         .         .         .         .
   0.333      0.1390     10.33  VQ        .         .         .         .
   0.417      0.2311     13.38  VQ        .         .         .         .
   0.500      0.3542     17.86  VQ        .         .         .         .
   0.583      0.5220     24.37  V Q       .         .         .         .
   0.667      0.7289     30.05  V  Q      .         .         .         .
   0.750      0.9675     34.64  .V Q      .         .         .         .
   0.833      1.2271     37.69  .V Q      .         .         .         .
   0.917      1.5030     40.07  .V  Q     .         .         .         .
   1.000      1.7811     40.37  . V Q     .         .         .         .
   1.083      2.0675     41.58  . V Q     .         .         .         .
   1.167      2.3918     47.10  .  VQ     .         .         .         .
   1.250      2.7742     55.52  .  V Q    .         .         .         .
   1.333      3.2084     63.04  .   V Q   .         .         .         .
   1.417      3.6757     67.85  .   V Q   .         .         .         .
   1.500      4.1772     72.81  .    V Q  .         .         .         .
   1.583      4.7275     79.91  .     VQ  .         .         .         .
   1.667      5.3350     88.20  .     V Q .         .         .         .
   1.750      5.9880     94.82  .      V Q.         .         .         .
   1.833      6.6945    102.59  .       V Q         .         .         .
   1.917      7.4732    113.06  .        V.Q        .         .         .
   2.000      8.3089    121.34  .         V Q       .         .         .
   2.083      9.1671    124.62  .         .VQ       .         .         .
   2.167     10.0559    129.05  .         . Q       .         .         .
   2.250     11.0309    141.57  .         .   Q     .         .         .
   2.333     12.1434    161.53  .         .    VQ   .         .         .
   2.417     13.4235    185.87  .         .      VQ .         .         .
   2.500     14.8947    213.61  .         .        V.Q        .         .
   2.583     16.6422    253.74  .         .         .V   Q    .         .
   2.667     18.7406    304.68  .         .         .   V     Q         .
   2.750     21.0005    328.13  .         .         .     V   . Q       .
   2.833     23.1106    306.39  .         .         .        VQ         .
   2.917     24.8006    245.39  .         .         .   Q     .V        .
   3.000     26.0479    181.10  .         .       Q .         .  V      .
   3.083     26.9970    137.82  .         .  Q      .         .   V     .
   3.167     27.7333    106.91  .         Q         .         .    V    .
   3.250     28.2983     82.03  .       Q .         .         .     V   .
   3.333     28.7463     65.05  .     Q   .         .         .     V   .
   3.417     29.1148     53.51  .    Q    .         .         .      V  .
   3.500     29.4248     45.01  .   Q     .         .         .      V  .
   3.583     29.6893     38.41  .  Q      .         .         .       V .
   3.667     29.9164     32.98  .  Q      .         .         .       V .
   3.750     30.1127     28.49  . Q       .         .         .       V .
   3.833     30.2846     24.97  . Q       .         .         .       V .
   3.917     30.4330     21.54  . Q       .         .         .        V.
   4.000     30.5596     18.37  .Q        .         .         .        V.
   4.083     30.6683     15.79  .Q        .         .         .        V.
   4.167     30.7605     13.40  .Q        .         .         .        V.
   4.250     30.8382     11.28  .Q        .         .         .        V.
   4.333     30.9005      9.04  Q         .         .         .        V.
```

```
    4.417     30.9504      7.25  Q         .         .         .        V.
    4.500     30.9946      6.42  Q         .         .         .        V.
    4.583     31.0353      5.90  Q         .         .         .        V.
    4.667     31.0721      5.34  Q         .         .         .        V.
    4.750     31.1049      4.77  Q         .         .         .        V.
    4.833     31.1340      4.23  Q         .         .         .        V.
    4.917     31.1597      3.73  Q         .         .         .        V.
    5.000     31.1793      2.85  Q         .         .         .        V.
    5.083     31.1923      1.88  Q         .         .         .        V.
    5.167     31.1986      0.92  Q         .         .         .        V.
    5.250     31.2011      0.36  Q         .         .         .        V.
    5.333     31.2025      0.22  Q         .         .         .        V.
    5.417     31.2032      0.09  Q         .         .         .        V.
    5.500     31.2032      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
              0%                              330.0
             10%                              180.0
             20%                              115.0
             30%                               85.0
             40%                               55.0
             50%                               40.0
             60%                               30.0
             70%                               25.0
             80%                               15.0
             90%                               15.0


 ****************************************************************************
   FLOW PROCESS FROM NODE    100.00 TO NODE    400.00 IS CODE =   1
 ----------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
 ============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #3)

         WATERSHED AREA =     252.600 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.283 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         USER-ENTERED RAINFALL =  2.89 INCHES
         RCFC&WCD 6-Hour Storm (5-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  29.446
```

```
============================================================================
                       UNIT HYDROGRAPH DETERMINATION

 ----------------------------------------------------------------------------
     INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
      NUMBER          MEAN VALUES          ORDINATES(CFS)
 ----------------------------------------------------------------------------
         1                 2.792                 85.306
         2                12.696                302.535
         3                30.896                555.990
         4                51.304                623.453
         5                64.121                391.548
         6                71.690                231.212
         7                76.748                154.526
         8                80.584                117.160
         9                83.576                 91.415
        10                86.031                 74.999
        11                88.014                 60.594
        12                89.721                 52.123
        13                91.167                 44.168
        14                92.425                 38.452
        15                93.517                 33.356
        16                94.483                 29.504
        17                95.349                 26.457
        18                96.133                 23.936
        19                96.714                 17.758
        20                97.286                 17.466
        21                97.846                 17.126
        22                98.158                  9.540
        23                98.370                  6.460
        24                98.581                  6.460
        25                98.793                  6.451
        26                99.004                  6.460
        27                99.215                  6.451
        28                99.426                  6.451
        29                99.638                  6.451
        30                99.849                  6.451
        31               100.000                  4.621
```

```
***************************************************************************
         UNIT             UNIT            UNIT              EFFECTIVE
        PERIOD          RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)         (INCHES)        (INCHES)            (INCHES)
---------------------------------------------------------------------------
           1            0.0145           0.0130              0.0014
           2            0.0173           0.0156              0.0017
           3            0.0173           0.0156              0.0017
           4            0.0173           0.0156              0.0017
           5            0.0173           0.0156              0.0017
           6            0.0202           0.0182              0.0020
           7            0.0202           0.0182              0.0020
           8            0.0202           0.0182              0.0020
           9            0.0202           0.0182              0.0020
          10            0.0202           0.0182              0.0020
          11            0.0202           0.0182              0.0020
          12            0.0231           0.0208              0.0023
          13            0.0231           0.0208              0.0023
          14            0.0231           0.0208              0.0023
          15            0.0231           0.0208              0.0023
          16            0.0231           0.0208              0.0023
          17            0.0231           0.0208              0.0023
          18            0.0231           0.0208              0.0023
          19            0.0231           0.0208              0.0023
          20            0.0231           0.0208              0.0023
          21            0.0231           0.0208              0.0023
          22            0.0231           0.0208              0.0023
          23            0.0231           0.0208              0.0023
          24            0.0260           0.0224              0.0036
          25            0.0231           0.0208              0.0023
          26            0.0260           0.0224              0.0036
          27            0.0260           0.0224              0.0036
          28            0.0260           0.0224              0.0036
          29            0.0260           0.0224              0.0036
          30            0.0260           0.0224              0.0036
          31            0.0260           0.0224              0.0036
          32            0.0260           0.0224              0.0036
          33            0.0289           0.0224              0.0065
          34            0.0289           0.0224              0.0065
          35            0.0289           0.0224              0.0065
          36            0.0289           0.0224              0.0065
          37            0.0289           0.0224              0.0065
          38            0.0318           0.0224              0.0094
          39            0.0318           0.0224              0.0094
          40            0.0318           0.0224              0.0094
          41            0.0347           0.0224              0.0123
          42            0.0376           0.0224              0.0152
          43            0.0405           0.0224              0.0180
          44            0.0405           0.0224              0.0180
          45            0.0434           0.0224              0.0209
          46            0.0434           0.0224              0.0209
          47            0.0462           0.0224              0.0238
          48            0.0462           0.0224              0.0238
          49            0.0491           0.0224              0.0267
          50            0.0520           0.0224              0.0296
          51            0.0549           0.0224              0.0325
          52            0.0578           0.0224              0.0354
          53            0.0607           0.0224              0.0383
          54            0.0607           0.0224              0.0383
          55            0.0636           0.0224              0.0412
          56            0.0665           0.0224              0.0441
          57            0.0694           0.0224              0.0469
          58            0.0694           0.0224              0.0469
```

```
         59            0.0723           0.0224              0.0498
         60            0.0751           0.0224              0.0527
         61            0.0896           0.0224              0.0672
         62            0.1040           0.0224              0.0816
         63            0.1127           0.0224              0.0903
         64            0.1214           0.0224              0.0990
         65            0.1358           0.0224              0.1134
         66            0.1618           0.0224              0.1394
         67            0.0549           0.0224              0.0325
         68            0.0260           0.0224              0.0036
         69            0.0173           0.0156              0.0017
         70            0.0145           0.0130              0.0014
         71            0.0087           0.0078              0.0009
         72            0.0058           0.0052              0.0006

        TOTAL STORM RAINFALL(INCHES) =  2.89
        TOTAL SOIL-LOSS(INCHES) =  1.48
        TOTAL EFFECTIVE RAINFALL(INCHES) =  1.41

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      31.2198
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      29.5994
----------------------------------------------------------------------------
```

```
============================================================================

                          6 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
----------------------------------------------------------------------------
   0.083      0.0008      0.12  Q         .         .         .         .
   0.167      0.0049      0.59  Q         .         .         .         .
   0.250      0.0150      1.48  Q         .         .         .         .
   0.333      0.0325      2.54  Q         .         .         .         .
   0.417      0.0551      3.28  Q         .         .         .         .
   0.500      0.0810      3.76  Q         .         .         .         .
   0.583      0.1095      4.13  Q         .         .         .         .
   0.667      0.1405      4.51  Q         .         .         .         .
   0.750      0.1739      4.85  Q         .         .         .         .
   0.833      0.2091      5.10  Q         .         .         .         .
   0.917      0.2454      5.28  Q         .         .         .         .
   1.000      0.2829      5.44  Q         .         .         .         .
   1.083      0.3217      5.64  Q         .         .         .         .
   1.167      0.3623      5.90  Q         .         .         .         .
   1.250      0.4047      6.16  Q         .         .         .         .
   1.333      0.4484      6.34  Q         .         .         .         .
   1.417      0.4929      6.47  Q         .         .         .         .
   1.500      0.5382      6.57  Q         .         .         .         .
   1.583      0.5839      6.65  Q         .         .         .         .
   1.667      0.6302      6.71  Q         .         .         .         .
   1.750      0.6768      6.77  Q         .         .         .         .
   1.833      0.7237      6.82  Q         .         .         .         .
   1.917      0.7709      6.85  QV        .         .         .         .
   2.000      0.8190      6.99  QV        .         .         .         .
   2.083      0.8693      7.29  QV        .         .         .         .
   2.167      0.9227      7.75  .Q        .         .         .         .
   2.250      0.9795      8.25  .Q        .         .         .         .
   2.333      1.0393      8.69  .Q        .         .         .         .
   2.417      1.1034      9.30  .Q        .         .         .         .
   2.500      1.1703      9.72  .Q        .         .         .         .
   2.583      1.2391      9.99  .Q        .         .         .         .
   2.667      1.3090     10.16  .Q        .         .         .         .
   2.750      1.3816     10.54  .Q        .         .         .         .
   2.833      1.4609     11.52  .Q        .         .         .         .
   2.917      1.5519     13.21  .QV       .         .         .         .
   3.000      1.6558     15.08  . Q       .         .         .         .
   3.083      1.7679     16.28  . Q       .         .         .         .
   3.167      1.8866     17.24  . Q       .         .         .         .
   3.250      2.0148     18.61  . Q       .         .         .         .
   3.333      2.1567     20.60  . Q       .         .         .         .
   3.417      2.3147     22.95  .  Q      .         .         .         .
   3.500      2.4899     25.44  .  Q      .         .         .         .
   3.583      2.6899     29.04  .  Q      .         .         .         .
   3.667      2.9237     33.95  .  VQ     .         .         .         .
   3.750      3.1938     39.21  .   VQ    .         .         .         .
   3.833      3.4973     44.08  .   VQ    .         .         .         .
   3.917      3.8314     48.51  .    VQ   .         .         .         .
   4.000      4.1957     52.90  .    V Q  .         .         .         .
   4.083      4.5895     57.17  .     VQ  .         .         .         .
   4.167      5.0150     61.79  .     V Q .         .         .         .
   4.250      5.4759     66.92  .      VQ .         .         .         .
   4.333      5.9797     73.16  .       VQ.         .         .         .
```

```
    4.417      6.5316     80.12  .       V Q         .         .         .
    4.500      7.1325     87.26  .        V.Q        .         .         .
    4.583      7.7801     94.03  .         V Q       .         .         .
    4.667      8.4707    100.27  .         .V Q      .         .         .
    4.750      9.2040    106.48  .         . V Q     .         .         .
    4.833      9.9840    113.26  .         .  V Q    .         .         .
    4.917     10.8101    119.95  .         .   VQ    .         .         .
    5.000     11.6794    126.22  .         .    VQ   .         .         .
    5.083     12.5987    133.48  .         .      Q  .         .         .
    5.167     13.5976    145.05  .         .       VQ.         .         .
    5.250     14.7208    163.09  .         .        V.Q        .         .
    5.333     16.0079    186.89  .         .         .V  Q     .         .
    5.417     17.4726    212.68  .         .         .  V    Q .         .
    5.500     19.1283    240.41  .         .         .    V    . Q       .
    5.583     20.9406    263.14  .         .         .       V .    Q    .
    5.667     22.7480    262.44  .         .         .         V   Q     .
    5.750     24.2869    223.44  .         .         .        Q. V       .
    5.833     25.3844    159.36  .         .         .Q        .   V     .
    5.917     26.1498    111.14  .         .   Q     .         .    V    .
    6.000     26.7219     83.07  .         .Q        .         .     V   .
    6.083     27.1766     66.02  .       Q .         .         .     V   .
    6.167     27.5479     53.91  .      Q  .         .         .      V  .
    6.250     27.8565     44.81  .    Q    .         .         .      V  .
    6.333     28.1155     37.61  .    Q    .         .         .      V  .
    6.417     28.3368     32.13  .   Q     .         .         .       V .
    6.500     28.5271     27.63  .  Q      .         .         .       V .
    6.583     28.6917     23.90  .  Q      .         .         .       V .
    6.667     28.8343     20.71  . Q       .         .         .       V .
    6.750     28.9582     17.99  . Q       .         .         .        V.
    6.833     29.0652     15.54  . Q       .         .         .        V.
    6.917     29.1563     13.23  .Q        .         .         .        V.
    7.000     29.2321     11.00  .Q        .         .         .        V.
    7.083     29.2969      9.41  .Q        .         .         .        V.
    7.167     29.3512      7.88  .Q        .         .         .        V.
    7.250     29.3935      6.15  Q         .         .         .        V.
    7.333     29.4290      5.16  Q         .         .         .        V.
    7.417     29.4615      4.71  Q         .         .         .        V.
    7.500     29.4915      4.36  Q         .         .         .        V.
    7.583     29.5189      3.97  Q         .         .         .        V.
    7.667     29.5430      3.50  Q         .         .         .        V.
    7.750     29.5633      2.95  Q         .         .         .        V.
    7.833     29.5795      2.35  Q         .         .         .        V.
    7.917     29.5911      1.69  Q         .         .         .        V.
    8.000     29.5974      0.91  Q         .         .         .        V.
    8.083     29.5988      0.20  Q         .         .         .        V.
    8.167     29.5991      0.05  Q         .         .         .        V.
    8.250     29.5993      0.03  Q         .         .         .        V.
    8.333     29.5994      0.02  Q         .         .         .        V.
    8.417     29.5994      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             505.0
              10%                             180.0
              20%                             135.0
              30%                             100.0
              40%                              75.0
              50%                              50.0
              60%                              40.0
```

```
             70%                                30.0
             80%                                25.0
             90%                                15.0


****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    400.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #4)

         WATERSHED AREA =     252.600 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.283 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.269
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.900
         MINIMUM SOIL-LOSS RATE(INCH/HOUR) =   0.134
         USER-ENTERED RAINFALL =  4.61 INCHES
         RCFC&WCD 24-Hour Storm (15-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =  15.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  88.339



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1               15.461               157.442
        2               62.372               477.687
        3               80.303               182.587
        4               87.922                77.589
        5               92.370                45.289
        6               95.321                30.058
        7               97.282                19.962
        8               98.370                11.079
        9               99.004                 6.457
       10               99.602                 6.086
       11               99.900                 3.043
       12              100.000                 1.014
```

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0092           0.0083              0.0009
           2             0.0138           0.0124              0.0014
           3             0.0138           0.0124              0.0014
           4             0.0184           0.0166              0.0018
           5             0.0138           0.0124              0.0014
           6             0.0138           0.0124              0.0014
           7             0.0138           0.0124              0.0014
           8             0.0184           0.0166              0.0018
           9             0.0184           0.0166              0.0018
          10             0.0184           0.0166              0.0018
          11             0.0231           0.0207              0.0023
          12             0.0231           0.0207              0.0023
          13             0.0231           0.0207              0.0023
          14             0.0231           0.0207              0.0023
          15             0.0231           0.0207              0.0023
          16             0.0277           0.0249              0.0028
          17             0.0277           0.0249              0.0028
          18             0.0323           0.0290              0.0032
          19             0.0323           0.0290              0.0032
          20             0.0369           0.0332              0.0037
          21             0.0277           0.0249              0.0028
          22             0.0323           0.0290              0.0032
          23             0.0369           0.0332              0.0037
          24             0.0369           0.0332              0.0037
          25             0.0415           0.0373              0.0041
          26             0.0415           0.0373              0.0041
          27             0.0461           0.0415              0.0046
          28             0.0461           0.0415              0.0046
          29             0.0461           0.0415              0.0046
          30             0.0507           0.0456              0.0051
          31             0.0553           0.0498              0.0055
          32             0.0599           0.0539              0.0060
          33             0.0692           0.0622              0.0069
          34             0.0692           0.0622              0.0069
          35             0.0738           0.0664              0.0074
          36             0.0784           0.0705              0.0078
          37             0.0876           0.0745              0.0131
          38             0.0922           0.0735              0.0187
          39             0.0968           0.0724              0.0244
          40             0.1014           0.0714              0.0301
          41             0.0692           0.0622              0.0069
          42             0.0692           0.0622              0.0069
          43             0.0922           0.0683              0.0239
          44             0.0922           0.0673              0.0249
          45             0.0876           0.0663              0.0213
          46             0.0876           0.0653              0.0223
          47             0.0784           0.0644              0.0140
          48             0.0830           0.0634              0.0196
          49             0.1153           0.0625              0.0528
          50             0.1199           0.0615              0.0583
          51             0.1291           0.0606              0.0685
          52             0.1337           0.0597              0.0740
          53             0.1567           0.0588              0.0980
          54             0.1567           0.0579              0.0988
          55             0.1060           0.0570              0.0490
          56             0.1060           0.0561              0.0499
          57             0.1245           0.0553              0.0692
          58             0.1199           0.0544              0.0654
```

```
          59            0.1199           0.0536              0.0662
          60            0.1153           0.0528              0.0625
          61            0.1106           0.0520              0.0587
          62            0.1060           0.0512              0.0548
          63            0.0876           0.0504              0.0372
          64            0.0876           0.0496              0.0380
          65            0.0184           0.0166              0.0018
          66            0.0184           0.0166              0.0018
          67            0.0138           0.0124              0.0014
          68            0.0138           0.0124              0.0014
          69            0.0231           0.0207              0.0023
          70            0.0231           0.0207              0.0023
          71            0.0231           0.0207              0.0023
          72            0.0184           0.0166              0.0018
          73            0.0184           0.0166              0.0018
          74            0.0184           0.0166              0.0018
          75            0.0138           0.0124              0.0014
          76            0.0092           0.0083              0.0009
          77            0.0138           0.0124              0.0014
          78            0.0184           0.0166              0.0018
          79            0.0138           0.0124              0.0014
          80            0.0092           0.0083              0.0009
          81            0.0138           0.0124              0.0014
          82            0.0138           0.0124              0.0014
          83            0.0138           0.0124              0.0014
          84            0.0092           0.0083              0.0009
          85            0.0138           0.0124              0.0014
          86            0.0092           0.0083              0.0009
          87            0.0138           0.0124              0.0014
          88            0.0092           0.0083              0.0009
          89            0.0138           0.0124              0.0014
          90            0.0092           0.0083              0.0009
          91            0.0092           0.0083              0.0009
          92            0.0092           0.0083              0.0009
          93            0.0092           0.0083              0.0009
          94            0.0092           0.0083              0.0009
          95            0.0092           0.0083              0.0009
          96            0.0092           0.0083              0.0009

         TOTAL STORM RAINFALL(INCHES) =  4.61
         TOTAL SOIL-LOSS(INCHES) =  3.21
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.40

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      67.6748
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      29.3505
----------------------------------------------------------------------------
```

```
===========================================================================

                         2 4 - H O U R   S T O R M
                     R U N O F F   H Y D R O G R A P H

 ===========================================================================
                HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
         (Note: Time indicated is at END of Each Unit Intervals)
 ---------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.       22.5      45.0      67.5      90.0
 ---------------------------------------------------------------------------
    0.083       0.0010       0.15  Q         .         .         .         .
    0.167       0.0020       0.15  Q         .         .         .         .
    0.250       0.0030       0.15  Q         .         .         .         .
    0.333       0.0075       0.66  Q         .         .         .         .
    0.417       0.0121       0.66  Q         .         .         .         .
    0.500       0.0166       0.66  Q         .         .         .         .
    0.583       0.0238       1.05  Q         .         .         .         .
    0.667       0.0310       1.05  Q         .         .         .         .
    0.750       0.0382       1.05  Q         .         .         .         .
    0.833       0.0470       1.28  Q         .         .         .         .
    0.917       0.0558       1.28  Q         .         .         .         .
    1.000       0.0646       1.28  Q         .         .         .         .
    1.083       0.0749       1.50  Q         .         .         .         .
    1.167       0.0852       1.50  Q         .         .         .         .
    1.250       0.0956       1.50  Q         .         .         .         .
    1.333       0.1053       1.41  Q         .         .         .         .
    1.417       0.1150       1.41  Q         .         .         .         .
    1.500       0.1248       1.41  Q         .         .         .         .
    1.583       0.1344       1.40  Q         .         .         .         .
    1.667       0.1440       1.40  Q         .         .         .         .
    1.750       0.1536       1.40  Q         .         .         .         .
    1.833       0.1638       1.47  Q         .         .         .         .
    1.917       0.1739       1.47  Q         .         .         .         .
    2.000       0.1841       1.47  Q         .         .         .         .
    2.083       0.1957       1.70  Q         .         .         .         .
    2.167       0.2074       1.70  Q         .         .         .         .
    2.250       0.2191       1.70  Q         .         .         .         .
    2.333       0.2314       1.79  Q         .         .         .         .
    2.417       0.2437       1.79  Q         .         .         .         .
    2.500       0.2560       1.79  Q         .         .         .         .
    2.583       0.2691       1.90  Q         .         .         .         .
    2.667       0.2822       1.90  Q         .         .         .         .
    2.750       0.2952       1.90  Q         .         .         .         .
    2.833       0.3099       2.14  Q         .         .         .         .
    2.917       0.3246       2.14  Q         .         .         .         .
    3.000       0.3394       2.14  Q         .         .         .         .
    3.083       0.3548       2.24  Q         .         .         .         .
    3.167       0.3702       2.24  Q         .         .         .         .
    3.250       0.3856       2.24  Q         .         .         .         .
    3.333       0.4013       2.28  VQ        .         .         .         .
    3.417       0.4169       2.28  VQ        .         .         .         .
    3.500       0.4326       2.28  VQ        .         .         .         .
    3.583       0.4485       2.30  VQ        .         .         .         .
    3.667       0.4644       2.30  VQ        .         .         .         .
    3.750       0.4803       2.30  VQ        .         .         .         .
    3.833       0.4967       2.39  VQ        .         .         .         .
    3.917       0.5132       2.39  VQ        .         .         .         .
    4.000       0.5297       2.39  VQ        .         .         .         .
    4.083       0.5478       2.63  VQ        .         .         .         .
    4.167       0.5659       2.63  VQ        .         .         .         .
    4.250       0.5839       2.63  VQ        .         .         .         .
    4.333       0.6031       2.79  VQ        .         .         .         .
    4.417       0.6223       2.79  VQ        .         .         .         .
```

```
4.500      0.6416      2.79  VQ        .         .         .         .
4.583      0.6625      3.05  VQ        .         .         .         .
4.667      0.6835      3.05  VQ        .         .         .         .
4.750      0.7045      3.05  VQ        .         .         .         .
4.833      0.7268      3.23  VQ        .         .         .         .
4.917      0.7490      3.23   Q        .         .         .         .
5.000      0.7712      3.23   Q        .         .         .         .
5.083      0.7943      3.35  .Q        .         .         .         .
5.167      0.8174      3.35  .Q        .         .         .         .
5.250      0.8405      3.35  .Q        .         .         .         .
5.333      0.8619      3.10  .Q        .         .         .         .
5.417      0.8833      3.10  .Q        .         .         .         .
5.500      0.9046      3.10  .Q        .         .         .         .
5.583      0.9272      3.28  .Q        .         .         .         .
5.667      0.9498      3.28  .Q        .         .         .         .
5.750      0.9724      3.28  .Q        .         .         .         .
5.833      0.9968      3.55  .Q        .         .         .         .
5.917      1.0213      3.55  .Q        .         .         .         .
6.000      1.0457      3.55  .Q        .         .         .         .
6.083      1.0713      3.72  .Q        .         .         .         .
6.167      1.0969      3.72  .Q        .         .         .         .
6.250      1.1225      3.72  .Q        .         .         .         .
6.333      1.1499      3.98  .Q        .         .         .         .
6.417      1.1774      3.98  .Q        .         .         .         .
6.500      1.2048      3.98  .Q        .         .         .         .
6.583      1.2335      4.16  .Q        .         .         .         .
6.667      1.2621      4.16  .Q        .         .         .         .
6.750      1.2908      4.16  .Q        .         .         .         .
6.833      1.3214      4.44  .Q        .         .         .         .
6.917      1.3519      4.44  .Q        .         .         .         .
7.000      1.3825      4.44  .Q        .         .         .         .
7.083      1.4138      4.55  .VQ       .         .         .         .
7.167      1.4452      4.55  .VQ       .         .         .         .
7.250      1.4765      4.55  . Q       .         .         .         .
7.333      1.5088      4.68  . Q       .         .         .         .
7.417      1.5410      4.68  . Q       .         .         .         .
7.500      1.5732      4.68  . Q       .         .         .         .
7.583      1.6077      5.01  . Q       .         .         .         .
7.667      1.6422      5.01  . Q       .         .         .         .
7.750      1.6766      5.01  . Q       .         .         .         .
7.833      1.7139      5.40  . Q       .         .         .         .
7.917      1.7511      5.40  . Q       .         .         .         .
8.000      1.7883      5.40  . Q       .         .         .         .
8.083      1.8290      5.90  . Q       .         .         .         .
8.167      1.8696      5.90  . Q       .         .         .         .
8.250      1.9103      5.90  . Q       .         .         .         .
8.333      1.9550      6.49  . Q       .         .         .         .
8.417      1.9997      6.49  . Q       .         .         .         .
8.500      2.0445      6.49  . Q       .         .         .         .
8.583      2.0914      6.81  . VQ      .         .         .         .
8.667      2.1383      6.81  . VQ      .         .         .         .
8.750      2.1851      6.81  . VQ      .         .         .         .
8.833      2.2349      7.22  .  Q      .         .         .         .
8.917      2.2846      7.22  .  Q      .         .         .         .
9.000      2.3343      7.22  .  Q      .         .         .         .
9.083      2.3923      8.42  .  Q      .         .         .         .
9.167      2.4504      8.42  .  Q      .         .         .         .
9.250      2.5084      8.42  .  Q      .         .         .         .
9.333      2.5909     11.98  .  V Q    .         .         .         .
9.417      2.6734     11.98  .  V Q    .         .         .         .
9.500      2.7560     11.98  .  V Q    .         .         .         .
9.583      2.8705     16.63  .  V   Q  .         .         .         .
9.667      2.9850     16.63  .   V  Q  .         .         .         .
9.750      3.0995     16.63  .   V  Q  .         .         .         .
```

```
  9.833      3.2490     21.71  .   V    Q.         .         .         .
  9.917      3.3986     21.71  .   V    Q.         .         .         .
 10.000      3.5481     21.71  .   V    Q.         .         .         .
 10.083      3.7032     22.51  .    V    Q         .         .         .
 10.167      3.8582     22.51  .    V    Q         .         .         .
 10.250      4.0133     22.51  .    V    Q         .         .         .
 10.333      4.1054     13.37  .    Q    .         .         .         .
 10.417      4.1974     13.37  .    Q    .         .         .         .
 10.500      4.2894     13.37  .    Q    .         .         .         .
 10.583      4.3776     12.79  .    Q    .         .         .         .
 10.667      4.4657     12.79  .    QV   .         .         .         .
 10.750      4.5538     12.79  .    QV   .         .         .         .
 10.833      4.6907     19.87  .     V Q .         .         .         .
 10.917      4.8275     19.87  .     V Q .         .         .         .
 11.000      4.9644     19.87  .     V Q .         .         .         .
 11.083      5.1174     22.22  .     V  Q.         .         .         .
 11.167      5.2704     22.22  .      V Q.         .         .         .
 11.250      5.4234     22.22  .      V Q.         .         .         .
 11.333      5.5728     21.69  .      V Q.         .         .         .
 11.417      5.7222     21.69  .      V Q.         .         .         .
 11.500      5.8716     21.69  .       VQ.         .         .         .
 11.583      6.0144     20.73  .       VQ.         .         .         .
 11.667      6.1572     20.73  .       VQ.         .         .         .
 11.750      6.3000     20.73  .       VQ.         .         .         .
 11.833      6.4237     17.96  .      QV .         .         .         .
 11.917      6.5474     17.96  .      QV .         .         .         .
 12.000      6.6711     17.96  .      Q V.         .         .         .
 12.083      6.8400     24.53  .        VQ         .         .         .
 12.167      7.0090     24.53  .        VQ         .         .         .
 12.250      7.1779     24.53  .        VQ         .         .         .
 12.333      7.4649     41.67  .         V       Q .         .         .
 12.417      7.7519     41.67  .         V       Q .         .         .
 12.500      8.0389     41.67  .         V       Q .         .         .
 12.583      8.3974     52.06  .         .V        .  Q      .         .
 12.667      8.7559     52.06  .         .V        .  Q      .         .
 12.750      9.1144     52.06  .         . V       .  Q      .         .
 12.833      9.5375     61.43  .         . V       .      Q  .         .
 12.917      9.9606     61.43  .         .  V      .      Q  .         .
 13.000     10.3837     61.43  .         .   V     .      Q  .         .
 13.083     10.8773     71.67  .         .   V     .         .Q        .
 13.167     11.3709     71.67  .         .    V    .         .Q        .
 13.250     11.8645     71.67  .         .     V   .         .Q        .
 13.333     12.4591     86.33  .         .     V   .         .       Q .
 13.417     13.0536     86.33  .         .      V  .         .       Q .
 13.500     13.6481     86.33  .         .       V .         .       Q .
 13.583     14.2336     85.00  .         .        V.         .      Q  .
 13.667     14.8190     85.00  .         .         V         .      Q  .
 13.750     15.4044     85.00  .         .         V         .      Q  .
 13.833     15.8477     64.37  .         .         .V      Q .         .
 13.917     16.2911     64.37  .         .         . V     Q .         .
 14.000     16.7344     64.37  .         .         . V     Q .         .
 14.083     17.1513     60.54  .         .         .  V  Q   .         .
 14.167     17.5683     60.54  .         .         .  V  Q   .         .
 14.250     17.9852     60.54  .         .         .   V Q   .         .
 14.333     18.4444     66.68  .         .         .    V   Q.         .
 14.417     18.9037     66.68  .         .         .    V   Q.         .
 14.500     19.3629     66.68  .         .         .     V  Q.         .
 14.583     19.8252     67.12  .         .         .      V Q.         .
 14.667     20.2875     67.12  .         .         .      V Q.         .
 14.750     20.7497     67.12  .         .         .       VQ.         .
 14.833     21.2091     66.70  .         .         .       VQ.         .
 14.917     21.6685     66.70  .         .         .        Q.         .
 15.000     22.1279     66.70  .         .         .        QV         .
 15.083     22.5707     64.30  .         .         .       Q V         .
```

```
15.167     23.0135     64.30  .         .         .       Q  V         .
15.250     23.4563     64.30  .         .         .       Q  V         .
15.333     23.8786     61.30  .         .         .      Q  . V        .
15.417     24.3008     61.30  .         .         .      Q  .  V       .
15.500     24.7230     61.30  .         .         .      Q  .  V       .
15.583     25.1072     55.80  .         .         .   Q     .   V      .
15.667     25.4915     55.80  .         .         .   Q     .   V      .
15.750     25.8758     55.80  .         .         .   Q     .    V     .
15.833     26.1940     46.21  .         .         Q         .    V     .
15.917     26.5123     46.21  .         .         Q         .     V    .
16.000     26.8306     46.21  .         .         Q         .     V    .
16.083     27.0857     37.04  .         .     Q   .         .     V    .
16.167     27.3408     37.04  .         .     Q   .         .      V   .
16.250     27.5959     37.04  .         .     Q   .         .      V   .
16.333     27.7216     18.26  .       Q .         .         .      V   .
16.417     27.8474     18.26  .       Q .         .         .      V   .
16.500     27.9731     18.26  .       Q .         .         .       V  .
16.583     28.0466     10.66  .   Q     .         .         .       V  .
16.667     28.1200     10.66  .   Q     .         .         .       V  .
16.750     28.1934     10.66  .   Q     .         .         .       V  .
16.833     28.2417      7.01  .  Q      .         .         .       V  .
16.917     28.2900      7.01  .  Q      .         .         .       V  .
17.000     28.3383      7.01  .  Q      .         .         .       V  .
17.083     28.3729      5.02  . Q       .         .         .       V  .
17.167     28.4075      5.02  . Q       .         .         .       V  .
17.250     28.4421      5.02  . Q       .         .         .       V  .
17.333     28.4703      4.10  .Q        .         .         .       V  .
17.417     28.4985      4.10  .Q        .         .         .       V  .
17.500     28.5268      4.10  .Q        .         .         .       V  .
17.583     28.5501      3.38  .Q        .         .         .       V  .
17.667     28.5734      3.38  .Q        .         .         .       V  .
17.750     28.5967      3.38  .Q        .         .         .       V  .
17.833     28.6163      2.85  .Q        .         .         .       V  .
17.917     28.6359      2.85  .Q        .         .         .        V.
18.000     28.6556      2.85  .Q        .         .         .        V.
18.083     28.6719      2.38  .Q        .         .         .        V.
18.167     28.6883      2.38  .Q        .         .         .        V.
18.250     28.7047      2.38  .Q        .         .         .        V.
18.333     28.7190      2.08  Q         .         .         .        V.
18.417     28.7333      2.08  Q         .         .         .        V.
18.500     28.7476      2.08  Q         .         .         .        V.
18.583     28.7606      1.88  Q         .         .         .        V.
18.667     28.7735      1.88  Q         .         .         .        V.
18.750     28.7864      1.88  Q         .         .         .        V.
18.833     28.7970      1.53  Q         .         .         .        V.
18.917     28.8076      1.53  Q         .         .         .        V.
19.000     28.8181      1.53  Q         .         .         .        V.
19.083     28.8270      1.29  Q         .         .         .        V.
19.167     28.8360      1.29  Q         .         .         .        V.
19.250     28.8449      1.29  Q         .         .         .        V.
19.333     28.8549      1.46  Q         .         .         .        V.
19.417     28.8650      1.46  Q         .         .         .        V.
19.500     28.8751      1.46  Q         .         .         .        V.
19.583     28.8863      1.64  Q         .         .         .        V.
19.667     28.8976      1.64  Q         .         .         .        V.
19.750     28.9089      1.64  Q         .         .         .        V.
19.833     28.9187      1.43  Q         .         .         .        V.
19.917     28.9285      1.43  Q         .         .         .        V.
20.000     28.9383      1.43  Q         .         .         .        V.
20.083     28.9468      1.22  Q         .         .         .        V.
20.167     28.9552      1.22  Q         .         .         .        V.
20.250     28.9636      1.22  Q         .         .         .        V.
20.333     28.9729      1.34  Q         .         .         .        V.
20.417     28.9821      1.34  Q         .         .         .        V.
```

```
20.500     28.9914      1.34  Q         .         .         .        V.
20.583     29.0009      1.39  Q         .         .         .        V.
20.667     29.0105      1.39  Q         .         .         .        V.
20.750     29.0200      1.39  Q         .         .         .        V.
20.833     29.0291      1.32  Q         .         .         .        V.
20.917     29.0383      1.32  Q         .         .         .        V.
21.000     29.0474      1.32  Q         .         .         .        V.
21.083     29.0555      1.18  Q         .         .         .        V.
21.167     29.0636      1.18  Q         .         .         .        V.
21.250     29.0717      1.18  Q         .         .         .        V.
21.333     29.0803      1.24  Q         .         .         .        V.
21.417     29.0888      1.24  Q         .         .         .        V.
21.500     29.0974      1.24  Q         .         .         .        V.
21.583     29.1053      1.15  Q         .         .         .        V.
21.667     29.1132      1.15  Q         .         .         .        V.
21.750     29.1211      1.15  Q         .         .         .        V.
21.833     29.1296      1.23  Q         .         .         .        V.
21.917     29.1381      1.23  Q         .         .         .        V.
22.000     29.1465      1.23  Q         .         .         .        V.
22.083     29.1544      1.14  Q         .         .         .        V.
22.167     29.1622      1.14  Q         .         .         .        V.
22.250     29.1700      1.14  Q         .         .         .        V.
22.333     29.1784      1.22  Q         .         .         .        V.
22.417     29.1868      1.22  Q         .         .         .        V.
22.500     29.1952      1.22  Q         .         .         .        V.
22.583     29.2025      1.06  Q         .         .         .        V.
22.667     29.2098      1.06  Q         .         .         .        V.
22.750     29.2171      1.06  Q         .         .         .        V.
22.833     29.2240      1.00  Q         .         .         .        V.
22.917     29.2309      1.00  Q         .         .         .        V.
23.000     29.2378      1.00  Q         .         .         .        V.
23.083     29.2445      0.97  Q         .         .         .        V.
23.166     29.2512      0.97  Q         .         .         .        V.
23.250     29.2579      0.97  Q         .         .         .        V.
23.333     29.2645      0.96  Q         .         .         .        V.
23.416     29.2711      0.96  Q         .         .         .        V.
23.500     29.2777      0.96  Q         .         .         .        V.
23.583     29.2843      0.95  Q         .         .         .        V.
23.666     29.2908      0.95  Q         .         .         .        V.
23.750     29.2974      0.95  Q         .         .         .        V.
23.833     29.3039      0.95  Q         .         .         .        V.
23.916     29.3105      0.95  Q         .         .         .        V.
24.000     29.3170      0.95  Q         .         .         .        V.
24.083     29.3225      0.80  Q         .         .         .        V.
24.166     29.3280      0.80  Q         .         .         .        V.
24.250     29.3335      0.80  Q         .         .         .        V.
24.333     29.3359      0.36  Q         .         .         .        V.
24.416     29.3384      0.36  Q         .         .         .        V.
24.500     29.3408      0.36  Q         .         .         .        V.
24.583     29.3421      0.19  Q         .         .         .        V.
24.666     29.3434      0.19  Q         .         .         .        V.
24.750     29.3447      0.19  Q         .         .         .        V.
24.833     29.3455      0.11  Q         .         .         .        V.
24.916     29.3463      0.11  Q         .         .         .        V.
25.000     29.3470      0.11  Q         .         .         .        V.
25.083     29.3475      0.07  Q         .         .         .        V.
25.166     29.3480      0.07  Q         .         .         .        V.
25.250     29.3485      0.07  Q         .         .         .        V.
25.333     29.3488      0.04  Q         .         .         .        V.
25.416     29.3491      0.04  Q         .         .         .        V.
25.500     29.3494      0.04  Q         .         .         .        V.
25.583     29.3496      0.03  Q         .         .         .        V.
25.666     29.3498      0.03  Q         .         .         .        V.
25.750     29.3500      0.03  Q         .         .         .        V.
```

```
   25.833     29.3501      0.02  Q         .         .         .        V.
   25.916     29.3502      0.02  Q         .         .         .        V.
   26.000     29.3503      0.02  Q         .         .         .        V.
   26.083     29.3503      0.01  Q         .         .         .        V.
   26.166     29.3504      0.01  Q         .         .         .        V.
   26.250     29.3505      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
             0%                              1575.0
            10%                               450.0
            20%                               375.0
            30%                               240.0
            40%                               240.0
            50%                               210.0
            60%                               195.0
            70%                               165.0
            80%                                45.0
            90%                                30.0
 ============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

D.2 – 100-YR PROPOSED HYDROLOGY

- Loss Rate Calculations
- AES Unit Hydrograph Calcs

Synthetic Unit Hydrograph Method Loss Rate Parameter Development
Project Condition (AMC II)
Travertine Development

Subarea	Land Use	Cover Type	Cover Quality	Area A (acres)	AMC II Runoff Index RI	Pervious Area Infiltration Rate Fp (in/hr)	Impervious Fraction A_i	Adjusted Infiltration Rate F (in/hr)	F x A	A_i x A
A	Undeveloped	A		36.42	78	0.268	0.00	0.268	9.761	0.000
A	Single Family (1/4)	A		141.90	32	0.739	0.50	0.406	57.675	70.950
A	Mobile Home	A		6.49	32	0.739	0.75	0.240	1.559	4.868
A	Condminium	A		21.29	32	0.739	0.65	0.307	6.529	13.839
A	Commercial	A		16.44	32	0.739	0.90	0.140	2.308	14.796
			Watershed A Total Area (acres) =	222.54				Average Adjusted Infiltration Rate, F (in/hr) =	0.350	
									Low Loss Fraction =	0.525
									Lag = Rational Method (Tc/60 min) x 0.8 =	0.204
B	Undeveloped	A		53.88	78	0.268	0.00	0.268	14.440	0.000
B	Single Family (1/2)	A		2.08	32	0.739	0.40	0.473	0.984	0.832
B	Single Family (1/4)	A		188.42	32	0.739	0.50	0.406	76.583	94.210
B	Mobile Home	A		27.38	32	0.739	0.75	0.240	6.576	20.535
B	Condminium	A		23.94	32	0.739	0.65	0.307	7.342	15.561
B	Commercial	A		0.00	32	0.739	0.90	0.140	0.000	0.000
			Watershed B Total Area (acres) =	295.70				Average Adjusted Infiltration Rate, F (in/hr) =	0.358	
									Low Loss Fraction =	0.545
									Lag = Rational Method (Tc/60 min) x 0.8 =	0.322

Rainfall Data (NOAA Atlas 14)	
Duration	100-Year Precipitation (inches)
1-Hour	1.56
3-Hour	2.28
6-Hour	2.89
24-Hour	4.61

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

              F L O O D   R O U T I N G   A N A L Y S I S

ACCORDING TO RIVERSIDE COUNTY FLOOD CONTORL AND WATER CONSERVATION DISTRICT
                     (RCFC&WCD) 1978 HYDROLOGY MANUAL
         (c) Copyright 1989-2015 Advanced Engineering Software (aes)
                 (Synthetic Unit Hydrograph Version 22.0)
                 Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:





 ************************* DESCRIPTION OF STUDY *************************
* TRAVERTINE DEVELOPMENT                                                   *
* BASIN ROUTING - 100 YEAR STORM 1 HOUR A + B                              *
* 09-23-2021 6 - 42IN RISERS                                               *
 **************************************************************************

  FILE NAME: TR-BAS1.DAT
  TIME/DATE OF STUDY: 08:28 09/23/2021


****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     10.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     220.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.204 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.350
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.525
         USER-ENTERED RAINFALL =  1.56 INCHES
         RCFC&WCD 1-Hour Storm (5-Minute period) SELECTED
         (SLOPE OF INTENSITY-DURATION CURVE = 0.58)
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  40.850



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                4.403                117.320
```

2	22.644	485.967
3	50.373	738.765
4	67.046	444.231
5	75.561	226.848
6	80.978	144.325
7	84.890	104.231
8	87.828	78.282
9	90.157	62.038
10	92.038	50.111
11	93.582	41.133
12	94.876	34.477
13	96.012	30.282
14	96.844	22.165
15	97.637	21.120
16	98.159	13.916
17	98.452	7.809
18	98.746	7.814
19	99.039	7.809
20	99.332	7.809
21	99.625	7.809
22	99.918	7.809
23	100.000	2.188

```
****************************************************************************
         UNIT                 UNIT             UNIT               EFFECTIVE
        PERIOD              RAINFALL        SOIL-LOSS             RAINFALL
       (NUMBER)             (INCHES)         (INCHES)             (INCHES)
----------------------------------------------------------------------------
           1                 0.0566           0.0292               0.0274
           2                 0.0604           0.0292               0.0313
           3                 0.0651           0.0292               0.0359
           4                 0.0732           0.0292               0.0441
           5                 0.0782           0.0292               0.0490
           6                 0.0913           0.0292               0.0621
           7                 0.1110           0.0292               0.0819
           8                 0.1242           0.0292               0.0950
           9                 0.2040           0.0292               0.1749
          10                 0.5310           0.0292               0.5018
          11                 0.1012           0.0292               0.0720
          12                 0.0638           0.0292               0.0347

         TOTAL STORM RAINFALL(INCHES) =  1.56
         TOTAL SOIL-LOSS(INCHES) =  0.35
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.21

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =       6.4254
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      22.2021
----------------------------------------------------------------------------
```

```
============================================================================

                          1 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      150.0     300.0     450.0     600.0
----------------------------------------------------------------------------
   0.083      0.0222      3.22  Q         .         .         .         .
   0.167      0.1392     16.99  VQ        .         .         .         .
   0.250      0.4123     39.66  V Q       .         .         .         .
   0.333      0.8110     57.89  .V Q      .         .         .         .
   0.417      1.3192     73.79  . V Q     .         .         .         .
   0.500      1.9435     90.65  .  V  Q   .         .         .         .
   0.583      2.7085    111.08  .   V  Q  .         .         .         .
   0.667      3.6670    139.17  .     V  Q.         .         .         .
   0.750      4.9075    180.13  .       V . Q       .         .         .
   0.833      6.8517    282.30  .         . V     Q .         .         .
   0.917     10.0523    464.73  .         .       V .         Q         .
   1.000     13.7570    537.92  .         .         .   V     .    Q    .
   1.083     16.2940    368.37  .         .         .   Q    V.         .
   1.167     17.8360    223.89  .         .   Q     .         . V       .
   1.250     18.8271    143.91  .        Q.         .         .  V      .
   1.333     19.5272    101.66  .     Q   .         .         .    V    .
   1.417     20.0560     76.78  .    Q    .         .         .     V   .
   1.500     20.4742     60.73  .   Q     .         .         .     V   .
   1.583     20.8120     49.04  .  Q      .         .         .      V  .
   1.667     21.0888     40.20  . Q       .         .         .      V  .
   1.750     21.3193     33.46  . Q       .         .         .       V .
   1.833     21.5126     28.08  .Q        .         .         .       V .
   1.917     21.6638     21.95  .Q        .         .         .        V.
   2.000     21.7920     18.62  .Q        .         .         .        V.
   2.083     21.8837     13.31  Q         .         .         .        V.
   2.167     21.9482      9.36  Q         .         .         .        V.
   2.250     22.0054      8.30  Q         .         .         .        V.
   2.333     22.0580      7.63  Q         .         .         .        V.
   2.417     22.1064      7.04  Q         .         .         .        V.
   2.500     22.1500      6.32  Q         .         .         .        V.
   2.583     22.1853      5.13  Q         .         .         .        V.
   2.667     22.1986      1.93  Q         .         .         .        V.
   2.750     22.2016      0.43  Q         .         .         .        V.
   2.833     22.2021      0.08  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                Duration
       Peak Flow Rate                     (minutes)
   =======================                =========
              0%                            170.0
             10%                             75.0
             20%                             45.0
             30%                             30.0
             40%                             25.0
             50%                             20.0
             60%                             15.0
             70%                             10.0
             80%                             10.0
             90%                              5.0
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE     10.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #2)

         WATERSHED AREA =     295.700 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.322 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.358
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.545
         USER-ENTERED RAINFALL =  1.56 INCHES
         RCFC&WCD 1-Hour Storm (5-Minute period) SELECTED
         (SLOPE OF INTENSITY-DURATION CURVE = 0.58)
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  25.880



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH         UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                 2.366                84.607
        2                10.202               280.224
        3                24.613               515.375
        4                43.211               665.070
        5                58.251               537.840
        6                67.091               316.147
        7                72.914               208.215
        8                77.143               151.237
        9                80.487               119.614
       10                83.170                95.934
       11                85.423                80.569
       12                87.296                66.975
       13                88.853                55.683
       14                90.286                51.265
       15                91.500                43.381
       16                92.561                37.949
       17                93.519                34.276
       18                94.379                30.764
       19                95.141                27.218
       20                95.884                26.586
       21                96.438                19.810
       22                96.940                17.969
       23                97.443                17.964
       24                97.921                17.111
       25                98.166                 8.744
       26                98.351                 6.634
       27                98.537                 6.650
```

28	98.723	6.639
29	98.909	6.645
30	99.094	6.644
31	99.280	6.644
32	99.466	6.644
33	99.652	6.644
34	99.838	6.644
35	100.000	5.808

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL      SOIL-LOSS             RAINFALL
       (NUMBER)          (INCHES)       (INCHES)             (INCHES)
----------------------------------------------------------------------------
           1             0.0566          0.0298               0.0268
           2             0.0604          0.0298               0.0306
           3             0.0651          0.0298               0.0352
           4             0.0732          0.0298               0.0434
           5             0.0782          0.0298               0.0483
           6             0.0913          0.0298               0.0615
           7             0.1110          0.0298               0.0812
           8             0.1242          0.0298               0.0944
           9             0.2040          0.0298               0.1742
          10             0.5310          0.0298               0.5012
          11             0.1012          0.0298               0.0713
          12             0.0638          0.0298               0.0340

         TOTAL STORM RAINFALL(INCHES) =  1.56
         TOTAL SOIL-LOSS(INCHES) =  0.36
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.20

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =       8.8217
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      29.6040
----------------------------------------------------------------------------
```

```
============================================================================

                          1 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      150.0     300.0     450.0     600.0
----------------------------------------------------------------------------
   0.083      0.0156      2.26  Q         .         .         .         .
   0.167      0.0851     10.09  Q         .         .         .         .
   0.250      0.2596     25.34  VQ        .         .         .         .
   0.333      0.5840     47.11  V  Q      .         .         .         .
   0.417      1.0602     69.14  .V  Q     .         .         .         .
   0.500      1.6763     89.45  . V  Q    .         .         .         .
   0.583      2.4480    112.05  .  V   Q  .         .         .         .
   0.667      3.4083    139.45  .   V    Q.         .         .         .
   0.750      4.6396    178.77  .     V   .Q        .         .         .
   0.833      6.4492    262.77  .       V .      Q  .         .         .
   0.917      9.1216    388.03  .         . V       .    Q    .         .
   1.000     12.6089    506.36  .         .      V  .         .  Q      .
   1.083     16.3668    545.64  .         .         . V       .     Q   .
   1.167     19.4138    442.42  .         .         .     V  Q.         .
   1.250     21.4596    297.06  .         .        Q.       V .         .
   1.333     22.8740    205.36  .         .  Q      .         V         .
   1.417     23.9102    150.46  .         Q         .         . V       .
   1.500     24.7267    118.55  .      Q  .         .         .  V      .
   1.583     25.3906     96.40  .     Q   .         .         .   V     .
   1.667     25.9484     80.99  .    Q    .         .         .    V    .
   1.750     26.4185     68.26  .   Q     .         .         .    V    .
   1.833     26.8201     58.33  .  Q      .         .         .     V   .
   1.917     27.1779     51.95  .  Q      .         .         .     V   .
   2.000     27.4885     45.09  .  Q      .         .         .      V  .
   2.083     27.7619     39.70  . Q       .         .         .      V  .
   2.167     28.0054     35.36  . Q       .         .         .      V  .
   2.250     28.2218     31.42  . Q       .         .         .       V .
   2.333     28.4138     27.88  .Q        .         .         .       V .
   2.417     28.5880     25.29  .Q        .         .         .       V .
   2.500     28.7307     20.73  .Q        .         .         .       V .
   2.583     28.8575     18.41  .Q        .         .         .       V .
   2.667     28.9742     16.94  .Q        .         .         .        V.
   2.750     29.0760     14.79  Q         .         .         .        V.
   2.833     29.1460     10.17  Q         .         .         .        V.
   2.917     29.2043      8.46  Q         .         .         .        V.
   3.000     29.2584      7.86  Q         .         .         .        V.
   3.083     29.3106      7.57  Q         .         .         .        V.
   3.167     29.3611      7.34  Q         .         .         .        V.
   3.250     29.4096      7.04  Q         .         .         .        V.
   3.333     29.4558      6.71  Q         .         .         .        V.
   3.417     29.4991      6.29  Q         .         .         .        V.
   3.500     29.5386      5.74  Q         .         .         .        V.
   3.583     29.5734      5.04  Q         .         .         .        V.
   3.667     29.5982      3.61  Q         .         .         .        V.
   3.750     29.6026      0.64  Q         .         .         .        V.
   3.833     29.6040      0.20  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                 Duration
```

```
       Peak Flow Rate                      (minutes)
   =======================                 =========
              0%                             230.0
             10%                              90.0
             20%                              60.0
             30%                              40.0
             40%                              30.0
             50%                              25.0
             60%                              20.0
             70%                              20.0
             80%                              15.0
             90%                              10.0

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
============================================================================

            STREAM HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      275.0     550.0     825.0    1100.0
----------------------------------------------------------------------------
   0.083      0.0377      5.48  Q         .         .         .         .
   0.167      0.2242     27.08  Q         .         .         .         .
   0.250      0.6719     65.00  V Q       .         .         .         .
   0.333      1.3950    104.99  .V Q      .         .         .         .
   0.417      2.3794    142.93  .V   Q    .         .         .         .
   0.500      3.6198    180.10  . V   Q   .         .         .         .
   0.583      5.1565    223.13  .  V    Q .         .         .         .
   0.667      7.0753    278.62  .    V    Q         .         .         .
   0.750      9.5471    358.90  .      V  .  Q      .         .         .
   0.833     13.3010    545.06  .         V        Q.         .         .
   0.917     19.1740    852.76  .         .   V     .         .Q        .
   1.000     26.3659   1044.27  .         .         V         .      Q  .
   1.083     32.6608    914.01  .         .         .    V    .  Q      .
   1.167     37.2498    666.32  .         .         .   Q   V .         .
   1.250     40.2867    440.96  .         .     Q   .         .V        .
   1.333     42.4012    307.02  .         .Q        .         . V       .
   1.417     43.9662    227.24  .       Q .         .         .  V      .
   1.500     45.2009    179.29  .     Q   .         .         .   V     .
   1.583     46.2026    145.44  .    Q    .         .         .    V    .
   1.667     47.0372    121.18  .   Q     .         .         .     V   .
   1.750     47.7377    101.72  .  Q      .         .         .     V   .
   1.833     48.3328     86.40  .  Q      .         .         .      V  .
   1.917     48.8417     73.90  . Q       .         .         .      V  .
   2.000     49.2805     63.71  . Q       .         .         .       V .
   2.083     49.6456     53.01  .Q        .         .         .       V .
   2.167     49.9536     44.72  .Q        .         .         .       V .
   2.250     50.2271     39.72  .Q        .         .         .       V .
   2.333     50.4718     35.52  .Q        .         .         .       V .
   2.417     50.6944     32.33  .Q        .         .         .        V.
   2.500     50.8807     27.05  Q         .         .         .        V.
   2.583     51.0429     23.54  Q         .         .         .        V.
   2.667     51.1728     18.87  Q         .         .         .        V.
```

```
    2.750     51.2776     15.22  Q         .         .         .        V.
    2.833     51.3482     10.24  Q         .         .         .        V.
    2.917     51.4065      8.46  Q         .         .         .        V.
    3.000     51.4606      7.86  Q         .         .         .        V.
    3.083     51.5127      7.57  Q         .         .         .        V.
    3.167     51.5632      7.34  Q         .         .         .        V.
    3.250     51.6117      7.04  Q         .         .         .        V.
    3.333     51.6579      6.71  Q         .         .         .        V.
    3.417     51.7012      6.29  Q         .         .         .        V.
    3.500     51.7407      5.74  Q         .         .         .        V.
    3.583     51.7755      5.04  Q         .         .         .        V.
    3.667     51.8003      3.61  Q         .         .         .        V.
    3.750     51.8047      0.64  Q         .         .         .        V.
    3.833     51.8061      0.20  Q         .         .         .        V.
    3.917     51.8061      0.00  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             230.0
              10%                              85.0
              20%                              55.0
              30%                              35.0
              40%                              30.0
              50%                              25.0
              60%                              20.0
              70%                              15.0
              80%                              15.0
              90%                               5.0


 *****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE = 3.1
 -----------------------------------------------------------------------------
   >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
 =============================================================================

                      INFLOW
                    (STREAM 2)
                         |
                         |
                         V                __effective depth
                     -----------          |   (and volume)
                    |           |    |    |
                    |           |    |....V........
                    | detention |<-->|           outflow
                    |   basin   |    |.........________
                     -----------     |    ^    |  \
                         |           |  dead   |   basin outlet
                         V           | storage |
                      OUTFLOW         ---------
                    (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) =    0.00


         BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

          INTERVAL    DEPTH      OUTFLOW     STORAGE
           NUMBER      (FT)       (CFS)        (AF)
               1        0.00        0.00       0.000
               2        1.00        0.01      12.220
               3        2.00        0.02      24.740
               4        2.70        0.03      33.660
               5        3.00       33.61      37.530
               6        4.00      303.14      50.660


============================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-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                                             MEAN
            TIME  DEAD-STORAGE  INFLOW    LOSS   EFFECTIVE OUTFLOW  EFFECTIVE
           (HRS)   FILLED(AF)    (CFS)    (CFS)  DEPTH(FT)  (CFS)   VOLUME(AF)
----------------------------------------------------------------------------
           0.083        0.000     5.48     0.00       0.00      0.0      0.038
           0.167        0.000    27.08     0.00       0.02      0.0      0.224
           0.250        0.000    65.00     0.00       0.05      0.0      0.672
           0.333        0.000   104.99     0.00       0.11      0.0      1.395
           0.417        0.000   142.93     0.00       0.19      0.0      2.379
           0.500        0.000   180.10     0.00       0.30      0.0      3.620
           0.583        0.000   223.13     0.00       0.42      0.0      5.156
           0.667        0.000   278.62     0.00       0.58      0.0      7.075
           0.750        0.000   358.90     0.00       0.78      0.0      9.547
           0.833        0.000   545.06     0.00       1.09      0.0     13.301
           0.917        0.000   852.76     0.00       1.56      0.0     19.174
           1.000        0.000  1044.27     0.00       2.13      0.0     26.365
           1.083        0.000   914.01     0.00       2.62      0.0     32.660
           1.167        0.000   666.32     0.00       2.97     15.1     37.145
           1.250        0.000   440.96     0.00       3.17     55.2     39.801
           1.333        0.000   307.02     0.00       3.28     95.2     41.260
           1.417        0.000   227.24     0.00       3.34    117.9     42.013
           1.500        0.000   179.29     0.00       3.37    129.2     42.358
           1.583        0.000   145.44     0.00       3.37    133.6     42.440
           1.667        0.000   121.18     0.00       3.37    133.5     42.355
           1.750        0.000   101.72     0.00       3.35    130.6     42.156
           1.833        0.000    86.40     0.00       3.33    125.8     41.885
           1.917        0.000    73.90     0.00       3.31    119.8     41.569
           2.000        0.000    63.71     0.00       3.28    113.0     41.229
           2.083        0.000    53.01     0.00       3.25    105.8     40.865
           2.167        0.000    44.72     0.00       3.23     98.3     40.497
           2.250        0.000    39.72     0.00       3.20     90.9     40.144
           2.333        0.000    35.52     0.00       3.17     83.9     39.811
           2.417        0.000    32.33     0.00       3.15     77.3     39.502
           2.500        0.000    27.05     0.00       3.13     71.0     39.199
           2.583        0.000    23.54     0.00       3.11     64.9     38.914
           2.667        0.000    18.87     0.00       3.08     59.2     38.636
           2.750        0.000    15.22     0.00       3.06     53.6     38.372
           2.833        0.000    10.24     0.00       3.04     48.2     38.111
           2.917        0.000     8.46     0.00       3.03     43.1     37.872
           3.000        0.000     7.86     0.00       3.01     38.5     37.661
           3.083        0.000     7.57     0.00       3.00     34.7     37.474
           3.167        0.000     7.34     0.00       2.98     32.4     37.302
           3.250        0.000     7.04     0.00       2.97     30.9     37.137
```

```
3.333       0.000     6.71    0.00     2.96    29.5    36.980
3.417       0.000     6.29    0.00     2.95    28.2    36.830
3.500       0.000     5.74    0.00     2.93    26.9    36.684
3.583       0.000     5.04    0.00     2.92    25.7    36.542
3.667       0.000     3.61    0.00     2.91    24.4    36.399
3.750       0.000     0.64    0.00     2.90    23.1    36.244
3.833       0.000     0.20    0.00     2.89    21.8    36.095
3.917       0.000     0.00    0.00     2.88    20.5    35.953
4.000       0.000     0.00    0.00     2.87    19.4    35.820
4.083       0.000     0.00    0.00     2.86    18.2    35.695
4.167       0.000     0.00    0.00     2.85    17.2    35.576
4.250       0.000     0.00    0.00     2.84    16.2    35.465
4.333       0.000     0.00    0.00     2.83    15.2    35.360
4.417       0.000     0.00    0.00     2.82    14.4    35.261
4.500       0.000     0.00    0.00     2.82    13.5    35.168
4.583       0.000     0.00    0.00     2.81    12.7    35.080
4.667       0.000     0.00    0.00     2.80    12.0    34.998
4.750       0.000     0.00    0.00     2.80    11.3    34.920
4.833       0.000     0.00    0.00     2.79    10.6    34.846
4.917       0.000     0.00    0.00     2.79    10.0    34.777
5.000       0.000     0.00    0.00     2.78     9.4    34.712
5.083       0.000     0.00    0.00     2.78     8.9    34.651
5.167       0.000     0.00    0.00     2.77     8.4    34.593
5.250       0.000     0.00    0.00     2.77     7.9    34.539
5.333       0.000     0.00    0.00     2.76     7.4    34.488
5.417       0.000     0.00    0.00     2.76     7.0    34.440
5.500       0.000     0.00    0.00     2.76     6.6    34.394
5.583       0.000     0.00    0.00     2.75     6.2    34.351
5.667       0.000     0.00    0.00     2.75     5.9    34.311
5.750       0.000     0.00    0.00     2.75     5.5    34.273
5.833       0.000     0.00    0.00     2.74     5.2    34.237
5.917       0.000     0.00    0.00     2.74     4.9    34.203
6.000       0.000     0.00    0.00     2.74     4.6    34.172
6.083       0.000     0.00    0.00     2.74     4.3    34.142
6.167       0.000     0.00    0.00     2.74     4.1    34.114
6.250       0.000     0.00    0.00     2.73     3.9    34.087
6.333       0.000     0.00    0.00     2.73     3.6    34.062
6.417       0.000     0.00    0.00     2.73     3.4    34.039
6.500       0.000     0.00    0.00     2.73     3.2    34.016
6.583       0.000     0.00    0.00     2.73     3.0    33.995
6.667       0.000     0.00    0.00     2.72     2.9    33.976
6.750       0.000     0.00    0.00     2.72     2.7    33.957
6.833       0.000     0.00    0.00     2.72     2.5    33.940
6.917       0.000     0.00    0.00     2.72     2.4    33.923
7.000       0.000     0.00    0.00     2.72     2.3    33.908
7.083       0.000     0.00    0.00     2.72     2.1    33.893
7.167       0.000     0.00    0.00     2.72     2.0    33.879
7.250       0.000     0.00    0.00     2.72     1.9    33.866
7.333       0.000     0.00    0.00     2.72     1.8    33.854
7.417       0.000     0.00    0.00     2.71     1.7    33.843
7.500       0.000     0.00    0.00     2.71     1.6    33.832
7.583       0.000     0.00    0.00     2.71     1.5    33.822
7.667       0.000     0.00    0.00     2.71     1.4    33.812
7.750       0.000     0.00    0.00     2.71     1.3    33.803
7.833       0.000     0.00    0.00     2.71     1.2    33.795
7.917       0.000     0.00    0.00     2.71     1.2    33.787
8.000       0.000     0.00    0.00     2.71     1.1    33.779
8.083       0.000     0.00    0.00     2.71     1.0    33.772
8.167       0.000     0.00    0.00     2.71     1.0    33.765
8.250       0.000     0.00    0.00     2.71     0.9    33.759
8.333       0.000     0.00    0.00     2.71     0.9    33.753
8.417       0.000     0.00    0.00     2.71     0.8    33.747
8.500       0.000     0.00    0.00     2.71     0.8    33.742
8.583       0.000     0.00    0.00     2.71     0.7    33.737
```

```
  8.667        0.000     0.00     0.00      2.71      0.7     33.732
  8.750        0.000     0.00     0.00      2.71      0.6     33.728
  8.833        0.000     0.00     0.00      2.70      0.6     33.724
  8.917        0.000     0.00     0.00      2.70      0.6     33.720
  9.000        0.000     0.00     0.00      2.70      0.5     33.716
  9.083        0.000     0.00     0.00      2.70      0.5     33.713
  9.167        0.000     0.00     0.00      2.70      0.5     33.709
  9.250        0.000     0.00     0.00      2.70      0.4     33.706
  9.333        0.000     0.00     0.00      2.70      0.4     33.703
  9.417        0.000     0.00     0.00      2.70      0.4     33.701
  9.500        0.000     0.00     0.00      2.70      0.4     33.698
  9.583        0.000     0.00     0.00      2.70      0.4     33.696
  9.667        0.000     0.00     0.00      2.70      0.3     33.693
  9.750        0.000     0.00     0.00      2.70      0.3     33.691
  9.833        0.000     0.00     0.00      2.70      0.3     33.689
  9.917        0.000     0.00     0.00      2.70      0.3     33.687
 10.000        0.000     0.00     0.00      2.70      0.3     33.685
 10.083        0.000     0.00     0.00      2.70      0.2     33.684
 10.167        0.000     0.00     0.00      2.70      0.2     33.682
 10.250        0.000     0.00     0.00      2.70      0.2     33.681
 10.333        0.000     0.00     0.00      2.70      0.2     33.679
 10.417        0.000     0.00     0.00      2.70      0.2     33.678
 10.500        0.000     0.00     0.00      2.70      0.2     33.677
 10.583        0.000     0.00     0.00      2.70      0.2     33.675
 10.667        0.000     0.00     0.00      2.70      0.2     33.674
 10.750        0.000     0.00     0.00      2.70      0.2     33.673
 10.833        0.000     0.00     0.00      2.70      0.1     33.672
 10.917        0.000     0.00     0.00      2.70      0.1     33.671
 11.000        0.000     0.00     0.00      2.70      0.1     33.670
 11.083        0.000     0.00     0.00      2.70      0.1     33.670
 11.167        0.000     0.00     0.00      2.70      0.1     33.669
 11.250        0.000     0.00     0.00      2.70      0.1     33.668
 11.333        0.000     0.00     0.00      2.70      0.1     33.667
 11.417        0.000     0.00     0.00      2.70      0.1     33.667
 11.500        0.000     0.00     0.00      2.70      0.1     33.666
 11.583        0.000     0.00     0.00      2.70      0.1     33.666
 11.667        0.000     0.00     0.00      2.70      0.1     33.665
 11.750        0.000     0.00     0.00      2.70      0.1     33.665
 11.833        0.000     0.00     0.00      2.70      0.1     33.664
 11.917        0.000     0.00     0.00      2.70      0.1     33.664
 12.000        0.000     0.00     0.00      2.70      0.1     33.663
 12.083        0.000     0.00     0.00      2.70      0.1     33.663
 12.167        0.000     0.00     0.00      2.70      0.1     33.662
 12.250        0.000     0.00     0.00      2.70      0.1     33.662
 12.333        0.000     0.00     0.00      2.70      0.0     33.662
 12.417        0.000     0.00     0.00      2.70      0.0     33.661
 12.500        0.000     0.00     0.00      2.70      0.0     33.661
 12.583        0.000     0.00     0.00      2.70      0.0     33.661
 12.667        0.000     0.00     0.00      2.70      0.0     33.661
 12.750        0.000     0.00     0.00      2.70      0.0     33.660
 12.833        0.000     0.00     0.00      2.70      0.0     33.660
 12.917        0.000     0.00     0.00      2.70      0.0     33.660
 13.000        0.000     0.00     0.00      2.70      0.0     33.660
 13.083        0.000     0.00     0.00      2.70      0.0     33.659
 13.167        0.000     0.00     0.00      2.70      0.0     33.659
 13.250        0.000     0.00     0.00      2.70      0.0     33.659
 13.333        0.000     0.00     0.00      2.70      0.0     33.659
 13.417        0.000     0.00     0.00      2.70      0.0     33.658
 13.500        0.000     0.00     0.00      2.70      0.0     33.658
 13.583        0.000     0.00     0.00      2.70      0.0     33.658
 13.667        0.000     0.00     0.00      2.70      0.0     33.658
 13.750        0.000     0.00     0.00      2.70      0.0     33.658
 13.833        0.000     0.00     0.00      2.70      0.0     33.657
 13.917        0.000     0.00     0.00      2.70      0.0     33.657
```

```
14.000         0.000     0.00      0.00      2.70      0.0     33.657
14.083         0.000     0.00      0.00      2.70      0.0     33.657
14.167         0.000     0.00      0.00      2.70      0.0     33.656
14.250         0.000     0.00      0.00      2.70      0.0     33.656
14.333         0.000     0.00      0.00      2.70      0.0     33.656
14.417         0.000     0.00      0.00      2.70      0.0     33.656
14.500         0.000     0.00      0.00      2.70      0.0     33.655
14.583         0.000     0.00      0.00      2.70      0.0     33.655
14.667         0.000     0.00      0.00      2.70      0.0     33.655
14.750         0.000     0.00      0.00      2.70      0.0     33.655
14.833         0.000     0.00      0.00      2.70      0.0     33.655
14.917         0.000     0.00      0.00      2.70      0.0     33.654
15.000         0.000     0.00      0.00      2.70      0.0     33.654
15.083         0.000     0.00      0.00      2.70      0.0     33.654
15.167         0.000     0.00      0.00      2.70      0.0     33.654
15.250         0.000     0.00      0.00      2.70      0.0     33.653
15.333         0.000     0.00      0.00      2.70      0.0     33.653
15.417         0.000     0.00      0.00      2.70      0.0     33.653
15.500         0.000     0.00      0.00      2.70      0.0     33.653
15.583         0.000     0.00      0.00      2.70      0.0     33.652
15.667         0.000     0.00      0.00      2.70      0.0     33.652
15.750         0.000     0.00      0.00      2.70      0.0     33.652
15.833         0.000     0.00      0.00      2.70      0.0     33.652
15.917         0.000     0.00      0.00      2.70      0.0     33.652
16.000         0.000     0.00      0.00      2.70      0.0     33.651
16.083         0.000     0.00      0.00      2.70      0.0     33.651
16.167         0.000     0.00      0.00      2.70      0.0     33.651
16.250         0.000     0.00      0.00      2.70      0.0     33.651
16.333         0.000     0.00      0.00      2.70      0.0     33.650
16.417         0.000     0.00      0.00      2.70      0.0     33.650
16.500         0.000     0.00      0.00      2.70      0.0     33.650
16.583         0.000     0.00      0.00      2.70      0.0     33.650
16.667         0.000     0.00      0.00      2.70      0.0     33.649
16.750         0.000     0.00      0.00      2.70      0.0     33.649
16.833         0.000     0.00      0.00      2.70      0.0     33.649
16.917         0.000     0.00      0.00      2.70      0.0     33.649
17.000         0.000     0.00      0.00      2.70      0.0     33.649
17.083         0.000     0.00      0.00      2.70      0.0     33.648
17.167         0.000     0.00      0.00      2.70      0.0     33.648
17.250         0.000     0.00      0.00      2.70      0.0     33.648
17.333         0.000     0.00      0.00      2.70      0.0     33.648
17.417         0.000     0.00      0.00      2.70      0.0     33.647
17.500         0.000     0.00      0.00      2.70      0.0     33.647
17.583         0.000     0.00      0.00      2.70      0.0     33.647
17.667         0.000     0.00      0.00      2.70      0.0     33.647
17.750         0.000     0.00      0.00      2.70      0.0     33.647
17.833         0.000     0.00      0.00      2.70      0.0     33.646
17.917         0.000     0.00      0.00      2.70      0.0     33.646
18.000         0.000     0.00      0.00      2.70      0.0     33.646
18.083         0.000     0.00      0.00      2.70      0.0     33.646
18.167         0.000     0.00      0.00      2.70      0.0     33.645
18.250         0.000     0.00      0.00      2.70      0.0     33.645
18.333         0.000     0.00      0.00      2.70      0.0     33.645
18.417         0.000     0.00      0.00      2.70      0.0     33.645
18.500         0.000     0.00      0.00      2.70      0.0     33.644
18.583         0.000     0.00      0.00      2.70      0.0     33.644
18.667         0.000     0.00      0.00      2.70      0.0     33.644
18.750         0.000     0.00      0.00      2.70      0.0     33.644
18.833         0.000     0.00      0.00      2.70      0.0     33.644
18.917         0.000     0.00      0.00      2.70      0.0     33.643
19.000         0.000     0.00      0.00      2.70      0.0     33.643
19.083         0.000     0.00      0.00      2.70      0.0     33.643
19.167         0.000     0.00      0.00      2.70      0.0     33.643
19.250         0.000     0.00      0.00      2.70      0.0     33.642
```

```
          19.333        0.000     0.00     0.00      2.70      0.0     33.642
          19.417        0.000     0.00     0.00      2.70      0.0     33.642
          19.500        0.000     0.00     0.00      2.70      0.0     33.642
          19.583        0.000     0.00     0.00      2.70      0.0     33.641
          19.667        0.000     0.00     0.00      2.70      0.0     33.641
          19.750        0.000     0.00     0.00      2.70      0.0     33.641
          19.833        0.000     0.00     0.00      2.70      0.0     33.641
          19.917        0.000     0.00     0.00      2.70      0.0     33.641
          20.000        0.000     0.00     0.00      2.70      0.0     33.640
          20.083        0.000     0.00     0.00      2.70      0.0     33.640
          20.167        0.000     0.00     0.00      2.70      0.0     33.640
          20.250        0.000     0.00     0.00      2.70      0.0     33.640
          20.333        0.000     0.00     0.00      2.70      0.0     33.639
          20.417        0.000     0.00     0.00      2.70      0.0     33.639
          20.500        0.000     0.00     0.00      2.70      0.0     33.639
          20.583        0.000     0.00     0.00      2.70      0.0     33.639
          20.667        0.000     0.00     0.00      2.70      0.0     33.639
          20.750        0.000     0.00     0.00      2.70      0.0     33.638
          20.833        0.000     0.00     0.00      2.70      0.0     33.638
          20.917        0.000     0.00     0.00      2.70      0.0     33.638
          21.000        0.000     0.00     0.00      2.70      0.0     33.638
          21.083        0.000     0.00     0.00      2.70      0.0     33.637
          21.167        0.000     0.00     0.00      2.70      0.0     33.637
          21.250        0.000     0.00     0.00      2.70      0.0     33.637
          21.333        0.000     0.00     0.00      2.70      0.0     33.637
          21.417        0.000     0.00     0.00      2.70      0.0     33.636
          21.500        0.000     0.00     0.00      2.70      0.0     33.636
          21.583        0.000     0.00     0.00      2.70      0.0     33.636
          21.667        0.000     0.00     0.00      2.70      0.0     33.636
          21.750        0.000     0.00     0.00      2.70      0.0     33.636
          21.833        0.000     0.00     0.00      2.70      0.0     33.635
          21.917        0.000     0.00     0.00      2.70      0.0     33.635
          22.000        0.000     0.00     0.00      2.70      0.0     33.635
          22.083        0.000     0.00     0.00      2.70      0.0     33.635
          22.167        0.000     0.00     0.00      2.70      0.0     33.634
          22.250        0.000     0.00     0.00      2.70      0.0     33.634
          22.333        0.000     0.00     0.00      2.70      0.0     33.634
          22.417        0.000     0.00     0.00      2.70      0.0     33.634
          22.500        0.000     0.00     0.00      2.70      0.0     33.633
          22.583        0.000     0.00     0.00      2.70      0.0     33.633
          22.667        0.000     0.00     0.00      2.70      0.0     33.633
          22.750        0.000     0.00     0.00      2.70      0.0     33.633
          22.833        0.000     0.00     0.00      2.70      0.0     33.633
          22.917        0.000     0.00     0.00      2.70      0.0     33.632
          23.000        0.000     0.00     0.00      2.70      0.0     33.632
          23.083        0.000     0.00     0.00      2.70      0.0     33.632
          23.167        0.000     0.00     0.00      2.70      0.0     33.632
          23.250        0.000     0.00     0.00      2.70      0.0     33.631
          23.333        0.000     0.00     0.00      2.70      0.0     33.631
          23.417        0.000     0.00     0.00      2.70      0.0     33.631
          23.500        0.000     0.00     0.00      2.70      0.0     33.631
          23.583        0.000     0.00     0.00      2.70      0.0     33.630
          23.667        0.000     0.00     0.00      2.70      0.0     33.630
          23.750        0.000     0.00     0.00      2.70      0.0     33.630
          23.833        0.000     0.00     0.00      2.70      0.0     33.630
          23.917        0.000     0.00     0.00      2.70      0.0     33.630
----------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =     51.806 AF
    BASIN  STORAGE =     31.489 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =     20.309 AF
    LOSS    VOLUME =      0.000 AF
============================================================================
```

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

              F L O O D   R O U T I N G   A N A L Y S I S

ACCORDING TO RIVERSIDE COUNTY FLOOD CONTORL AND WATER CONSERVATION DISTRICT
                     (RCFC&WCD) 1978 HYDROLOGY MANUAL
         (c) Copyright 1989-2015 Advanced Engineering Software (aes)
                 (Synthetic Unit Hydrograph Version 22.0)
                 Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:






 ************************* DESCRIPTION OF STUDY *************************
* TRAVERTINE DEVELOPMENT                                                 *
* BASIN ROUTING - 100 YEAR STORM 3 HOUR A + B                            *
* 09-23-2021 6 - 42IN RISERS                                             *
 ************************************************************************

  FILE NAME: TR-BAS3.DAT
  TIME/DATE OF STUDY: 08:30 09/23/2021


****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     10.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     220.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.204 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.350
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.525
         USER-ENTERED RAINFALL =  2.28 INCHES
         RCFC&WCD 3-Hour Storm (5-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  40.850



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH         UNIT HYDROGRAPH
     NUMBER          MEAN VALUES         ORDINATES(CFS)
----------------------------------------------------------------------------
        1                4.403               117.320
        2               22.644               485.967
        3               50.373               738.765
```

4	67.046	444.231
5	75.561	226.848
6	80.978	144.325
7	84.890	104.231
8	87.828	78.282
9	90.157	62.038
10	92.038	50.111
11	93.582	41.133
12	94.876	34.477
13	96.012	30.282
14	96.844	22.165
15	97.637	21.120
16	98.159	13.916
17	98.452	7.809
18	98.746	7.814
19	99.039	7.809
20	99.332	7.809
21	99.625	7.809
22	99.918	7.809
23	100.000	2.188

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0296           0.0156              0.0141
           2             0.0296           0.0156              0.0141
           3             0.0251           0.0132              0.0119
           4             0.0342           0.0180              0.0162
           5             0.0342           0.0180              0.0162
           6             0.0410           0.0215              0.0195
           7             0.0342           0.0180              0.0162
           8             0.0410           0.0215              0.0195
           9             0.0410           0.0215              0.0195
          10             0.0342           0.0180              0.0162
          11             0.0365           0.0192              0.0173
          12             0.0410           0.0215              0.0195
          13             0.0502           0.0263              0.0238
          14             0.0502           0.0263              0.0238
          15             0.0502           0.0263              0.0238
          16             0.0456           0.0239              0.0217
          17             0.0593           0.0292              0.0301
          18             0.0616           0.0292              0.0324
          19             0.0547           0.0287              0.0260
          20             0.0616           0.0292              0.0324
          21             0.0752           0.0292              0.0461
          22             0.0707           0.0292              0.0415
          23             0.0661           0.0292              0.0370
          24             0.0684           0.0292              0.0392
          25             0.0707           0.0292              0.0415
          26             0.0958           0.0292              0.0666
          27             0.1140           0.0292              0.0848
          28             0.0798           0.0292              0.0506
          29             0.1550           0.0292              0.1259
          30             0.1664           0.0292              0.1373
          31             0.1870           0.0292              0.1578
          32             0.1345           0.0292              0.1054
          33             0.0456           0.0239              0.0217
          34             0.0410           0.0215              0.0195
          35             0.0410           0.0215              0.0195
          36             0.0137           0.0072              0.0065

         TOTAL STORM RAINFALL(INCHES) =  2.28
         TOTAL SOIL-LOSS(INCHES) =  0.86
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.42

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      15.8768
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      25.9668
----------------------------------------------------------------------------
```

```
============================================================================

                          3 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
----------------------------------------------------------------------------
   0.083      0.0114      1.65  Q         .         .         .         .
   0.167      0.0699      8.49  VQ        .         .         .         .
   0.250      0.1983     18.64  V Q       .         .         .         .
   0.333      0.3660     24.35  V  Q      .         .         .         .
   0.417      0.5591     28.05  V  Q      .         .         .         .
   0.500      0.7843     32.70  .V  Q     .         .         .         .
   0.583      1.0378     36.80  .V  Q     .         .         .         .
   0.667      1.3117     39.77  . V  Q    .         .         .         .
   0.750      1.5987     41.67  . V  Q    .         .         .         .
   0.833      1.9015     43.97  . V  Q    .         .         .         .
   0.917      2.2078     44.48  .  V Q    .         .         .         .
   1.000      2.5116     44.11  .  V Q    .         .         .         .
   1.083      2.8281     45.97  .   V Q   .         .         .         .
   1.167      3.1733     50.12  .   V Q   .         .         .         .
   1.250      3.5497     54.65  .    V Q  .         .         .         .
   1.333      3.9428     57.08  .     VQ  .         .         .         .
   1.417      4.3456     58.48  .     VQ  .         .         .         .
   1.500      4.7745     62.28  .      VQ .         .         .         .
   1.583      5.2475     68.68  .       VQ.         .         .         .
   1.667      5.7426     71.89  .       VQ.         .         .         .
   1.750      6.2589     74.98  .        Q.         .         .         .
   1.833      6.8437     84.91  .         VQ        .         .         .
   1.917      7.4980     95.00  .         .VQ       .         .         .
   2.000      8.1679     97.27  .         . Q       .         .         .
   2.083      8.8388     97.41  .         . QV      .         .         .
   2.167      9.5472    102.87  .         .  QV     .         .         .
   2.250     10.3754    120.25  .         .    VQ   .         .         .
   2.333     11.3779    145.56  .         .      V Q.         .         .
   2.417     12.5049    163.64  .         .        V.Q        .         .
   2.500     13.8202    190.98  .         .         .V   Q    .         .
   2.583     15.5268    247.80  .         .         .  V      .  Q      .
   2.667     17.5350    291.58  .         .         .      V  .       Q .
   2.750     19.5527    292.97  .         .         .         V        Q.
   2.833     21.1756    235.65  .         .         .         .QV       .
   2.917     22.3027    163.66  .         .         .Q        .   V     .
   3.000     23.1397    121.53  .         .     Q   .         .    V    .
   3.083     23.7918     94.67  .         . Q       .         .     V   .
   3.167     24.2747     70.13  .        Q.         .         .      V  .
   3.250     24.6290     51.43  .     Q   .         .         .      V  .
   3.333     24.9020     39.65  .    Q    .         .         .       V .
   3.417     25.1218     31.91  .   Q     .         .         .       V .
   3.500     25.2985     25.66  .  Q      .         .         .       V .
   3.583     25.4426     20.93  . Q       .         .         .        V.
   3.667     25.5587     16.86  . Q       .         .         .        V.
   3.750     25.6504     13.31  .Q        .         .         .        V.
   3.833     25.7225     10.47  .Q        .         .         .        V.
   3.917     25.7785      8.13  .Q        .         .         .        V.
   4.000     25.8243      6.66  Q         .         .         .        V.
   4.083     25.8635      5.69  Q         .         .         .        V.
   4.167     25.8976      4.95  Q         .         .         .        V.
   4.250     25.9249      3.97  Q         .         .         .        V.
   4.333     25.9447      2.88  Q         .         .         .        V.
```

```
   4.417     25.9564      1.69  Q         .         .         .        V.
   4.500     25.9616      0.75  Q         .         .         .        V.
   4.583     25.9643      0.40  Q         .         .         .        V.
   4.667     25.9660      0.25  Q         .         .         .        V.
   4.750     25.9667      0.09  Q         .         .         .        V.
   4.833     25.9668      0.01  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                 Duration
       Peak Flow Rate                      (minutes)
   =======================                 =========
             0%                              290.0
            10%                              180.0
            20%                              105.0
            30%                               75.0
            40%                               50.0
            50%                               35.0
            60%                               25.0
            70%                               20.0
            80%                               20.0
            90%                               10.0


 ****************************************************************************
   FLOW PROCESS FROM NODE      2.00 TO NODE     10.00 IS CODE =   1
 ----------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
 ============================================================================

       (UNIT-HYDROGRAPH ADDED TO STREAM #2)

          WATERSHED AREA =     295.700 ACRES
          BASEFLOW =   0.000 CFS/SQUARE-MILE
          *USER ENTERED "LAG" TIME =    0.322 HOURS
           CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
           THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
           MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
          VALLEY S-GRAPH SELECTED
          UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.358
          LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.545
          USER-ENTERED RAINFALL =  2.28 INCHES
          RCFC&WCD 3-Hour Storm (5-Minute period) SELECTED
          *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


          UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
          UNIT INTERVAL PERCENTAGE OF LAG-TIME =  25.880



 ============================================================================
                       UNIT HYDROGRAPH DETERMINATION

 ----------------------------------------------------------------------------
     INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
      NUMBER          MEAN VALUES          ORDINATES(CFS)
 ----------------------------------------------------------------------------
         1                 2.366                84.607
         2                10.202               280.224
         3                24.613               515.375
         4                43.211               665.070
```

5	58.251	537.840
6	67.091	316.147
7	72.914	208.215
8	77.143	151.237
9	80.487	119.614
10	83.170	95.934
11	85.423	80.569
12	87.296	66.975
13	88.853	55.683
14	90.286	51.265
15	91.500	43.381
16	92.561	37.949
17	93.519	34.276
18	94.379	30.764
19	95.141	27.218
20	95.884	26.586
21	96.438	19.810
22	96.940	17.969
23	97.443	17.964
24	97.921	17.111
25	98.166	8.744
26	98.351	6.634
27	98.537	6.650
28	98.723	6.639
29	98.909	6.645
30	99.094	6.644
31	99.280	6.644
32	99.466	6.644
33	99.652	6.644
34	99.838	6.644
35	100.000	5.808

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0296           0.0162              0.0135
           2             0.0296           0.0162              0.0135
           3             0.0251           0.0137              0.0114
           4             0.0342           0.0186              0.0156
           5             0.0342           0.0186              0.0156
           6             0.0410           0.0224              0.0187
           7             0.0342           0.0186              0.0156
           8             0.0410           0.0224              0.0187
           9             0.0410           0.0224              0.0187
          10             0.0342           0.0186              0.0156
          11             0.0365           0.0199              0.0166
          12             0.0410           0.0224              0.0187
          13             0.0502           0.0273              0.0228
          14             0.0502           0.0273              0.0228
          15             0.0502           0.0273              0.0228
          16             0.0456           0.0249              0.0207
          17             0.0593           0.0298              0.0294
          18             0.0616           0.0298              0.0317
          19             0.0547           0.0298              0.0249
          20             0.0616           0.0298              0.0317
          21             0.0752           0.0298              0.0454
          22             0.0707           0.0298              0.0408
          23             0.0661           0.0298              0.0363
          24             0.0684           0.0298              0.0386
          25             0.0707           0.0298              0.0408
          26             0.0958           0.0298              0.0659
          27             0.1140           0.0298              0.0842
          28             0.0798           0.0298              0.0500
          29             0.1550           0.0298              0.1252
          30             0.1664           0.0298              0.1366
          31             0.1870           0.0298              0.1571
          32             0.1345           0.0298              0.1047
          33             0.0456           0.0249              0.0207
          34             0.0410           0.0224              0.0187
          35             0.0410           0.0224              0.0187
          36             0.0137           0.0075              0.0062

         TOTAL STORM RAINFALL(INCHES) =  2.28
         TOTAL SOIL-LOSS(INCHES) =  0.89
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.39

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      21.9584
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      34.2069
----------------------------------------------------------------------------
```

```
============================================================================

                          3 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      100.0     200.0     300.0     400.0
----------------------------------------------------------------------------
   0.083      0.0079      1.14  Q         .         .         .         .
   0.167      0.0417      4.92  Q         .         .         .         .
   0.250      0.1223     11.70  VQ        .         .         .         .
   0.333      0.2630     20.43  V Q       .         .         .         .
   0.417      0.4543     27.78  V Q       .         .         .         .
   0.500      0.6821     33.07  V  Q      .         .         .         .
   0.583      0.9447     38.13  .V Q      .         .         .         .
   0.667      1.2390     42.74  .V  Q     .         .         .         .
   0.750      1.5597     46.57  .V  Q     .         .         .         .
   0.833      1.8997     49.36  . V Q     .         .         .         .
   0.917      2.2538     51.42  . V  Q    .         .         .         .
   1.000      2.6176     52.82  .  V Q    .         .         .         .
   1.083      2.9895     54.01  .  V Q    .         .         .         .
   1.167      3.3799     56.69  .  V Q    .         .         .         .
   1.250      3.7995     60.93  .   V Q   .         .         .         .
   1.333      4.2490     65.27  .   V Q   .         .         .         .
   1.417      4.7235     68.90  .    VQ   .         .         .         .
   1.500      5.2244     72.72  .     VQ  .         .         .         .
   1.583      5.7583     77.53  .     VQ  .         .         .         .
   1.667      6.3324     83.35  .      VQ .         .         .         .
   1.750      6.9487     89.49  .       Q .         .         .         .
   1.833      7.6123     96.35  .       VQ.         .         .         .
   1.917      8.3397    105.61  .        VQ         .         .         .
   2.000      9.1318    115.02  .         VQ        .         .         .
   2.083      9.9600    120.26  .         .VQ       .         .         .
   2.167     10.8195    124.79  .         . Q       .         .         .
   2.250     11.7590    136.42  .         .  Q      .         .         .
   2.333     12.8275    155.15  .         .   VQ    .         .         .
   2.417     14.0734    180.90  .         .     V Q .         .         .
   2.500     15.5409    213.07  .         .       V .Q        .         .
   2.583     17.2867    253.49  .         .         V    Q    .         .
   2.667     19.3850    304.67  .         .         . V       Q         .
   2.750     21.7227    339.44  .         .         .    V    .  Q      .
   2.833     24.0094    332.02  .         .         .       V .  Q      .
   2.917     25.9650    283.96  .         .         .       Q V         .
   3.000     27.4697    218.48  .         .         .Q        . V       .
   3.083     28.6188    166.86  .         .     Q   .         .  V      .
   3.167     29.5294    132.22  .         .  Q      .         .   V     .
   3.250     30.2513    104.81  .         Q         .         .    V    .
   3.333     30.8237     83.11  .       Q .         .         .     V   .
   3.417     31.2875     67.35  .     Q   .         .         .     V   .
   3.500     31.6764     56.48  .    Q    .         .         .      V  .
   3.583     32.0088     48.25  .   Q     .         .         .      V  .
   3.667     32.2971     41.87  .   Q     .         .         .      V  .
   3.750     32.5491     36.59  .  Q      .         .         .       V .
   3.833     32.7694     31.99  .  Q      .         .         .       V .
   3.917     32.9630     28.10  . Q       .         .         .       V .
   4.000     33.1359     25.11  . Q       .         .         .       V .
   4.083     33.2886     22.18  . Q       .         .         .       V .
   4.167     33.4222     19.40  .Q        .         .         .        V.
   4.250     33.5375     16.74  .Q        .         .         .        V.
   4.333     33.6386     14.68  .Q        .         .         .        V.
```

```
    4.417     33.7266     12.77  .Q        .         .         .        V.
    4.500     33.8014     10.86  .Q        .         .         .        V.
    4.583     33.8618      8.78  Q         .         .         .        V.
    4.667     33.9113      7.18  Q         .         .         .        V.
    4.750     33.9560      6.49  Q         .         .         .        V.
    4.833     33.9976      6.04  Q         .         .         .        V.
    4.917     34.0360      5.58  Q         .         .         .        V.
    5.000     34.0718      5.19  Q         .         .         .        V.
    5.083     34.1043      4.73  Q         .         .         .        V.
    5.167     34.1332      4.20  Q         .         .         .        V.
    5.250     34.1594      3.80  Q         .         .         .        V.
    5.333     34.1798      2.96  Q         .         .         .        V.
    5.417     34.1938      2.04  Q         .         .         .        V.
    5.500     34.2009      1.04  Q         .         .         .        V.
    5.583     34.2038      0.41  Q         .         .         .        V.
    5.667     34.2057      0.27  Q         .         .         .        V.
    5.750     34.2067      0.15  Q         .         .         .        V.
    5.833     34.2069      0.04  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
              0%                              350.0
             10%                              195.0
             20%                              120.0
             30%                               85.0
             40%                               55.0
             50%                               40.0
             60%                               35.0
             70%                               25.0
             80%                               20.0
             90%                               10.0


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =   7
 ----------------------------------------------------------------------------
   >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
 ============================================================================


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  11
 ----------------------------------------------------------------------------
   >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
 ============================================================================

              STREAM HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
          (Note: Time indicated is at END of Each Unit Intervals)
 ----------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.      175.0     350.0     525.0     700.0
 ----------------------------------------------------------------------------
    0.083      0.0192      2.79  Q         .         .         .         .
    0.167      0.1116     13.41  Q         .         .         .         .
    0.250      0.3205     30.34  VQ        .         .         .         .
    0.333      0.6290     44.78  V Q       .         .         .         .
    0.417      1.0135     55.83  V  Q      .         .         .         .
    0.500      1.4664     65.77  V  Q      .         .         .         .
    0.583      1.9824     74.93  .V  Q     .         .         .         .
    0.667      2.5507     82.51  .V  Q     .         .         .         .
```

```
    0.750      3.1584     88.24  . V  Q    .         .         .         .
    0.833      3.8011     93.33  . V  Q    .         .         .         .
    0.917      4.4616     95.90  . V  Q    .         .         .         .
    1.000      5.1291     96.93  .  V Q    .         .         .         .
    1.083      5.8176     99.97  .  V Q    .         .         .         .
    1.167      6.5532    106.81  .   V Q   .         .         .         .
    1.250      7.3492    115.58  .   V Q   .         .         .         .
    1.333      8.1919    122.35  .    VQ   .         .         .         .
    1.417      9.0691    127.37  .     VQ  .         .         .         .
    1.500      9.9988    135.00  .     VQ  .         .         .         .
    1.583     11.0058    146.22  .      VQ .         .         .         .
    1.667     12.0750    155.24  .       Q .         .         .         .
    1.750     13.2077    164.47  .       VQ.         .         .         .
    1.833     14.4560    181.26  .        VQ         .         .         .
    1.917     15.8377    200.62  .         VQ        .         .         .
    2.000     17.2997    212.28  .         .VQ       .         .         .
    2.083     18.7988    217.67  .         . Q       .         .         .
    2.167     20.3667    227.66  .         .  Q      .         .         .
    2.250     22.1344    256.67  .         .   Q     .         .         .
    2.333     24.2054    300.71  .         .     VQ  .         .         .
    2.417     26.5783    344.54  .         .      V Q.         .         .
    2.500     29.3611    404.05  .         .        V.  Q      .         .
    2.583     32.8135    501.29  .         .         .V      Q .         .
    2.667     36.9199    596.26  .         .         .   V     .   Q     .
    2.750     41.2754    632.41  .         .         .      V  .     Q   .
    2.833     45.1850    567.67  .         .         .         V Q       .
    2.917     48.2677    447.62  .         .         .    Q    . V       .
    3.000     50.6094    340.01  .         .        Q.         .  V      .
    3.083     52.4106    261.53  .         .   Q     .         .   V     .
    3.167     53.8042    202.35  .         .Q        .         .    V    .
    3.250     54.8802    156.24  .       Q .         .         .     V   .
    3.333     55.7257    122.76  .      Q  .         .         .      V  .
    3.417     56.4092     99.25  .    Q    .         .         .      V  .
    3.500     56.9749     82.14  .   Q     .         .         .      V  .
    3.583     57.4514     69.18  .  Q      .         .         .       V .
    3.667     57.8558     58.72  .  Q      .         .         .       V .
    3.750     58.1995     49.90  . Q       .         .         .       V .
    3.833     58.4919     42.46  . Q       .         .         .       V .
    3.917     58.7414     36.23  . Q       .         .         .        V.
    4.000     58.9602     31.77  .Q        .         .         .        V.
    4.083     59.1521     27.86  .Q        .         .         .        V.
    4.167     59.3198     24.35  .Q        .         .         .        V.
    4.250     59.4624     20.71  .Q        .         .         .        V.
    4.333     59.5833     17.56  .Q        .         .         .        V.
    4.417     59.6829     14.46  Q         .         .         .        V.
    4.500     59.7629     11.61  Q         .         .         .        V.
    4.583     59.8261      9.18  Q         .         .         .        V.
    4.667     59.8773      7.43  Q         .         .         .        V.
    4.750     59.9227      6.59  Q         .         .         .        V.
    4.833     59.9643      6.05  Q         .         .         .        V.
    4.917     60.0027      5.58  Q         .         .         .        V.
    5.000     60.0385      5.19  Q         .         .         .        V.
    5.083     60.0711      4.73  Q         .         .         .        V.
    5.167     60.1000      4.20  Q         .         .         .        V.
    5.250     60.1262      3.80  Q         .         .         .        V.
    5.333     60.1465      2.96  Q         .         .         .        V.
    5.417     60.1606      2.04  Q         .         .         .        V.
    5.500     60.1677      1.04  Q         .         .         .        V.
    5.583     60.1705      0.41  Q         .         .         .        V.
    5.667     60.1724      0.27  Q         .         .         .        V.
    5.750     60.1734      0.15  Q         .         .         .        V.
    5.833     60.1737      0.04  Q         .         .         .        V.
    5.917     60.1737      0.00  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                 Duration
       Peak Flow Rate                      (minutes)
   =======================                 =========
              0%                             350.0
             10%                             190.0
             20%                             115.0
             30%                              80.0
             40%                              55.0
             50%                              40.0
             60%                              30.0
             70%                              25.0
             80%                              15.0
             90%                              10.0


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE = 3.1
----------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
============================================================================

                     INFLOW
                   (STREAM 2)
                        |
                        |
                        V                __effective depth
                    -----------          |   (and volume)
                   |           |    |    |
                   |           |    |....V........
                   | detention |<-->|           outflow
                   |   basin   |    |........._______
                    -----------     |    ^    |  \
                        |           |  dead   |   basin outlet
                        V           | storage |
                     OUTFLOW         ---------
                   (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) =    0.00


         BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

          INTERVAL    DEPTH      OUTFLOW     STORAGE
           NUMBER      (FT)       (CFS)        (AF)
               1        0.00        0.00       0.000
               2        1.00        0.01      12.220
               3        2.00        0.02      24.740
               4        2.70        0.03      33.660
               5        3.00       33.61      37.530
               6        4.00      303.14      50.660
```

```
============================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-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                                             MEAN
            TIME  DEAD-STORAGE  INFLOW    LOSS   EFFECTIVE OUTFLOW  EFFECTIVE
           (HRS)   FILLED(AF)    (CFS)    (CFS)  DEPTH(FT)  (CFS)   VOLUME(AF)
----------------------------------------------------------------------------
           0.083        0.000     2.79     0.00      0.00      0.0      0.019
           0.167        0.000    13.41     0.00      0.01      0.0      0.112
           0.250        0.000    30.34     0.00      0.03      0.0      0.321
           0.333        0.000    44.78     0.00      0.05      0.0      0.629
           0.417        0.000    55.83     0.00      0.08      0.0      1.013
           0.500        0.000    65.77     0.00      0.12      0.0      1.466
           0.583        0.000    74.93     0.00      0.16      0.0      1.982
           0.667        0.000    82.51     0.00      0.21      0.0      2.551
           0.750        0.000    88.24     0.00      0.26      0.0      3.158
           0.833        0.000    93.33     0.00      0.31      0.0      3.801
           0.917        0.000    95.90     0.00      0.37      0.0      4.461
           1.000        0.000    96.93     0.00      0.42      0.0      5.129
           1.083        0.000    99.97     0.00      0.48      0.0      5.817
           1.167        0.000   106.81     0.00      0.54      0.0      6.553
           1.250        0.000   115.58     0.00      0.60      0.0      7.349
           1.333        0.000   122.35     0.00      0.67      0.0      8.192
           1.417        0.000   127.37     0.00      0.74      0.0      9.069
           1.500        0.000   135.00     0.00      0.82      0.0      9.998
           1.583        0.000   146.22     0.00      0.90      0.0     11.005
           1.667        0.000   155.24     0.00      0.99      0.0     12.074
           1.750        0.000   164.47     0.00      1.08      0.0     13.207
           1.833        0.000   181.26     0.00      1.18      0.0     14.455
           1.917        0.000   200.62     0.00      1.29      0.0     15.837
           2.000        0.000   212.28     0.00      1.41      0.0     17.299
           2.083        0.000   217.67     0.00      1.53      0.0     18.798
           2.167        0.000   227.66     0.00      1.65      0.0     20.366
           2.250        0.000   256.67     0.00      1.79      0.0     22.133
           2.333        0.000   300.71     0.00      1.96      0.0     24.204
           2.417        0.000   344.54     0.00      2.14      0.0     26.577
           2.500        0.000   404.05     0.00      2.36      0.0     29.359
           2.583        0.000   501.29     0.00      2.63      0.0     32.812
           2.667        0.000   596.26     0.00      2.95     13.8     36.823
           2.750        0.000   632.41     0.00      3.24     63.5     40.741
           2.833        0.000   567.67     0.00      3.47    130.4     43.753
           2.917        0.000   447.62     0.00      3.61    180.2     45.594
           3.000        0.000   340.01     0.00      3.68    208.4     46.500
           3.083        0.000   261.53     0.00      3.70    220.6     46.782
           3.167        0.000   202.35     0.00      3.69    222.1     46.645
           3.250        0.000   156.24     0.00      3.66    216.5     46.231
           3.333        0.000   122.76     0.00      3.62    206.3     45.655
           3.417        0.000    99.25     0.00      3.57    193.7     45.005
           3.500        0.000    82.14     0.00      3.52    180.1     44.330
           3.583        0.000    69.18     0.00      3.47    166.3     43.661
           3.667        0.000    58.72     0.00      3.42    152.8     43.013
           3.750        0.000    49.90     0.00      3.37    139.8     42.394
           3.833        0.000    42.46     0.00      3.33    127.4     41.808
           3.917        0.000    36.23     0.00      3.28    115.8     41.260
           4.000        0.000    31.77     0.00      3.25    105.0     40.756
           4.083        0.000    27.86     0.00      3.21     95.1     40.293
           4.167        0.000    24.35     0.00      3.18     86.0     39.869
           4.250        0.000    20.71     0.00      3.15     77.6     39.477
           4.333        0.000    17.56     0.00      3.12     69.9     39.116
           4.417        0.000    14.46     0.00      3.10     62.8     38.784
           4.500        0.000    11.61     0.00      3.07     56.2     38.477
           4.583        0.000     9.18     0.00      3.05     50.1     38.195
```

```
4.667        0.000     7.43     0.00      3.03     44.6      37.938
4.750        0.000     6.59     0.00      3.01     39.7      37.711
4.833        0.000     6.05     0.00      3.00     35.4      37.509
4.917        0.000     5.58     0.00      2.98     32.6      37.323
5.000        0.000     5.19     0.00      2.97     31.0      37.145
5.083        0.000     4.73     0.00      2.96     29.5      36.974
5.167        0.000     4.20     0.00      2.94     28.1      36.809
5.250        0.000     3.80     0.00      2.93     26.7      36.652
5.333        0.000     2.96     0.00      2.92     25.3      36.498
5.417        0.000     2.04     0.00      2.91     24.0      36.347
5.500        0.000     1.04     0.00      2.90     22.7      36.197
5.583        0.000     0.41     0.00      2.89     21.4      36.053
5.667        0.000     0.27     0.00      2.87     20.2      35.915
5.750        0.000     0.15     0.00      2.86     19.0      35.785
5.833        0.000     0.04     0.00      2.86     17.9      35.662
5.917        0.000     0.00     0.00      2.85     16.9      35.546
6.000        0.000     0.00     0.00      2.84     15.9      35.436
6.083        0.000     0.00     0.00      2.83     15.0      35.333
6.167        0.000     0.00     0.00      2.82     14.1      35.236
6.250        0.000     0.00     0.00      2.82     13.3      35.144
6.333        0.000     0.00     0.00      2.81     12.5      35.058
6.417        0.000     0.00     0.00      2.80     11.8      34.976
6.500        0.000     0.00     0.00      2.80     11.1      34.900
6.583        0.000     0.00     0.00      2.79     10.5      34.828
6.667        0.000     0.00     0.00      2.79      9.9      34.760
6.750        0.000     0.00     0.00      2.78      9.3      34.696
6.833        0.000     0.00     0.00      2.78      8.8      34.635
6.917        0.000     0.00     0.00      2.77      8.2      34.578
7.000        0.000     0.00     0.00      2.77      7.8      34.525
7.083        0.000     0.00     0.00      2.76      7.3      34.475
7.167        0.000     0.00     0.00      2.76      6.9      34.427
7.250        0.000     0.00     0.00      2.76      6.5      34.382
7.333        0.000     0.00     0.00      2.75      6.1      34.340
7.417        0.000     0.00     0.00      2.75      5.8      34.300
7.500        0.000     0.00     0.00      2.75      5.4      34.263
7.583        0.000     0.00     0.00      2.74      5.1      34.228
7.667        0.000     0.00     0.00      2.74      4.8      34.195
7.750        0.000     0.00     0.00      2.74      4.5      34.163
7.833        0.000     0.00     0.00      2.74      4.3      34.134
7.917        0.000     0.00     0.00      2.73      4.0      34.106
8.000        0.000     0.00     0.00      2.73      3.8      34.080
8.083        0.000     0.00     0.00      2.73      3.6      34.056
8.167        0.000     0.00     0.00      2.73      3.4      34.032
8.250        0.000     0.00     0.00      2.73      3.2      34.011
8.333        0.000     0.00     0.00      2.73      3.0      33.990
8.417        0.000     0.00     0.00      2.72      2.8      33.971
8.500        0.000     0.00     0.00      2.72      2.6      33.952
8.583        0.000     0.00     0.00      2.72      2.5      33.935
8.667        0.000     0.00     0.00      2.72      2.4      33.919
8.750        0.000     0.00     0.00      2.72      2.2      33.904
8.833        0.000     0.00     0.00      2.72      2.1      33.889
8.917        0.000     0.00     0.00      2.72      2.0      33.876
9.000        0.000     0.00     0.00      2.72      1.9      33.863
9.083        0.000     0.00     0.00      2.71      1.7      33.851
9.167        0.000     0.00     0.00      2.71      1.6      33.840
9.250        0.000     0.00     0.00      2.71      1.5      33.829
9.333        0.000     0.00     0.00      2.71      1.5      33.819
9.417        0.000     0.00     0.00      2.71      1.4      33.810
9.500        0.000     0.00     0.00      2.71      1.3      33.801
9.583        0.000     0.00     0.00      2.71      1.2      33.792
9.667        0.000     0.00     0.00      2.71      1.1      33.784
9.750        0.000     0.00     0.00      2.71      1.1      33.777
9.833        0.000     0.00     0.00      2.71      1.0      33.770
9.917        0.000     0.00     0.00      2.71      1.0      33.763
```

```
10.000       0.000     0.00     0.00     2.71     0.9     33.757
10.083       0.000     0.00     0.00     2.71     0.9     33.751
10.167       0.000     0.00     0.00     2.71     0.8     33.746
10.250       0.000     0.00     0.00     2.71     0.8     33.741
10.333       0.000     0.00     0.00     2.71     0.7     33.736
10.417       0.000     0.00     0.00     2.71     0.7     33.731
10.500       0.000     0.00     0.00     2.71     0.6     33.727
10.583       0.000     0.00     0.00     2.70     0.6     33.723
10.667       0.000     0.00     0.00     2.70     0.6     33.719
10.750       0.000     0.00     0.00     2.70     0.5     33.715
10.833       0.000     0.00     0.00     2.70     0.5     33.712
10.917       0.000     0.00     0.00     2.70     0.5     33.709
11.000       0.000     0.00     0.00     2.70     0.4     33.705
11.083       0.000     0.00     0.00     2.70     0.4     33.703
11.167       0.000     0.00     0.00     2.70     0.4     33.700
11.250       0.000     0.00     0.00     2.70     0.4     33.697
11.333       0.000     0.00     0.00     2.70     0.3     33.695
11.417       0.000     0.00     0.00     2.70     0.3     33.693
11.500       0.000     0.00     0.00     2.70     0.3     33.691
11.583       0.000     0.00     0.00     2.70     0.3     33.689
11.667       0.000     0.00     0.00     2.70     0.3     33.687
11.750       0.000     0.00     0.00     2.70     0.3     33.685
11.833       0.000     0.00     0.00     2.70     0.2     33.683
11.917       0.000     0.00     0.00     2.70     0.2     33.682
12.000       0.000     0.00     0.00     2.70     0.2     33.680
12.083       0.000     0.00     0.00     2.70     0.2     33.679
12.167       0.000     0.00     0.00     2.70     0.2     33.678
12.250       0.000     0.00     0.00     2.70     0.2     33.676
12.333       0.000     0.00     0.00     2.70     0.2     33.675
12.417       0.000     0.00     0.00     2.70     0.2     33.674
12.500       0.000     0.00     0.00     2.70     0.2     33.673
12.583       0.000     0.00     0.00     2.70     0.1     33.672
12.667       0.000     0.00     0.00     2.70     0.1     33.671
12.750       0.000     0.00     0.00     2.70     0.1     33.670
12.833       0.000     0.00     0.00     2.70     0.1     33.669
12.917       0.000     0.00     0.00     2.70     0.1     33.669
13.000       0.000     0.00     0.00     2.70     0.1     33.668
13.083       0.000     0.00     0.00     2.70     0.1     33.667
13.167       0.000     0.00     0.00     2.70     0.1     33.667
13.250       0.000     0.00     0.00     2.70     0.1     33.666
13.333       0.000     0.00     0.00     2.70     0.1     33.665
13.417       0.000     0.00     0.00     2.70     0.1     33.665
13.500       0.000     0.00     0.00     2.70     0.1     33.664
13.583       0.000     0.00     0.00     2.70     0.1     33.664
13.667       0.000     0.00     0.00     2.70     0.1     33.663
13.750       0.000     0.00     0.00     2.70     0.1     33.663
13.833       0.000     0.00     0.00     2.70     0.1     33.663
13.917       0.000     0.00     0.00     2.70     0.1     33.662
14.000       0.000     0.00     0.00     2.70     0.1     33.662
14.083       0.000     0.00     0.00     2.70     0.0     33.662
14.167       0.000     0.00     0.00     2.70     0.0     33.661
14.250       0.000     0.00     0.00     2.70     0.0     33.661
14.333       0.000     0.00     0.00     2.70     0.0     33.661
14.417       0.000     0.00     0.00     2.70     0.0     33.660
14.500       0.000     0.00     0.00     2.70     0.0     33.660
14.583       0.000     0.00     0.00     2.70     0.0     33.660
14.667       0.000     0.00     0.00     2.70     0.0     33.660
14.750       0.000     0.00     0.00     2.70     0.0     33.660
14.833       0.000     0.00     0.00     2.70     0.0     33.659
14.917       0.000     0.00     0.00     2.70     0.0     33.659
15.000       0.000     0.00     0.00     2.70     0.0     33.659
15.083       0.000     0.00     0.00     2.70     0.0     33.659
15.167       0.000     0.00     0.00     2.70     0.0     33.658
15.250       0.000     0.00     0.00     2.70     0.0     33.658
```

```
15.333        0.000     0.00     0.00      2.70      0.0     33.658
15.417        0.000     0.00     0.00      2.70      0.0     33.658
15.500        0.000     0.00     0.00      2.70      0.0     33.657
15.583        0.000     0.00     0.00      2.70      0.0     33.657
15.667        0.000     0.00     0.00      2.70      0.0     33.657
15.750        0.000     0.00     0.00      2.70      0.0     33.657
15.833        0.000     0.00     0.00      2.70      0.0     33.657
15.917        0.000     0.00     0.00      2.70      0.0     33.656
16.000        0.000     0.00     0.00      2.70      0.0     33.656
16.083        0.000     0.00     0.00      2.70      0.0     33.656
16.167        0.000     0.00     0.00      2.70      0.0     33.656
16.250        0.000     0.00     0.00      2.70      0.0     33.655
16.333        0.000     0.00     0.00      2.70      0.0     33.655
16.417        0.000     0.00     0.00      2.70      0.0     33.655
16.500        0.000     0.00     0.00      2.70      0.0     33.655
16.583        0.000     0.00     0.00      2.70      0.0     33.654
16.667        0.000     0.00     0.00      2.70      0.0     33.654
16.750        0.000     0.00     0.00      2.70      0.0     33.654
16.833        0.000     0.00     0.00      2.70      0.0     33.654
16.917        0.000     0.00     0.00      2.70      0.0     33.654
17.000        0.000     0.00     0.00      2.70      0.0     33.653
17.083        0.000     0.00     0.00      2.70      0.0     33.653
17.167        0.000     0.00     0.00      2.70      0.0     33.653
17.250        0.000     0.00     0.00      2.70      0.0     33.653
17.333        0.000     0.00     0.00      2.70      0.0     33.652
17.417        0.000     0.00     0.00      2.70      0.0     33.652
17.500        0.000     0.00     0.00      2.70      0.0     33.652
17.583        0.000     0.00     0.00      2.70      0.0     33.652
17.667        0.000     0.00     0.00      2.70      0.0     33.651
17.750        0.000     0.00     0.00      2.70      0.0     33.651
17.833        0.000     0.00     0.00      2.70      0.0     33.651
17.917        0.000     0.00     0.00      2.70      0.0     33.651
18.000        0.000     0.00     0.00      2.70      0.0     33.651
18.083        0.000     0.00     0.00      2.70      0.0     33.650
18.167        0.000     0.00     0.00      2.70      0.0     33.650
18.250        0.000     0.00     0.00      2.70      0.0     33.650
18.333        0.000     0.00     0.00      2.70      0.0     33.650
18.417        0.000     0.00     0.00      2.70      0.0     33.649
18.500        0.000     0.00     0.00      2.70      0.0     33.649
18.583        0.000     0.00     0.00      2.70      0.0     33.649
18.667        0.000     0.00     0.00      2.70      0.0     33.649
18.750        0.000     0.00     0.00      2.70      0.0     33.649
18.833        0.000     0.00     0.00      2.70      0.0     33.648
18.917        0.000     0.00     0.00      2.70      0.0     33.648
19.000        0.000     0.00     0.00      2.70      0.0     33.648
19.083        0.000     0.00     0.00      2.70      0.0     33.648
19.167        0.000     0.00     0.00      2.70      0.0     33.647
19.250        0.000     0.00     0.00      2.70      0.0     33.647
19.333        0.000     0.00     0.00      2.70      0.0     33.647
19.417        0.000     0.00     0.00      2.70      0.0     33.647
19.500        0.000     0.00     0.00      2.70      0.0     33.646
19.583        0.000     0.00     0.00      2.70      0.0     33.646
19.667        0.000     0.00     0.00      2.70      0.0     33.646
19.750        0.000     0.00     0.00      2.70      0.0     33.646
19.833        0.000     0.00     0.00      2.70      0.0     33.646
19.917        0.000     0.00     0.00      2.70      0.0     33.645
20.000        0.000     0.00     0.00      2.70      0.0     33.645
20.083        0.000     0.00     0.00      2.70      0.0     33.645
20.167        0.000     0.00     0.00      2.70      0.0     33.645
20.250        0.000     0.00     0.00      2.70      0.0     33.644
20.333        0.000     0.00     0.00      2.70      0.0     33.644
20.417        0.000     0.00     0.00      2.70      0.0     33.644
20.500        0.000     0.00     0.00      2.70      0.0     33.644
20.583        0.000     0.00     0.00      2.70      0.0     33.643
```

```
          20.667        0.000     0.00     0.00      2.70      0.0     33.643
          20.750        0.000     0.00     0.00      2.70      0.0     33.643
          20.833        0.000     0.00     0.00      2.70      0.0     33.643
          20.917        0.000     0.00     0.00      2.70      0.0     33.643
          21.000        0.000     0.00     0.00      2.70      0.0     33.642
          21.083        0.000     0.00     0.00      2.70      0.0     33.642
          21.167        0.000     0.00     0.00      2.70      0.0     33.642
          21.250        0.000     0.00     0.00      2.70      0.0     33.642
          21.333        0.000     0.00     0.00      2.70      0.0     33.641
          21.417        0.000     0.00     0.00      2.70      0.0     33.641
          21.500        0.000     0.00     0.00      2.70      0.0     33.641
          21.583        0.000     0.00     0.00      2.70      0.0     33.641
          21.667        0.000     0.00     0.00      2.70      0.0     33.641
          21.750        0.000     0.00     0.00      2.70      0.0     33.640
          21.833        0.000     0.00     0.00      2.70      0.0     33.640
          21.917        0.000     0.00     0.00      2.70      0.0     33.640
          22.000        0.000     0.00     0.00      2.70      0.0     33.640
          22.083        0.000     0.00     0.00      2.70      0.0     33.639
          22.167        0.000     0.00     0.00      2.70      0.0     33.639
          22.250        0.000     0.00     0.00      2.70      0.0     33.639
          22.333        0.000     0.00     0.00      2.70      0.0     33.639
          22.417        0.000     0.00     0.00      2.70      0.0     33.638
          22.500        0.000     0.00     0.00      2.70      0.0     33.638
          22.583        0.000     0.00     0.00      2.70      0.0     33.638
          22.667        0.000     0.00     0.00      2.70      0.0     33.638
          22.750        0.000     0.00     0.00      2.70      0.0     33.638
          22.833        0.000     0.00     0.00      2.70      0.0     33.637
          22.917        0.000     0.00     0.00      2.70      0.0     33.637
          23.000        0.000     0.00     0.00      2.70      0.0     33.637
          23.083        0.000     0.00     0.00      2.70      0.0     33.637
          23.167        0.000     0.00     0.00      2.70      0.0     33.636
          23.250        0.000     0.00     0.00      2.70      0.0     33.636
          23.333        0.000     0.00     0.00      2.70      0.0     33.636
          23.417        0.000     0.00     0.00      2.70      0.0     33.636
          23.500        0.000     0.00     0.00      2.70      0.0     33.635
          23.583        0.000     0.00     0.00      2.70      0.0     33.635
          23.667        0.000     0.00     0.00      2.70      0.0     33.635
          23.750        0.000     0.00     0.00      2.70      0.0     33.635
          23.833        0.000     0.00     0.00      2.70      0.0     33.635
          23.917        0.000     0.00     0.00      2.70      0.0     33.634
----------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =     60.174 AF
    BASIN  STORAGE =     31.494 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =     28.672 AF
    LOSS    VOLUME =      0.000 AF
============================================================================

   ____________________________________________________________________________
****************************************************************************

             F L O O D   R O U T I N G   A N A L Y S I S

ACCORDING TO RIVERSIDE COUNTY FLOOD CONTORL AND WATER CONSERVATION DISTRICT
                     (RCFC&WCD) 1978 HYDROLOGY MANUAL
         (c) Copyright 1989-2015 Advanced Engineering Software (aes)
                 (Synthetic Unit Hydrograph Version 22.0)
                 Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* TRAVERTINE DEVELOPMENT                                                   *
* BASIN ROUTING - 100 YEAR STORM 6 HOUR A + B                              *
* 09-23-2021 6 - 42IN RISERS                                               *
 **************************************************************************

  FILE NAME: TR-BAS6.DAT
  TIME/DATE OF STUDY: 07:46 09/23/2021


****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     10.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     220.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.204 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.350
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.525
         USER-ENTERED RAINFALL =  2.89 INCHES
         RCFC&WCD 6-Hour Storm (5-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  40.850



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                 4.403              117.320
        2                22.644              485.967
        3                50.373              738.765
        4                67.046              444.231
        5                75.561              226.848
        6                80.978              144.325
        7                84.890              104.231
        8                87.828               78.282
        9                90.157               62.038
       10                92.038               50.111
       11                93.582               41.133
       12                94.876               34.477
       13                96.012               30.282
       14                96.844               22.165
       15                97.637               21.120
       16                98.159               13.916
       17                98.452                7.809
       18                98.746                7.814
```

19	99.039	7.809
20	99.332	7.809
21	99.625	7.809
22	99.918	7.809
23	100.000	2.188

```
*****************************************************************************
         UNIT              UNIT            UNIT               EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS             RAINFALL
       (NUMBER)          (INCHES)        (INCHES)             (INCHES)
-----------------------------------------------------------------------------
           1             0.0145           0.0076               0.0069
           2             0.0173           0.0091               0.0082
           3             0.0173           0.0091               0.0082
           4             0.0173           0.0091               0.0082
           5             0.0173           0.0091               0.0082
           6             0.0202           0.0106               0.0096
           7             0.0202           0.0106               0.0096
           8             0.0202           0.0106               0.0096
           9             0.0202           0.0106               0.0096
          10             0.0202           0.0106               0.0096
          11             0.0202           0.0106               0.0096
          12             0.0231           0.0121               0.0110
          13             0.0231           0.0121               0.0110
          14             0.0231           0.0121               0.0110
          15             0.0231           0.0121               0.0110
          16             0.0231           0.0121               0.0110
          17             0.0231           0.0121               0.0110
          18             0.0231           0.0121               0.0110
          19             0.0231           0.0121               0.0110
          20             0.0231           0.0121               0.0110
          21             0.0231           0.0121               0.0110
          22             0.0231           0.0121               0.0110
          23             0.0231           0.0121               0.0110
          24             0.0260           0.0137               0.0124
          25             0.0231           0.0121               0.0110
          26             0.0260           0.0137               0.0124
          27             0.0260           0.0137               0.0124
          28             0.0260           0.0137               0.0124
          29             0.0260           0.0137               0.0124
          30             0.0260           0.0137               0.0124
          31             0.0260           0.0137               0.0124
          32             0.0260           0.0137               0.0124
          33             0.0289           0.0152               0.0137
          34             0.0289           0.0152               0.0137
          35             0.0289           0.0152               0.0137
          36             0.0289           0.0152               0.0137
          37             0.0289           0.0152               0.0137
          38             0.0318           0.0167               0.0151
          39             0.0318           0.0167               0.0151
          40             0.0318           0.0167               0.0151
          41             0.0347           0.0182               0.0165
          42             0.0376           0.0197               0.0178
          43             0.0405           0.0212               0.0192
          44             0.0405           0.0212               0.0192
          45             0.0434           0.0228               0.0206
          46             0.0434           0.0228               0.0206
          47             0.0462           0.0243               0.0220
          48             0.0462           0.0243               0.0220
          49             0.0491           0.0258               0.0233
          50             0.0520           0.0273               0.0247
          51             0.0549           0.0288               0.0261
          52             0.0578           0.0292               0.0286
          53             0.0607           0.0292               0.0315
          54             0.0607           0.0292               0.0315
          55             0.0636           0.0292               0.0344
          56             0.0665           0.0292               0.0373
          57             0.0694           0.0292               0.0402
          58             0.0694           0.0292               0.0402
```

```
          59             0.0723           0.0292              0.0431
          60             0.0751           0.0292              0.0460
          61             0.0896           0.0292              0.0604
          62             0.1040           0.0292              0.0749
          63             0.1127           0.0292              0.0835
          64             0.1214           0.0292              0.0922
          65             0.1358           0.0292              0.1067
          66             0.1618           0.0292              0.1327
          67             0.0549           0.0288              0.0261
          68             0.0260           0.0137              0.0124
          69             0.0173           0.0091              0.0082
          70             0.0145           0.0076              0.0069
          71             0.0087           0.0046              0.0041
          72             0.0058           0.0030              0.0027

         TOTAL STORM RAINFALL(INCHES) =  2.89
         TOTAL SOIL-LOSS(INCHES) =  1.26
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.63

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      23.1566
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      29.8836
----------------------------------------------------------------------------
```

```
============================================================================

                          6 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
----------------------------------------------------------------------------
   0.083      0.0055      0.81  Q         .         .         .         .
   0.167      0.0352      4.30  Q         .         .         .         .
   0.250      0.1043     10.04  VQ        .         .         .         .
   0.333      0.2014     14.10  VQ        .         .         .         .
   0.417      0.3135     16.27  V Q       .         .         .         .
   0.500      0.4356     17.73  V Q       .         .         .         .
   0.583      0.5686     19.31  V Q       .         .         .         .
   0.667      0.7133     21.01  V Q       .         .         .         .
   0.750      0.8659     22.15  .VQ       .         .         .         .
   0.833      1.0235     22.89  .V Q      .         .         .         .
   0.917      1.1850     23.44  .V Q      .         .         .         .
   1.000      1.3505     24.04  .V Q      .         .         .         .
   1.083      1.5232     25.07  . VQ      .         .         .         .
   1.167      1.7047     26.36  . VQ      .         .         .         .
   1.250      1.8921     27.21  . VQ      .         .         .         .
   1.333      2.0830     27.71  . VQ      .         .         .         .
   1.417      2.2760     28.03  .  Q      .         .         .         .
   1.500      2.4707     28.27  .  Q      .         .         .         .
   1.583      2.6668     28.48  .  Q      .         .         .         .
   1.667      2.8642     28.66  .  Q      .         .         .         .
   1.750      3.0626     28.81  .  QV     .         .         .         .
   1.833      3.2619     28.94  .  QV     .         .         .         .
   1.917      3.4617     29.02  .  QV     .         .         .         .
   2.000      3.6631     29.24  .  QV     .         .         .         .
   2.083      3.8683     29.79  .  Q V    .         .         .         .
   2.167      4.0772     30.33  .   QV    .         .         .         .
   2.250      4.2881     30.63  .   QV    .         .         .         .
   2.333      4.5040     31.36  .   Q V   .         .         .         .
   2.417      4.7235     31.86  .   Q V   .         .         .         .
   2.500      4.9448     32.13  .   Q V   .         .         .         .
   2.583      5.1672     32.30  .   Q V   .         .         .         .
   2.667      5.3906     32.44  .   Q  V  .         .         .         .
   2.750      5.6158     32.70  .   Q  V  .         .         .         .
   2.833      5.8461     33.44  .   Q  V  .         .         .         .
   2.917      6.0838     34.51  .   Q   V .         .         .         .
   3.000      6.3261     35.18  .   Q   V .         .         .         .
   3.083      6.5707     35.52  .   Q   V .         .         .         .
   3.167      6.8181     35.92  .   Q    V.         .         .         .
   3.250      7.0712     36.75  .   Q    V.         .         .         .
   3.333      7.3322     37.89  .    Q   V.         .         .         .
   3.417      7.5992     38.77  .    Q    V         .         .         .
   3.500      7.8746     39.99  .    Q    V         .         .         .
   3.583      8.1646     42.10  .    Q    V         .         .         .
   3.667      8.4717     44.59  .    Q    .V        .         .         .
   3.750      8.7943     46.85  .     Q   .V        .         .         .
   3.833      9.1300     48.75  .     Q   . V       .         .         .
   3.917      9.4791     50.68  .     Q   . V       .         .         .
   4.000      9.8406     52.49  .     Q   .  V      .         .         .
   4.083     10.2150     54.37  .      Q  .  V      .         .         .
   4.167     10.6029     56.32  .      Q  .   V     .         .         .
   4.250     11.0083     58.87  .      Q  .   V     .         .         .
   4.333     11.4351     61.97  .       Q .    V    .         .         .
```

```
    4.417     11.8889     65.89  .       Q .    V    .         .         .
    4.500     12.3753     70.62  .        Q.     V   .         .         .
    4.583     12.8927     75.13  .         Q      V  .         .         .
    4.667     13.4395     79.39  .         Q      V  .         .         .
    4.750     14.0235     84.80  .         .Q      V .         .         .
    4.833     14.6481     90.70  .         . Q      V.         .         .
    4.917     15.3088     95.93  .         . Q       V         .         .
    5.000     16.0022    100.68  .         .  Q      .V        .         .
    5.083     16.7447    107.81  .         .   Q     . V       .         .
    5.167     17.5802    121.32  .         .     Q   .  V      .         .
    5.250     18.5653    143.04  .         .        Q.   V     .         .
    5.333     19.7174    167.27  .         .         . Q   V   .         .
    5.417     21.0305    190.67  .         .         .    Q  V .         .
    5.500     22.5281    217.44  .         .         .       Q V         .
    5.583     24.1707    238.51  .         .         .         .QV       .
    5.667     25.6670    217.27  .         .         .       Q .   V     .
    5.750     26.7066    150.94  .         .         Q         .    V    .
    5.833     27.4155    102.93  .         .  Q      .         .     V   .
    5.917     27.9443     76.79  .         Q         .         .      V  .
    6.000     28.3586     60.16  .       Q .         .         .      V  .
    6.083     28.6851     47.40  .     Q   .         .         .       V .
    6.167     28.9406     37.10  .   Q     .         .         .       V .
    6.250     29.1386     28.75  .  Q      .         .         .        V.
    6.333     29.2957     22.80  .  Q      .         .         .        V.
    6.417     29.4223     18.38  . Q       .         .         .        V.
    6.500     29.5243     14.81  .Q        .         .         .        V.
    6.583     29.6045     11.65  .Q        .         .         .        V.
    6.667     29.6692      9.39  .Q        .         .         .        V.
    6.750     29.7186      7.18  Q         .         .         .        V.
    6.833     29.7577      5.67  Q         .         .         .        V.
    6.917     29.7913      4.88  Q         .         .         .        V.
    7.000     29.8198      4.14  Q         .         .         .        V.
    7.083     29.8431      3.38  Q         .         .         .        V.
    7.167     29.8610      2.60  Q         .         .         .        V.
    7.250     29.8731      1.76  Q         .         .         .        V.
    7.333     29.8784      0.76  Q         .         .         .        V.
    7.417     29.8806      0.33  Q         .         .         .        V.
    7.500     29.8820      0.20  Q         .         .         .        V.
    7.583     29.8828      0.13  Q         .         .         .        V.
    7.667     29.8833      0.07  Q         .         .         .        V.
    7.750     29.8835      0.03  Q         .         .         .        V.
    7.833     29.8836      0.01  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             470.0
              10%                             320.0
              20%                             135.0
              30%                              85.0
              40%                              60.0
              50%                              40.0
              60%                              30.0
              70%                              25.0
              80%                              15.0
              90%                              15.0


 ****************************************************************************
   FLOW PROCESS FROM NODE      2.00 TO NODE     10.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #2)

         WATERSHED AREA =     295.700 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.322 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.358
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.545
         USER-ENTERED RAINFALL =  2.89 INCHES
         RCFC&WCD 6-Hour Storm (5-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  25.880



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1                 2.366                 84.607
        2                10.202                280.224
        3                24.613                515.375
        4                43.211                665.070
        5                58.251                537.840
        6                67.091                316.147
        7                72.914                208.215
        8                77.143                151.237
        9                80.487                119.614
       10                83.170                 95.934
       11                85.423                 80.569
       12                87.296                 66.975
       13                88.853                 55.683
       14                90.286                 51.265
       15                91.500                 43.381
       16                92.561                 37.949
       17                93.519                 34.276
       18                94.379                 30.764
       19                95.141                 27.218
       20                95.884                 26.586
       21                96.438                 19.810
       22                96.940                 17.969
       23                97.443                 17.964
       24                97.921                 17.111
       25                98.166                  8.744
       26                98.351                  6.634
       27                98.537                  6.650
       28                98.723                  6.639
       29                98.909                  6.645
       30                99.094                  6.644
       31                99.280                  6.644
       32                99.466                  6.644
```

33	99.652	6.644
34	99.838	6.644
35	100.000	5.808

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0145           0.0079              0.0066
           2             0.0173           0.0095              0.0079
           3             0.0173           0.0095              0.0079
           4             0.0173           0.0095              0.0079
           5             0.0173           0.0095              0.0079
           6             0.0202           0.0110              0.0092
           7             0.0202           0.0110              0.0092
           8             0.0202           0.0110              0.0092
           9             0.0202           0.0110              0.0092
          10             0.0202           0.0110              0.0092
          11             0.0202           0.0110              0.0092
          12             0.0231           0.0126              0.0105
          13             0.0231           0.0126              0.0105
          14             0.0231           0.0126              0.0105
          15             0.0231           0.0126              0.0105
          16             0.0231           0.0126              0.0105
          17             0.0231           0.0126              0.0105
          18             0.0231           0.0126              0.0105
          19             0.0231           0.0126              0.0105
          20             0.0231           0.0126              0.0105
          21             0.0231           0.0126              0.0105
          22             0.0231           0.0126              0.0105
          23             0.0231           0.0126              0.0105
          24             0.0260           0.0142              0.0118
          25             0.0231           0.0126              0.0105
          26             0.0260           0.0142              0.0118
          27             0.0260           0.0142              0.0118
          28             0.0260           0.0142              0.0118
          29             0.0260           0.0142              0.0118
          30             0.0260           0.0142              0.0118
          31             0.0260           0.0142              0.0118
          32             0.0260           0.0142              0.0118
          33             0.0289           0.0158              0.0131
          34             0.0289           0.0158              0.0131
          35             0.0289           0.0158              0.0131
          36             0.0289           0.0158              0.0131
          37             0.0289           0.0158              0.0131
          38             0.0318           0.0173              0.0145
          39             0.0318           0.0173              0.0145
          40             0.0318           0.0173              0.0145
          41             0.0347           0.0189              0.0158
          42             0.0376           0.0205              0.0171
          43             0.0405           0.0221              0.0184
          44             0.0405           0.0221              0.0184
          45             0.0434           0.0236              0.0197
          46             0.0434           0.0236              0.0197
          47             0.0462           0.0252              0.0210
          48             0.0462           0.0252              0.0210
          49             0.0491           0.0268              0.0224
          50             0.0520           0.0284              0.0237
          51             0.0549           0.0298              0.0251
          52             0.0578           0.0298              0.0280
          53             0.0607           0.0298              0.0309
          54             0.0607           0.0298              0.0309
          55             0.0636           0.0298              0.0337
          56             0.0665           0.0298              0.0366
          57             0.0694           0.0298              0.0395
          58             0.0694           0.0298              0.0395
```

```
          59              0.0723           0.0298              0.0424
          60              0.0751           0.0298              0.0453
          61              0.0896           0.0298              0.0598
          62              0.1040           0.0298              0.0742
          63              0.1127           0.0298              0.0829
          64              0.1214           0.0298              0.0915
          65              0.1358           0.0298              0.1060
          66              0.1618           0.0298              0.1320
          67              0.0549           0.0298              0.0251
          68              0.0260           0.0142              0.0118
          69              0.0173           0.0095              0.0079
          70              0.0145           0.0079              0.0066
          71              0.0087           0.0047              0.0039
          72              0.0058           0.0032              0.0026

         TOTAL STORM RAINFALL(INCHES) =  2.89
         TOTAL SOIL-LOSS(INCHES) =  1.30
         TOTAL EFFECTIVE RAINFALL(INCHES) =  1.59

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      32.0974
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      39.0968
----------------------------------------------------------------------------
```

```
============================================================================

                          6 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
----------------------------------------------------------------------------
   0.083      0.0038      0.56  Q         .         .         .         .
   0.167      0.0211      2.51  Q         .         .         .         .
   0.250      0.0643      6.27  Q         .         .         .         .
   0.333      0.1422     11.32  VQ        .         .         .         .
   0.417      0.2505     15.73  V Q       .         .         .         .
   0.500      0.3788     18.63  V Q       .         .         .         .
   0.583      0.5219     20.78  V Q       .         .         .         .
   0.667      0.6784     22.72  V  Q      .         .         .         .
   0.750      0.8477     24.58  V  Q      .         .         .         .
   0.833      1.0273     26.08  .V Q      .         .         .         .
   0.917      1.2143     27.15  .V Q      .         .         .         .
   1.000      1.4077     28.08  .V Q      .         .         .         .
   1.083      1.6082     29.10  .V Q      .         .         .         .
   1.167      1.8172     30.35  .V  Q     .         .         .         .
   1.250      2.0355     31.70  . V Q     .         .         .         .
   1.333      2.2616     32.82  . V Q     .         .         .         .
   1.417      2.4930     33.60  . V Q     .         .         .         .
   1.500      2.7285     34.20  . V Q     .         .         .         .
   1.583      2.9673     34.68  .  VQ     .         .         .         .
   1.667      3.2091     35.11  .  VQ     .         .         .         .
   1.750      3.4532     35.45  .  VQ     .         .         .         .
   1.833      3.6994     35.74  .  VQ     .         .         .         .
   1.917      3.9474     36.01  .   Q     .         .         .         .
   2.000      4.1979     36.37  .   Q     .         .         .         .
   2.083      4.4514     36.81  .   Q     .         .         .         .
   2.167      4.7087     37.37  .   Q     .         .         .         .
   2.250      4.9708     38.06  .    Q    .         .         .         .
   2.333      5.2373     38.69  .    Q    .         .         .         .
   2.417      5.5086     39.39  .    Q    .         .         .         .
   2.500      5.7844     40.05  .    Q    .         .         .         .
   2.583      6.0633     40.49  .    QV   .         .         .         .
   2.667      6.3443     40.81  .    QV   .         .         .         .
   2.750      6.6279     41.17  .    QV   .         .         .         .
   2.833      6.9155     41.76  .    Q V  .         .         .         .
   2.917      7.2091     42.63  .    Q V  .         .         .         .
   3.000      7.5095     43.62  .    Q V  .         .         .         .
   3.083      7.8155     44.43  .    Q V  .         .         .         .
   3.167      8.1257     45.04  .     Q V .         .         .         .
   3.250      8.4408     45.76  .     Q V .         .         .         .
   3.333      8.7624     46.70  .     Q V .         .         .         .
   3.417      9.0923     47.90  .     Q  V.         .         .         .
   3.500      9.4315     49.26  .     Q  V.         .         .         .
   3.583      9.7827     50.99  .     Q   V         .         .         .
   3.667     10.1498     53.31  .      Q  V         .         .         .
   3.750     10.5354     55.99  .      Q  V         .         .         .
   3.833     10.9391     58.61  .      Q  .V        .         .         .
   3.917     11.3593     61.01  .       Q .V        .         .         .
   4.000     11.7952     63.31  .       Q . V       .         .         .
   4.083     12.2469     65.58  .       Q . V       .         .         .
   4.167     12.7150     67.96  .        Q.  V      .         .         .
   4.250     13.2013     70.61  .        Q.  V      .         .         .
   4.333     13.7098     73.84  .        Q.   V     .         .         .
```

```
    4.417     14.2468     77.98  .         Q   V     .         .         .
    4.500     14.8183     82.97  .         .Q   V    .         .         .
    4.583     15.4285     88.61  .         .Q   V    .         .         .
    4.667     16.0794     94.51  .         . Q   V   .         .         .
    4.750     16.7720    100.56  .         .  Q   V  .         .         .
    4.833     17.5097    107.12  .         .   Q  V  .         .         .
    4.917     18.2953    114.06  .         .    Q  V .         .         .
    5.000     19.1278    120.88  .         .     Q  V.         .         .
    5.083     20.0135    128.60  .         .      Q  V         .         .
    5.167     20.9789    140.18  .         .       Q .V        .         .
    5.250     22.0675    158.07  .         .         .QV       .         .
    5.333     23.3245    182.52  .         .         .  VQ     .         .
    5.417     24.7776    210.99  .         .         .    V  Q .         .
    5.500     26.4449    242.09  .         .         .      V  . Q       .
    5.583     28.2880    267.61  .         .         .       V .    Q    .
    5.667     30.1727    273.67  .         .         .         V     Q   .
    5.750     31.8900    249.35  .         .         .         . VQ      .
    5.833     33.2406    196.11  .         .         .     Q   .   V     .
    5.917     34.2342    144.27  .         .        Q.         .    V    .
    6.000     35.0032    111.66  .         .   Q     .         .    V    .
    6.083     35.6229     89.98  .         .Q        .         .     V   .
    6.167     36.1320     73.93  .        Q.         .         .     V   .
    6.250     36.5517     60.94  .       Q .         .         .      V  .
    6.333     36.9003     50.61  .     Q   .         .         .      V  .
    6.417     37.1931     42.52  .    Q    .         .         .       V .
    6.500     37.4443     36.47  .   Q     .         .         .       V .
    6.583     37.6640     31.89  .   Q     .         .         .       V .
    6.667     37.8554     27.79  .  Q      .         .         .       V .
    6.750     38.0235     24.41  .  Q      .         .         .       V .
    6.833     38.1719     21.54  . Q       .         .         .        V.
    6.917     38.3027     19.00  . Q       .         .         .        V.
    7.000     38.4181     16.75  . Q       .         .         .        V.
    7.083     38.5195     14.72  .Q        .         .         .        V.
    7.167     38.6056     12.50  .Q        .         .         .        V.
    7.250     38.6805     10.88  .Q        .         .         .        V.
    7.333     38.7457      9.47  .Q        .         .         .        V.
    7.417     38.8005      7.96  .Q        .         .         .        V.
    7.500     38.8441      6.32  Q         .         .         .        V.
    7.583     38.8822      5.53  Q         .         .         .        V.
    7.667     38.9172      5.09  Q         .         .         .        V.
    7.750     38.9497      4.72  Q         .         .         .        V.
    7.833     38.9798      4.36  Q         .         .         .        V.
    7.917     39.0073      4.00  Q         .         .         .        V.
    8.000     39.0319      3.56  Q         .         .         .        V.
    8.083     39.0529      3.06  Q         .         .         .        V.
    8.167     39.0701      2.50  Q         .         .         .        V.
    8.250     39.0831      1.88  Q         .         .         .        V.
    8.333     39.0910      1.15  Q         .         .         .        V.
    8.417     39.0935      0.36  Q         .         .         .        V.
    8.500     39.0949      0.21  Q         .         .         .        V.
    8.583     39.0958      0.13  Q         .         .         .        V.
    8.667     39.0964      0.08  Q         .         .         .        V.
    8.750     39.0967      0.04  Q         .         .         .        V.
    8.833     39.0968      0.02  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             530.0
              10%                             345.0
```

```
             20%                             155.0
             30%                             100.0
             40%                              70.0
             50%                              50.0
             60%                              35.0
             70%                              30.0
             80%                              20.0
             90%                              15.0

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
============================================================================

            STREAM HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      150.0     300.0     450.0     600.0
----------------------------------------------------------------------------
   0.083      0.0094      1.36  Q         .         .         .         .
   0.167      0.0563      6.81  Q         .         .         .         .
   0.250      0.1686     16.31  VQ        .         .         .         .
   0.333      0.3437     25.42  VQ        .         .         .         .
   0.417      0.5640     32.00  V Q       .         .         .         .
   0.500      0.8144     36.36  V Q       .         .         .         .
   0.583      1.0905     40.09  V Q       .         .         .         .
   0.667      1.3917     43.73  V Q       .         .         .         .
   0.750      1.7136     46.73  V  Q      .         .         .         .
   0.833      2.0509     48.97  .V Q      .         .         .         .
   0.917      2.3993     50.59  .V Q      .         .         .         .
   1.000      2.7582     52.12  .V Q      .         .         .         .
   1.083      3.1313     54.17  .V Q      .         .         .         .
   1.167      3.5219     56.71  . VQ      .         .         .         .
   1.250      3.9276     58.92  . VQ      .         .         .         .
   1.333      4.3445     60.53  . V Q     .         .         .         .
   1.417      4.7689     61.63  . V Q     .         .         .         .
   1.500      5.1992     62.47  .  VQ     .         .         .         .
   1.583      5.6341     63.16  .  VQ     .         .         .         .
   1.667      6.0733     63.76  .  VQ     .         .         .         .
   1.750      6.5158     64.25  .  VQ     .         .         .         .
   1.833      6.9612     64.68  .   Q     .         .         .         .
   1.917      7.4091     65.04  .   Q     .         .         .         .
   2.000      7.8610     65.61  .   Q     .         .         .         .
   2.083      8.3196     66.59  .   Q     .         .         .         .
   2.167      8.7859     67.70  .   QV    .         .         .         .
   2.250      9.2589     68.68  .   QV    .         .         .         .
   2.333      9.7413     70.05  .   QV    .         .         .         .
   2.417     10.2320     71.25  .   QV    .         .         .         .
   2.500     10.7292     72.18  .   Q V   .         .         .         .
   2.583     11.2305     72.79  .   Q V   .         .         .         .
   2.667     11.7350     73.24  .   Q V   .         .         .         .
   2.750     12.2437     73.87  .   Q  V  .         .         .         .
   2.833     12.7616     75.20  .    Q V  .         .         .         .
   2.917     13.2929     77.14  .    Q V  .         .         .         .
   3.000     13.8356     78.80  .    Q  V .         .         .         .
```

```
3.083     14.3862      79.95  .    Q  V .         .         .         .
3.167     14.9438      80.96  .    Q  V .         .         .         .
3.250     15.5120      82.51  .    Q  V .         .         .         .
3.333     16.0946      84.60  .    Q   V.         .         .         .
3.417     16.6915      86.67  .    Q   V.         .         .         .
3.500     17.3062      89.25  .    Q    V         .         .         .
3.583     17.9473      93.08  .     Q   V         .         .         .
3.667     18.6215      97.89  .     Q   V         .         .         .
3.750     19.3297     102.84  .     Q   .V        .         .         .
3.833     20.0691     107.36  .      Q  .V        .         .         .
3.917     20.8383     111.69  .      Q  . V       .         .         .
4.000     21.6358     115.79  .      Q  . V       .         .         .
4.083     22.4619     119.95  .      Q  .  V      .         .         .
4.167     23.3179     124.28  .       Q .  V      .         .         .
4.250     24.2096     129.48  .       Q .   V     .         .         .
4.333     25.1449     135.81  .        Q.   V     .         .         .
4.417     26.1358     143.87  .        Q.    V    .         .         .
4.500     27.1935     153.59  .         Q    V    .         .         .
4.583     28.3212     163.74  .         Q     V   .         .         .
4.667     29.5189     173.90  .         .Q     V  .         .         .
4.750     30.7955     185.36  .         . Q    V  .         .         .
4.833     32.1579     197.82  .         .  Q    V .         .         .
4.917     33.6041     209.99  .         .  Q     V.         .         .
5.000     35.1300     221.56  .         .   Q     V         .         .
5.083     36.7582     236.41  .         .    Q    .V        .         .
5.167     38.5592     261.50  .         .      Q  . V       .         .
5.250     40.6329     301.11  .         .         Q  V      .         .
5.333     43.0419     349.79  .         .         .  QV     .         .
5.417     45.8082     401.66  .         .         .     Q   .         .
5.500     48.9730     459.53  .         .         .       V Q         .
5.583     52.4587     506.12  .         .         .         V  Q      .
5.667     55.8398     490.94  .         .         .         . Q       .
5.750     58.5965     400.28  .         .         .     Q   .  V      .
5.833     60.6560     299.04  .         .        Q.         .    V    .
5.917     62.1785     221.06  .         .   Q     .         .     V   .
6.000     63.3618     171.82  .         .Q        .         .     V   .
6.083     64.3080     137.38  .        Q.         .         .      V  .
6.167     65.0727     111.03  .      Q  .         .         .      V  .
6.250     65.6904      89.69  .    Q    .         .         .       V .
6.333     66.1960      73.42  .   Q     .         .         .       V .
6.417     66.6154      60.90  .   Q     .         .         .       V .
6.500     66.9686      51.28  .  Q      .         .         .       V .
6.583     67.2685      43.55  . Q       .         .         .        V.
6.667     67.5246      37.19  . Q       .         .         .        V.
6.750     67.7422      31.59  . Q       .         .         .        V.
6.833     67.9296      27.21  .Q        .         .         .        V.
6.917     68.0940      23.88  .Q        .         .         .        V.
7.000     68.2379      20.89  .Q        .         .         .        V.
7.083     68.3626      18.10  .Q        .         .         .        V.
7.167     68.4666      15.10  .Q        .         .         .        V.
7.250     68.5536      12.64  Q         .         .         .        V.
7.333     68.6241      10.23  Q         .         .         .        V.
7.417     68.6811       8.29  Q         .         .         .        V.
7.500     68.7260       6.52  Q         .         .         .        V.
7.583     68.7650       5.66  Q         .         .         .        V.
7.667     68.8005       5.16  Q         .         .         .        V.
7.750     68.8332       4.75  Q         .         .         .        V.
7.833     68.8633       4.37  Q         .         .         .        V.
7.917     68.8909       4.00  Q         .         .         .        V.
8.000     68.9154       3.56  Q         .         .         .        V.
8.083     68.9365       3.06  Q         .         .         .        V.
8.167     68.9537       2.50  Q         .         .         .        V.
8.250     68.9666       1.88  Q         .         .         .        V.
8.333     68.9745       1.15  Q         .         .         .        V.
```

```
    8.417     68.9771      0.36  Q         .         .         .        V.
    8.500     68.9785      0.21  Q         .         .         .        V.
    8.583     68.9794      0.13  Q         .         .         .        V.
    8.667     68.9800      0.08  Q         .         .         .        V.
    8.750     68.9802      0.04  Q         .         .         .        V.
    8.833     68.9803      0.02  Q         .         .         .         V
    8.917     68.9803      0.00  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             530.0
              10%                             335.0
              20%                             150.0
              30%                              95.0
              40%                              65.0
              50%                              45.0
              60%                              30.0
              70%                              25.0
              80%                              15.0
              90%                              15.0


 *****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE = 3.1
 -----------------------------------------------------------------------------
   >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
 =============================================================================

                      INFLOW
                    (STREAM 2)
                         |
                         |
                         V                __effective depth
                     -----------          |   (and volume)
                    |           |    |    |
                    |           |    |....V........
                    | detention |<-->|           outflow
                    |   basin   |    |.........________
                     -----------     |    ^    |  \
                         |           |  dead   |   basin outlet
                         V           | storage |
                      OUTFLOW         ---------
                    (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) =    0.00


          BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

           INTERVAL    DEPTH      OUTFLOW     STORAGE
            NUMBER      (FT)       (CFS)        (AF)
```

```
               1        0.00        0.00       0.000
               2        1.00        0.01      12.220
               3        2.00        0.02      24.740
               4        2.70        0.03      33.660
               5        3.00       33.61      37.530
               6        4.00      303.14      50.660


=============================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-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                                              MEAN
            TIME  DEAD-STORAGE  INFLOW    LOSS   EFFECTIVE OUTFLOW   EFFECTIVE
           (HRS)   FILLED(AF)    (CFS)    (CFS)  DEPTH(FT)   (CFS)   VOLUME(AF)
-----------------------------------------------------------------------------
           0.083        0.000     1.36     0.00       0.00      0.0      0.009
           0.167        0.000     6.81     0.00       0.00      0.0      0.056
           0.250        0.000    16.31     0.00       0.01      0.0      0.169
           0.333        0.000    25.42     0.00       0.03      0.0      0.344
           0.417        0.000    32.00     0.00       0.05      0.0      0.564
           0.500        0.000    36.36     0.00       0.07      0.0      0.814
           0.583        0.000    40.09     0.00       0.09      0.0      1.091
           0.667        0.000    43.73     0.00       0.11      0.0      1.392
           0.750        0.000    46.73     0.00       0.14      0.0      1.714
           0.833        0.000    48.97     0.00       0.17      0.0      2.051
           0.917        0.000    50.59     0.00       0.20      0.0      2.399
           1.000        0.000    52.12     0.00       0.23      0.0      2.758
           1.083        0.000    54.17     0.00       0.26      0.0      3.131
           1.167        0.000    56.71     0.00       0.29      0.0      3.522
           1.250        0.000    58.92     0.00       0.32      0.0      3.928
           1.333        0.000    60.53     0.00       0.36      0.0      4.344
           1.417        0.000    61.63     0.00       0.39      0.0      4.769
           1.500        0.000    62.47     0.00       0.43      0.0      5.199
           1.583        0.000    63.16     0.00       0.46      0.0      5.634
           1.667        0.000    63.76     0.00       0.50      0.0      6.073
           1.750        0.000    64.25     0.00       0.53      0.0      6.515
           1.833        0.000    64.68     0.00       0.57      0.0      6.961
           1.917        0.000    65.04     0.00       0.61      0.0      7.409
           2.000        0.000    65.61     0.00       0.64      0.0      7.861
           2.083        0.000    66.59     0.00       0.68      0.0      8.319
           2.167        0.000    67.70     0.00       0.72      0.0      8.785
           2.250        0.000    68.68     0.00       0.76      0.0      9.258
           2.333        0.000    70.05     0.00       0.80      0.0      9.741
           2.417        0.000    71.25     0.00       0.84      0.0     10.231
           2.500        0.000    72.18     0.00       0.88      0.0     10.728
           2.583        0.000    72.79     0.00       0.92      0.0     11.230
           2.667        0.000    73.24     0.00       0.96      0.0     11.734
           2.750        0.000    73.87     0.00       1.00      0.0     12.243
           2.833        0.000    75.20     0.00       1.04      0.0     12.761
           2.917        0.000    77.14     0.00       1.09      0.0     13.292
           3.000        0.000    78.80     0.00       1.13      0.0     13.834
           3.083        0.000    79.95     0.00       1.17      0.0     14.385
           3.167        0.000    80.96     0.00       1.22      0.0     14.942
           3.250        0.000    82.51     0.00       1.26      0.0     15.510
           3.333        0.000    84.60     0.00       1.31      0.0     16.093
           3.417        0.000    86.67     0.00       1.36      0.0     16.690
           3.500        0.000    89.25     0.00       1.41      0.0     17.304
           3.583        0.000    93.08     0.00       1.46      0.0     17.945
           3.667        0.000    97.89     0.00       1.51      0.0     18.619
           3.750        0.000   102.84     0.00       1.57      0.0     19.328
           3.833        0.000   107.36     0.00       1.63      0.0     20.067
           3.917        0.000   111.69     0.00       1.69      0.0     20.836
```

```
4.000        0.000   115.79     0.00      1.75      0.0     21.633
4.083        0.000   119.95     0.00      1.82      0.0     22.459
4.167        0.000   124.28     0.00      1.89      0.0     23.315
4.250        0.000   129.48     0.00      1.96      0.0     24.207
4.333        0.000   135.81     0.00      2.03      0.0     25.142
4.417        0.000   143.87     0.00      2.11      0.0     26.132
4.500        0.000   153.59     0.00      2.19      0.0     27.190
4.583        0.000   163.74     0.00      2.28      0.0     28.318
4.667        0.000   173.90     0.00      2.37      0.0     29.515
4.750        0.000   185.36     0.00      2.47      0.0     30.791
4.833        0.000   197.82     0.00      2.58      0.0     32.154
4.917        0.000   209.99     0.00      2.70      0.0     33.600
5.000        0.000   221.56     0.00      2.81      6.2     35.083
5.083        0.000   236.41     0.00      2.93     18.9     36.581
5.167        0.000   261.50     0.00      3.05     35.7     38.136
5.250        0.000   301.11     0.00      3.17     62.9     39.777
5.333        0.000   349.79     0.00      3.30     97.6     41.514
5.417        0.000   401.66     0.00      3.44    134.3     43.355
5.500        0.000   459.53     0.00      3.59    173.4     45.326
5.583        0.000   506.12     0.00      3.75    214.3     47.336
5.667        0.000   490.94     0.00      3.87    251.8     48.983
5.750        0.000   400.28     0.00      3.94    277.4     49.829
5.833        0.000   299.04     0.00      3.94    286.9     49.912
5.917        0.000   221.06     0.00      3.91    283.4     49.483
6.000        0.000   171.82     0.00      3.86    271.9     48.794
6.083        0.000   137.38     0.00      3.80    256.4     47.974
6.167        0.000   111.03     0.00      3.73    239.0     47.093
6.250        0.000    89.69     0.00      3.66    220.7     46.191
6.333        0.000    73.42     0.00      3.59    202.3     45.303
6.417        0.000    60.90     0.00      3.53    184.4     44.452
6.500        0.000    51.28     0.00      3.47    167.5     43.652
6.583        0.000    43.55     0.00      3.41    151.6     42.908
6.667        0.000    37.19     0.00      3.36    136.9     42.221
6.750        0.000    31.59     0.00      3.31    123.4     41.588
6.833        0.000    27.21     0.00      3.27    111.0     41.011
6.917        0.000    23.88     0.00      3.23     99.7     40.489
7.000        0.000    20.89     0.00      3.19     89.5     40.016
7.083        0.000    18.10     0.00      3.16     80.3     39.588
7.167        0.000    15.10     0.00      3.13     71.9     39.198
7.250        0.000    12.64     0.00      3.10     64.2     38.842
7.333        0.000    10.23     0.00      3.08     57.2     38.519
7.417        0.000     8.29     0.00      3.05     50.9     38.225
7.500        0.000     6.52     0.00      3.03     45.2     37.959
7.583        0.000     5.66     0.00      3.01     40.0     37.723
7.667        0.000     5.16     0.00      3.00     35.5     37.514
7.750        0.000     4.75     0.00      2.98     32.6     37.322
7.833        0.000     4.37     0.00      2.97     31.0     37.138
7.917        0.000     4.00     0.00      2.96     29.5     36.963
8.000        0.000     3.56     0.00      2.94     28.0     36.795
8.083        0.000     3.06     0.00      2.93     26.5     36.633
8.167        0.000     2.50     0.00      2.92     25.2     36.477
8.250        0.000     1.88     0.00      2.91     23.8     36.326
8.333        0.000     1.15     0.00      2.90     22.5     36.179
8.417        0.000     0.36     0.00      2.88     21.3     36.035
8.500        0.000     0.21     0.00      2.87     20.0     35.898
8.583        0.000     0.13     0.00      2.86     18.9     35.769
8.667        0.000     0.08     0.00      2.85     17.8     35.647
8.750        0.000     0.04     0.00      2.85     16.8     35.532
8.833        0.000     0.02     0.00      2.84     15.8     35.423
8.917        0.000     0.00     0.00      2.83     14.9     35.321
9.000        0.000     0.00     0.00      2.82     14.0     35.224
9.083        0.000     0.00     0.00      2.81     13.2     35.133
9.167        0.000     0.00     0.00      2.81     12.4     35.047
9.250        0.000     0.00     0.00      2.80     11.7     34.967
```

```
  9.333        0.000     0.00     0.00      2.80     11.0      34.891
  9.417        0.000     0.00     0.00      2.79     10.4      34.819
  9.500        0.000     0.00     0.00      2.78      9.8      34.752
  9.583        0.000     0.00     0.00      2.78      9.2      34.688
  9.667        0.000     0.00     0.00      2.78      8.7      34.628
  9.750        0.000     0.00     0.00      2.77      8.2      34.572
  9.833        0.000     0.00     0.00      2.77      7.7      34.519
  9.917        0.000     0.00     0.00      2.76      7.3      34.469
 10.000        0.000     0.00     0.00      2.76      6.8      34.421
 10.083        0.000     0.00     0.00      2.76      6.4      34.377
 10.167        0.000     0.00     0.00      2.75      6.1      34.335
 10.250        0.000     0.00     0.00      2.75      5.7      34.296
 10.333        0.000     0.00     0.00      2.75      5.4      34.259
 10.417        0.000     0.00     0.00      2.74      5.1      34.224
 10.500        0.000     0.00     0.00      2.74      4.8      34.191
 10.583        0.000     0.00     0.00      2.74      4.5      34.160
 10.667        0.000     0.00     0.00      2.74      4.2      34.131
 10.750        0.000     0.00     0.00      2.73      4.0      34.103
 10.833        0.000     0.00     0.00      2.73      3.8      34.077
 10.917        0.000     0.00     0.00      2.73      3.5      34.053
 11.000        0.000     0.00     0.00      2.73      3.3      34.030
 11.083        0.000     0.00     0.00      2.73      3.1      34.008
 11.167        0.000     0.00     0.00      2.73      3.0      33.988
 11.250        0.000     0.00     0.00      2.72      2.8      33.968
 11.333        0.000     0.00     0.00      2.72      2.6      33.950
 11.417        0.000     0.00     0.00      2.72      2.5      33.933
 11.500        0.000     0.00     0.00      2.72      2.3      33.917
 11.583        0.000     0.00     0.00      2.72      2.2      33.902
 11.667        0.000     0.00     0.00      2.72      2.1      33.888
 11.750        0.000     0.00     0.00      2.72      2.0      33.874
 11.833        0.000     0.00     0.00      2.72      1.8      33.862
 11.917        0.000     0.00     0.00      2.71      1.7      33.850
 12.000        0.000     0.00     0.00      2.71      1.6      33.838
 12.083        0.000     0.00     0.00      2.71      1.5      33.828
 12.167        0.000     0.00     0.00      2.71      1.4      33.818
 12.250        0.000     0.00     0.00      2.71      1.4      33.809
 12.333        0.000     0.00     0.00      2.71      1.3      33.800
 12.417        0.000     0.00     0.00      2.71      1.2      33.791
 12.500        0.000     0.00     0.00      2.71      1.1      33.784
 12.583        0.000     0.00     0.00      2.71      1.1      33.776
 12.667        0.000     0.00     0.00      2.71      1.0      33.769
 12.750        0.000     0.00     0.00      2.71      1.0      33.763
 12.833        0.000     0.00     0.00      2.71      0.9      33.756
 12.917        0.000     0.00     0.00      2.71      0.8      33.751
 13.000        0.000     0.00     0.00      2.71      0.8      33.745
 13.083        0.000     0.00     0.00      2.71      0.7      33.740
 13.167        0.000     0.00     0.00      2.71      0.7      33.735
 13.250        0.000     0.00     0.00      2.71      0.7      33.731
 13.333        0.000     0.00     0.00      2.71      0.6      33.726
 13.417        0.000     0.00     0.00      2.70      0.6      33.722
 13.500        0.000     0.00     0.00      2.70      0.6      33.718
 13.583        0.000     0.00     0.00      2.70      0.5      33.715
 13.667        0.000     0.00     0.00      2.70      0.5      33.711
 13.750        0.000     0.00     0.00      2.70      0.5      33.708
 13.833        0.000     0.00     0.00      2.70      0.4      33.705
 13.917        0.000     0.00     0.00      2.70      0.4      33.702
 14.000        0.000     0.00     0.00      2.70      0.4      33.700
 14.083        0.000     0.00     0.00      2.70      0.4      33.697
 14.167        0.000     0.00     0.00      2.70      0.3      33.695
 14.250        0.000     0.00     0.00      2.70      0.3      33.692
 14.333        0.000     0.00     0.00      2.70      0.3      33.690
 14.417        0.000     0.00     0.00      2.70      0.3      33.688
 14.500        0.000     0.00     0.00      2.70      0.3      33.687
 14.583        0.000     0.00     0.00      2.70      0.3      33.685
```

```
14.667         0.000     0.00     0.00      2.70      0.2     33.683
14.750         0.000     0.00     0.00      2.70      0.2     33.682
14.833         0.000     0.00     0.00      2.70      0.2     33.680
14.917         0.000     0.00     0.00      2.70      0.2     33.679
15.000         0.000     0.00     0.00      2.70      0.2     33.677
15.083         0.000     0.00     0.00      2.70      0.2     33.676
15.167         0.000     0.00     0.00      2.70      0.2     33.675
15.250         0.000     0.00     0.00      2.70      0.2     33.674
15.333         0.000     0.00     0.00      2.70      0.1     33.673
15.417         0.000     0.00     0.00      2.70      0.1     33.672
15.500         0.000     0.00     0.00      2.70      0.1     33.671
15.583         0.000     0.00     0.00      2.70      0.1     33.670
15.667         0.000     0.00     0.00      2.70      0.1     33.669
15.750         0.000     0.00     0.00      2.70      0.1     33.669
15.833         0.000     0.00     0.00      2.70      0.1     33.668
15.917         0.000     0.00     0.00      2.70      0.1     33.667
16.000         0.000     0.00     0.00      2.70      0.1     33.667
16.083         0.000     0.00     0.00      2.70      0.1     33.666
16.167         0.000     0.00     0.00      2.70      0.1     33.665
16.250         0.000     0.00     0.00      2.70      0.1     33.665
16.333         0.000     0.00     0.00      2.70      0.1     33.664
16.417         0.000     0.00     0.00      2.70      0.1     33.664
16.500         0.000     0.00     0.00      2.70      0.1     33.663
16.583         0.000     0.00     0.00      2.70      0.1     33.663
16.667         0.000     0.00     0.00      2.70      0.1     33.663
16.750         0.000     0.00     0.00      2.70      0.1     33.662
16.833         0.000     0.00     0.00      2.70      0.1     33.662
16.917         0.000     0.00     0.00      2.70      0.0     33.662
17.000         0.000     0.00     0.00      2.70      0.0     33.661
17.083         0.000     0.00     0.00      2.70      0.0     33.661
17.167         0.000     0.00     0.00      2.70      0.0     33.661
17.250         0.000     0.00     0.00      2.70      0.0     33.660
17.333         0.000     0.00     0.00      2.70      0.0     33.660
17.417         0.000     0.00     0.00      2.70      0.0     33.660
17.500         0.000     0.00     0.00      2.70      0.0     33.660
17.583         0.000     0.00     0.00      2.70      0.0     33.659
17.667         0.000     0.00     0.00      2.70      0.0     33.659
17.750         0.000     0.00     0.00      2.70      0.0     33.659
17.833         0.000     0.00     0.00      2.70      0.0     33.659
17.917         0.000     0.00     0.00      2.70      0.0     33.659
18.000         0.000     0.00     0.00      2.70      0.0     33.658
18.083         0.000     0.00     0.00      2.70      0.0     33.658
18.167         0.000     0.00     0.00      2.70      0.0     33.658
18.250         0.000     0.00     0.00      2.70      0.0     33.658
18.333         0.000     0.00     0.00      2.70      0.0     33.657
18.417         0.000     0.00     0.00      2.70      0.0     33.657
18.500         0.000     0.00     0.00      2.70      0.0     33.657
18.583         0.000     0.00     0.00      2.70      0.0     33.657
18.667         0.000     0.00     0.00      2.70      0.0     33.657
18.750         0.000     0.00     0.00      2.70      0.0     33.656
18.833         0.000     0.00     0.00      2.70      0.0     33.656
18.917         0.000     0.00     0.00      2.70      0.0     33.656
19.000         0.000     0.00     0.00      2.70      0.0     33.656
19.083         0.000     0.00     0.00      2.70      0.0     33.655
19.167         0.000     0.00     0.00      2.70      0.0     33.655
19.250         0.000     0.00     0.00      2.70      0.0     33.655
19.333         0.000     0.00     0.00      2.70      0.0     33.655
19.417         0.000     0.00     0.00      2.70      0.0     33.654
19.500         0.000     0.00     0.00      2.70      0.0     33.654
19.583         0.000     0.00     0.00      2.70      0.0     33.654
19.667         0.000     0.00     0.00      2.70      0.0     33.654
19.750         0.000     0.00     0.00      2.70      0.0     33.654
19.833         0.000     0.00     0.00      2.70      0.0     33.653
19.917         0.000     0.00     0.00      2.70      0.0     33.653
```

```
          20.000        0.000     0.00     0.00      2.70      0.0     33.653
          20.083        0.000     0.00     0.00      2.70      0.0     33.653
          20.167        0.000     0.00     0.00      2.70      0.0     33.652
          20.250        0.000     0.00     0.00      2.70      0.0     33.652
          20.333        0.000     0.00     0.00      2.70      0.0     33.652
          20.417        0.000     0.00     0.00      2.70      0.0     33.652
          20.500        0.000     0.00     0.00      2.70      0.0     33.651
          20.583        0.000     0.00     0.00      2.70      0.0     33.651
          20.667        0.000     0.00     0.00      2.70      0.0     33.651
          20.750        0.000     0.00     0.00      2.70      0.0     33.651
          20.833        0.000     0.00     0.00      2.70      0.0     33.651
          20.917        0.000     0.00     0.00      2.70      0.0     33.650
          21.000        0.000     0.00     0.00      2.70      0.0     33.650
          21.083        0.000     0.00     0.00      2.70      0.0     33.650
          21.167        0.000     0.00     0.00      2.70      0.0     33.650
          21.250        0.000     0.00     0.00      2.70      0.0     33.649
          21.333        0.000     0.00     0.00      2.70      0.0     33.649
          21.417        0.000     0.00     0.00      2.70      0.0     33.649
          21.500        0.000     0.00     0.00      2.70      0.0     33.649
          21.583        0.000     0.00     0.00      2.70      0.0     33.648
          21.667        0.000     0.00     0.00      2.70      0.0     33.648
          21.750        0.000     0.00     0.00      2.70      0.0     33.648
          21.833        0.000     0.00     0.00      2.70      0.0     33.648
          21.917        0.000     0.00     0.00      2.70      0.0     33.648
          22.000        0.000     0.00     0.00      2.70      0.0     33.647
          22.083        0.000     0.00     0.00      2.70      0.0     33.647
          22.167        0.000     0.00     0.00      2.70      0.0     33.647
          22.250        0.000     0.00     0.00      2.70      0.0     33.647
          22.333        0.000     0.00     0.00      2.70      0.0     33.646
          22.417        0.000     0.00     0.00      2.70      0.0     33.646
          22.500        0.000     0.00     0.00      2.70      0.0     33.646
          22.583        0.000     0.00     0.00      2.70      0.0     33.646
          22.667        0.000     0.00     0.00      2.70      0.0     33.646
          22.750        0.000     0.00     0.00      2.70      0.0     33.645
          22.833        0.000     0.00     0.00      2.70      0.0     33.645
          22.917        0.000     0.00     0.00      2.70      0.0     33.645
          23.000        0.000     0.00     0.00      2.70      0.0     33.645
          23.083        0.000     0.00     0.00      2.70      0.0     33.644
          23.167        0.000     0.00     0.00      2.70      0.0     33.644
          23.250        0.000     0.00     0.00      2.70      0.0     33.644
          23.333        0.000     0.00     0.00      2.70      0.0     33.644
          23.417        0.000     0.00     0.00      2.70      0.0     33.643
          23.500        0.000     0.00     0.00      2.70      0.0     33.643
          23.583        0.000     0.00     0.00      2.70      0.0     33.643
          23.667        0.000     0.00     0.00      2.70      0.0     33.643
          23.750        0.000     0.00     0.00      2.70      0.0     33.643
          23.833        0.000     0.00     0.00      2.70      0.0     33.642
          23.917        0.000     0.00     0.00      2.70      0.0     33.642
----------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =     68.980 AF
    BASIN  STORAGE =     31.501 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =     37.471 AF
    LOSS    VOLUME =      0.000 AF
============================================================================


  ____________________________________________________________________________
****************************************************************************

              F L O O D    R O U T I N G    A N A L Y S I S

ACCORDING TO RIVERSIDE COUNTY FLOOD CONTORL AND WATER CONSERVATION DISTRICT
                     (RCFC&WCD) 1978 HYDROLOGY MANUAL
         (c) Copyright 1989-2015 Advanced Engineering Software (aes)
```

```
                 (Synthetic Unit Hydrograph Version 22.0)
                 Release Date: 07/01/2015  License ID 1673

                           Analysis prepared by:






 ************************* DESCRIPTION OF STUDY *************************
* TRAVERTINE DEVELOPMENT                                                  *
* BASIN ROUTING - 100 YEAR STORM 24 HOUR A + B                            *
* 09-23-2021 6 - 42IN RISERS                                              *
 ************************************************************************

  FILE NAME: TR-BAS24.DAT
  TIME/DATE OF STUDY: 08:32 09/23/2021


****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     10.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     220.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.204 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY S-GRAPH SELECTED
         UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.350
         LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.525
         MINIMUM SOIL-LOSS RATE(INCH/HOUR) =   0.175
         USER-ENTERED RAINFALL =  4.61 INCHES
         RCFC&WCD 24-Hour Storm (15-Minute period) SELECTED
         *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


         UNIT HYDROGRAPH TIME UNIT =  15.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME = 122.549



============================================================================
                      UNIT HYDROGRAPH DETERMINATION

----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
----------------------------------------------------------------------------
        1               25.807              229.184
        2               74.528              432.690
        3               87.625              116.310
        4               93.498               52.159
        5               96.831               29.598
        6               98.452               14.398
        7               99.291                7.448
        8               99.716                3.778
        9               99.929                1.889
```

```
10                100.000                  0.630
```

```
****************************************************************************
         UNIT              UNIT            UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS            RAINFALL
       (NUMBER)          (INCHES)        (INCHES)            (INCHES)
----------------------------------------------------------------------------
           1             0.0092           0.0048              0.0044
           2             0.0138           0.0073              0.0066
           3             0.0138           0.0073              0.0066
           4             0.0184           0.0097              0.0088
           5             0.0138           0.0073              0.0066
           6             0.0138           0.0073              0.0066
           7             0.0138           0.0073              0.0066
           8             0.0184           0.0097              0.0088
           9             0.0184           0.0097              0.0088
          10             0.0184           0.0097              0.0088
          11             0.0231           0.0121              0.0109
          12             0.0231           0.0121              0.0109
          13             0.0231           0.0121              0.0109
          14             0.0231           0.0121              0.0109
          15             0.0231           0.0121              0.0109
          16             0.0277           0.0145              0.0131
          17             0.0277           0.0145              0.0131
          18             0.0323           0.0169              0.0153
          19             0.0323           0.0169              0.0153
          20             0.0369           0.0194              0.0175
          21             0.0277           0.0145              0.0131
          22             0.0323           0.0169              0.0153
          23             0.0369           0.0194              0.0175
          24             0.0369           0.0194              0.0175
          25             0.0415           0.0218              0.0197
          26             0.0415           0.0218              0.0197
          27             0.0461           0.0242              0.0219
          28             0.0461           0.0242              0.0219
          29             0.0461           0.0242              0.0219
          30             0.0507           0.0266              0.0241
          31             0.0553           0.0290              0.0263
          32             0.0599           0.0315              0.0285
          33             0.0692           0.0363              0.0328
          34             0.0692           0.0363              0.0328
          35             0.0738           0.0387              0.0350
          36             0.0784           0.0411              0.0372
          37             0.0876           0.0460              0.0416
          38             0.0922           0.0484              0.0438
          39             0.0968           0.0508              0.0460
          40             0.1014           0.0532              0.0482
          41             0.0692           0.0363              0.0328
          42             0.0692           0.0363              0.0328
          43             0.0922           0.0484              0.0438
          44             0.0922           0.0484              0.0438
          45             0.0876           0.0460              0.0416
          46             0.0876           0.0460              0.0416
          47             0.0784           0.0411              0.0372
          48             0.0830           0.0436              0.0394
          49             0.1153           0.0605              0.0547
          50             0.1199           0.0629              0.0569
          51             0.1291           0.0678              0.0613
          52             0.1337           0.0702              0.0635
          53             0.1567           0.0765              0.0803
          54             0.1567           0.0753              0.0814
          55             0.1060           0.0557              0.0504
          56             0.1060           0.0557              0.0504
          57             0.1245           0.0653              0.0591
          58             0.1199           0.0629              0.0569
```

```
          59            0.1199           0.0629              0.0569
          60            0.1153           0.0605              0.0547
          61            0.1106           0.0581              0.0526
          62            0.1060           0.0557              0.0504
          63            0.0876           0.0460              0.0416
          64            0.0876           0.0460              0.0416
          65            0.0184           0.0097              0.0088
          66            0.0184           0.0097              0.0088
          67            0.0138           0.0073              0.0066
          68            0.0138           0.0073              0.0066
          69            0.0231           0.0121              0.0109
          70            0.0231           0.0121              0.0109
          71            0.0231           0.0121              0.0109
          72            0.0184           0.0097              0.0088
          73            0.0184           0.0097              0.0088
          74            0.0184           0.0097              0.0088
          75            0.0138           0.0073              0.0066
          76            0.0092           0.0048              0.0044
          77            0.0138           0.0073              0.0066
          78            0.0184           0.0097              0.0088
          79            0.0138           0.0073              0.0066
          80            0.0092           0.0048              0.0044
          81            0.0138           0.0073              0.0066
          82            0.0138           0.0073              0.0066
          83            0.0138           0.0073              0.0066
          84            0.0092           0.0048              0.0044
          85            0.0138           0.0073              0.0066
          86            0.0092           0.0048              0.0044
          87            0.0138           0.0073              0.0066
          88            0.0092           0.0048              0.0044
          89            0.0138           0.0073              0.0066
          90            0.0092           0.0048              0.0044
          91            0.0092           0.0048              0.0044
          92            0.0092           0.0048              0.0044
          93            0.0092           0.0048              0.0044
          94            0.0092           0.0048              0.0044
          95            0.0092           0.0048              0.0044
          96            0.0092           0.0048              0.0044

         TOTAL STORM RAINFALL(INCHES) =  4.61
         TOTAL SOIL-LOSS(INCHES) =  2.41
         TOTAL EFFECTIVE RAINFALL(INCHES) =  2.20

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      44.1975
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      40.4136
----------------------------------------------------------------------------
```

```
============================================================================

                        2 4 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       17.5      35.0      52.5      70.0
----------------------------------------------------------------------------
   0.083      0.0069      1.00  Q         .         .         .         .
   0.167      0.0138      1.00  Q         .         .         .         .
   0.250      0.0207      1.00  Q         .         .         .         .
   0.333      0.0442      3.40  VQ        .         .         .         .
   0.417      0.0676      3.40  VQ        .         .         .         .
   0.500      0.0910      3.40  VQ        .         .         .         .
   0.583      0.1245      4.86  V Q       .         .         .         .
   0.667      0.1579      4.86  V Q       .         .         .         .
   0.750      0.1914      4.86  V Q       .         .         .         .
   0.833      0.2316      5.84  V  Q      .         .         .         .
   0.917      0.2718      5.84  V  Q      .         .         .         .
   1.000      0.3121      5.84  V  Q      .         .         .         .
   1.083      0.3571      6.53  V  Q      .         .         .         .
   1.167      0.4020      6.53  V  Q      .         .         .         .
   1.250      0.4470      6.53  V  Q      .         .         .         .
   1.333      0.4881      5.97  V  Q      .         .         .         .
   1.417      0.5292      5.97  V  Q      .         .         .         .
   1.500      0.5703      5.97  V  Q      .         .         .         .
   1.583      0.6109      5.89  V  Q      .         .         .         .
   1.667      0.6514      5.89  V  Q      .         .         .         .
   1.750      0.6920      5.89  V  Q      .         .         .         .
   1.833      0.7359      6.38  V  Q      .         .         .         .
   1.917      0.7798      6.38  V  Q      .         .         .         .
   2.000      0.8237      6.38  V  Q      .         .         .         .
   2.083      0.8741      7.31  V   Q     .         .         .         .
   2.167      0.9244      7.31  V   Q     .         .         .         .
   2.250      0.9747      7.31  V   Q     .         .         .         .
   2.333      1.0267      7.55  .V  Q     .         .         .         .
   2.417      1.0787      7.55  .V  Q     .         .         .         .
   2.500      1.1308      7.55  .V  Q     .         .         .         .
   2.583      1.1870      8.16  .V  Q     .         .         .         .
   2.667      1.2432      8.16  .V  Q     .         .         .         .
   2.750      1.2994      8.16  .V  Q     .         .         .         .
   2.833      1.3626      9.17  .V   Q    .         .         .         .
   2.917      1.4257      9.17  .V   Q    .         .         .         .
   3.000      1.4889      9.17  .V   Q    .         .         .         .
   3.083      1.5540      9.45  .V   Q    .         .         .         .
   3.167      1.6191      9.45  .V   Q    .         .         .         .
   3.250      1.6842      9.45  .V   Q    .         .         .         .
   3.333      1.7502      9.58  .V   Q    .         .         .         .
   3.417      1.8162      9.58  .V   Q    .         .         .         .
   3.500      1.8822      9.58  .V   Q    .         .         .         .
   3.583      1.9487      9.66  .V   Q    .         .         .         .
   3.667      2.0152      9.66  .V   Q    .         .         .         .
   3.750      2.0817      9.66  . V  Q    .         .         .         .
   3.833      2.1519     10.19  . V  Q    .         .         .         .
   3.917      2.2221     10.19  . V  Q    .         .         .         .
   4.000      2.2923     10.19  . V  Q    .         .         .         .
   4.083      2.3692     11.16  . V   Q   .         .         .         .
   4.167      2.4460     11.16  . V   Q   .         .         .         .
   4.250      2.5229     11.16  . V   Q   .         .         .         .
   4.333      2.6050     11.92  . V   Q   .         .         .         .
```

```
4.417      2.6871     11.92  . V   Q   .         .         .         .
4.500      2.7693     11.92  . V   Q   .         .         .         .
4.583      2.8587     12.99  . V    Q  .         .         .         .
4.667      2.9482     12.99  . V    Q  .         .         .         .
4.750      3.0376     12.99  .  V   Q  .         .         .         .
4.833      3.1328     13.81  .  V   Q  .         .         .         .
4.917      3.2279     13.81  .  V   Q  .         .         .         .
5.000      3.3230     13.81  .  V   Q  .         .         .         .
5.083      3.4188     13.90  .  V   Q  .         .         .         .
5.167      3.5145     13.90  .  V   Q  .         .         .         .
5.250      3.6102     13.90  .  V   Q  .         .         .         .
5.333      3.6987     12.84  .  V   Q  .         .         .         .
5.417      3.7872     12.84  .  V   Q  .         .         .         .
5.500      3.8756     12.84  .  V   Q  .         .         .         .
5.583      3.9716     13.94  .  V   Q  .         .         .         .
5.667      4.0676     13.94  .   V  Q  .         .         .         .
5.750      4.1636     13.94  .   V  Q  .         .         .         .
5.833      4.2669     15.00  .   V   Q .         .         .         .
5.917      4.3702     15.00  .   V   Q .         .         .         .
6.000      4.4735     15.00  .   V   Q .         .         .         .
6.083      4.5822     15.78  .   V    Q.         .         .         .
6.167      4.6908     15.78  .   V    Q.         .         .         .
6.250      4.7995     15.78  .   V    Q.         .         .         .
6.333      4.9157     16.86  .   V    Q.         .         .         .
6.417      5.0318     16.86  .   V    Q.         .         .         .
6.500      5.1479     16.86  .    V   Q.         .         .         .
6.583      5.2698     17.69  .    V    Q         .         .         .
6.667      5.3917     17.69  .    V    Q         .         .         .
6.750      5.5135     17.69  .    V    Q         .         .         .
6.833      5.6429     18.79  .    V    Q         .         .         .
6.917      5.7723     18.79  .    V    Q         .         .         .
7.000      5.9017     18.79  .    V    Q         .         .         .
7.083      6.0335     19.13  .    V    Q         .         .         .
7.167      6.1652     19.13  .     V   Q         .         .         .
7.250      6.2970     19.13  .     V   Q         .         .         .
7.333      6.4332     19.79  .     V   .Q        .         .         .
7.417      6.5695     19.79  .     V   .Q        .         .         .
7.500      6.7057     19.79  .     V   .Q        .         .         .
7.583      6.8526     21.32  .     V   . Q       .         .         .
7.667      6.9994     21.32  .     V   . Q       .         .         .
7.750      7.1463     21.32  .      V  . Q       .         .         .
7.833      7.3051     23.07  .      V  .  Q      .         .         .
7.917      7.4640     23.07  .      V  .  Q      .         .         .
8.000      7.6228     23.07  .      V  .  Q      .         .         .
8.083      7.7978     25.41  .      V  .   Q     .         .         .
8.167      7.9728     25.41  .      V  .   Q     .         .         .
8.250      8.1478     25.41  .       V .   Q     .         .         .
8.333      8.3389     27.75  .       V .    Q    .         .         .
8.417      8.5299     27.75  .       V .    Q    .         .         .
8.500      8.7210     27.75  .       V .    Q    .         .         .
8.583      8.9206     28.97  .       V .     Q   .         .         .
8.667      9.1201     28.97  .        V.     Q   .         .         .
8.750      9.3196     28.97  .        V.     Q   .         .         .
8.833      9.5315     30.76  .        V.      Q  .         .         .
8.917      9.7433     30.76  .        V.      Q  .         .         .
9.000      9.9552     30.76  .        V.      Q  .         .         .
9.083     10.1835     33.15  .         V       Q .         .         .
9.167     10.4119     33.15  .         V       Q .         .         .
9.250     10.6402     33.15  .         V       Q .         .         .
9.333     10.8882     36.01  .         V         Q         .         .
9.417     11.1363     36.01  .          V        Q         .         .
9.500     11.3843     36.01  .          V        Q         .         .
9.583     11.6473     38.20  .         .V        .Q        .         .
9.667     11.9104     38.20  .         .V        .Q        .         .
```

```
 9.750     12.1735     38.20  .         . V       .Q        .         .
 9.833     12.4506     40.25  .         . V       . Q       .         .
 9.917     12.7278     40.25  .         . V       . Q       .         .
10.000     13.0050     40.25  .         . V       . Q       .         .
10.083     13.2684     38.24  .         .  V      .Q        .         .
10.167     13.5317     38.24  .         .  V      .Q        .         .
10.250     13.7950     38.24  .         .  V      .Q        .         .
10.333     14.0163     32.13  .         .  V    Q .         .         .
10.417     14.2376     32.13  .         .   V   Q .         .         .
10.500     14.4589     32.13  .         .   V   Q .         .         .
10.583     14.6869     33.11  .         .   V   Q .         .         .
10.667     14.9150     33.11  .         .   V   Q .         .         .
10.750     15.1430     33.11  .         .   V   Q .         .         .
10.833     15.3991     37.18  .         .    V    .Q        .         .
10.917     15.6552     37.18  .         .    V    .Q        .         .
11.000     15.9113     37.18  .         .    V    .Q        .         .
11.083     16.1700     37.57  .         .     V   .Q        .         .
11.167     16.4287     37.57  .         .     V   .Q        .         .
11.250     16.6875     37.57  .         .     V   .Q        .         .
11.333     16.9423     37.00  .         .     V   .Q        .         .
11.417     17.1971     37.00  .         .      V  .Q        .         .
11.500     17.4520     37.00  .         .      V  .Q        .         .
11.583     17.6997     35.97  .         .      V  Q         .         .
11.667     17.9474     35.97  .         .      V  Q         .         .
11.750     18.1951     35.97  .         .       V Q         .         .
11.833     18.4331     34.57  .         .       VQ.         .         .
11.917     18.6712     34.57  .         .       VQ.         .         .
12.000     18.9093     34.57  .         .       VQ.         .         .
12.083     19.1744     38.51  .         .       V . Q       .         .
12.167     19.4396     38.51  .         .        V. Q       .         .
12.250     19.7048     38.51  .         .        V. Q       .         .
12.333     20.0193     45.67  .         .        V.     Q   .         .
12.417     20.3338     45.67  .         .         V     Q   .         .
12.500     20.6483     45.67  .         .         V     Q   .         .
12.583     20.9885     49.39  .         .         V       Q .         .
12.667     21.3286     49.39  .         .          V      Q .         .
12.750     21.6688     49.39  .         .          V      Q .         .
12.833     22.0327     52.84  .         .         .V        Q         .
12.917     22.3966     52.84  .         .         . V       Q         .
13.000     22.7605     52.84  .         .         . V       Q         .
13.083     23.1648     58.70  .         .         . V       .  Q      .
13.167     23.5691     58.70  .         .         .  V      .  Q      .
13.250     23.9733     58.70  .         .         .  V      .  Q      .
13.333     24.4346     66.98  .         .         .   V     .       Q .
13.417     24.8959     66.98  .         .         .   V     .       Q .
13.500     25.3572     66.98  .         .         .    V    .       Q .
13.583     25.7890     62.70  .         .         .    V    .    Q    .
13.667     26.2209     62.70  .         .         .    V    .    Q    .
13.750     26.6527     62.70  .         .         .     V   .    Q    .
13.833     27.0004     50.48  .         .         .     V Q .         .
13.917     27.3480     50.48  .         .         .      VQ .         .
14.000     27.6957     50.48  .         .         .      VQ .         .
14.083     28.0368     49.54  .         .         .      VQ .         .
14.167     28.3780     49.54  .         .         .       Q .         .
14.250     28.7192     49.54  .         .         .       Q .         .
14.333     29.0740     51.53  .         .         .       VQ.         .
14.417     29.4289     51.53  .         .         .        Q.         .
14.500     29.7838     51.53  .         .         .        Q.         .
14.583     30.1339     50.84  .         .         .        Q.         .
14.667     30.4840     50.84  .         .         .        QV         .
14.750     30.8341     50.84  .         .         .        QV         .
14.833     31.1797     50.17  .         .         .       Q V         .
14.917     31.5252     50.17  .         .         .       Q  V        .
15.000     31.8707     50.17  .         .         .       Q  V        .
```

```
15.083     32.2059     48.67  .         .         .      Q  .V        .
15.167     32.5411     48.67  .         .         .      Q  . V       .
15.250     32.8764     48.67  .         .         .      Q  . V       .
15.333     33.1995     46.93  .         .         .     Q   . V       .
15.417     33.5227     46.93  .         .         .     Q   .  V      .
15.500     33.8459     46.93  .         .         .     Q   .  V      .
15.583     34.1460     43.58  .         .         .   Q     .  V      .
15.667     34.4461     43.58  .         .         .   Q     .   V     .
15.750     34.7462     43.58  .         .         .   Q     .   V     .
15.833     35.0172     39.35  .         .         . Q       .   V     .
15.917     35.2883     39.35  .         .         . Q       .   V     .
16.000     35.5593     39.35  .         .         . Q       .    V    .
16.083     35.7700     30.60  .         .      Q  .         .    V    .
16.167     35.9808     30.60  .         .      Q  .         .    V    .
16.250     36.1915     30.60  .         .      Q  .         .    V    .
16.333     36.3005     15.82  .        Q.         .         .    V    .
16.417     36.4095     15.82  .        Q.         .         .     V   .
16.500     36.5184     15.82  .        Q.         .         .     V   .
16.583     36.5954     11.18  .     Q   .         .         .     V   .
16.667     36.6725     11.18  .     Q   .         .         .     V   .
16.750     36.7495     11.18  .     Q   .         .         .     V   .
16.833     36.8071      8.37  .   Q     .         .         .     V   .
16.917     36.8647      8.37  .   Q     .         .         .     V   .
17.000     36.9224      8.37  .   Q     .         .         .     V   .
17.083     36.9779      8.06  .   Q     .         .         .     V   .
17.167     37.0334      8.06  .   Q     .         .         .     V   .
17.250     37.0890      8.06  .   Q     .         .         .     V   .
17.333     37.1533      9.33  .    Q    .         .         .     V   .
17.417     37.2175      9.33  .    Q    .         .         .     V   .
17.500     37.2818      9.33  .    Q    .         .         .     V   .
17.583     37.3474      9.52  .    Q    .         .         .     V   .
17.667     37.4129      9.52  .    Q    .         .         .      V  .
17.750     37.4784      9.52  .    Q    .         .         .      V  .
17.833     37.5410      9.08  .    Q    .         .         .      V  .
17.917     37.6035      9.08  .    Q    .         .         .      V  .
18.000     37.6661      9.08  .    Q    .         .         .      V  .
18.083     37.7225      8.19  .   Q     .         .         .      V  .
18.167     37.7788      8.19  .   Q     .         .         .      V  .
18.250     37.8352      8.19  .   Q     .         .         .      V  .
18.333     37.8901      7.96  .   Q     .         .         .      V  .
18.417     37.9449      7.96  .   Q     .         .         .      V  .
18.500     37.9998      7.96  .   Q     .         .         .      V  .
18.583     38.0506      7.38  .   Q     .         .         .      V  .
18.667     38.1014      7.38  .   Q     .         .         .      V  .
18.750     38.1522      7.38  .   Q     .         .         .      V  .
18.833     38.1927      5.88  .  Q      .         .         .      V  .
18.917     38.2331      5.88  .  Q      .         .         .      V  .
19.000     38.2736      5.88  .  Q      .         .         .      V  .
19.083     38.3091      5.15  . Q       .         .         .      V  .
19.167     38.3446      5.15  . Q       .         .         .      V  .
19.250     38.3801      5.15  . Q       .         .         .      V  .
19.333     38.4230      6.22  .  Q      .         .         .       V .
19.417     38.4658      6.22  .  Q      .         .         .       V .
19.500     38.5087      6.22  .  Q      .         .         .       V .
19.583     38.5550      6.73  .  Q      .         .         .       V .
19.667     38.6014      6.73  .  Q      .         .         .       V .
19.750     38.6478      6.73  .  Q      .         .         .       V .
19.833     38.6860      5.55  .  Q      .         .         .       V .
19.917     38.7243      5.55  .  Q      .         .         .       V .
20.000     38.7625      5.55  .  Q      .         .         .       V .
20.083     38.7969      4.98  . Q       .         .         .       V .
20.167     38.8312      4.98  . Q       .         .         .       V .
20.250     38.8655      4.98  . Q       .         .         .       V .
20.333     38.9043      5.63  .  Q      .         .         .       V .
```

```
20.417     38.9431      5.63  .  Q      .         .         .       V .
20.500     38.9819      5.63  .  Q      .         .         .       V .
20.583     39.0214      5.74  .  Q      .         .         .       V .
20.667     39.0610      5.74  .  Q      .         .         .       V .
20.750     39.1006      5.74  .  Q      .         .         .       V .
20.833     39.1369      5.28  .  Q      .         .         .       V .
20.917     39.1733      5.28  .  Q      .         .         .       V .
21.000     39.2096      5.28  .  Q      .         .         .       V .
21.083     39.2431      4.86  . Q       .         .         .       V .
21.167     39.2766      4.86  . Q       .         .         .       V .
21.250     39.3101      4.86  . Q       .         .         .       V .
21.333     39.3450      5.07  . Q       .         .         .       V .
21.417     39.3799      5.07  . Q       .         .         .       V .
21.500     39.4148      5.07  . Q       .         .         .        V.
21.583     39.4476      4.77  . Q       .         .         .        V.
21.667     39.4804      4.77  . Q       .         .         .        V.
21.750     39.5132      4.77  . Q       .         .         .        V.
21.833     39.5477      5.01  . Q       .         .         .        V.
21.917     39.5822      5.01  . Q       .         .         .        V.
22.000     39.6167      5.01  . Q       .         .         .        V.
22.083     39.6493      4.74  . Q       .         .         .        V.
22.167     39.6820      4.74  . Q       .         .         .        V.
22.250     39.7146      4.74  . Q       .         .         .        V.
22.333     39.7490      5.00  . Q       .         .         .        V.
22.417     39.7834      5.00  . Q       .         .         .        V.
22.500     39.8179      5.00  . Q       .         .         .        V.
22.583     39.8470      4.23  . Q       .         .         .        V.
22.667     39.8761      4.23  . Q       .         .         .        V.
22.750     39.9053      4.23  . Q       .         .         .        V.
22.833     39.9331      4.04  . Q       .         .         .        V.
22.917     39.9610      4.04  . Q       .         .         .        V.
23.000     39.9888      4.04  . Q       .         .         .        V.
23.083     40.0162      3.97  . Q       .         .         .        V.
23.166     40.0436      3.97  . Q       .         .         .        V.
23.250     40.0710      3.97  . Q       .         .         .        V.
23.333     40.0980      3.93  . Q       .         .         .        V.
23.416     40.1251      3.93  . Q       .         .         .        V.
23.500     40.1522      3.93  . Q       .         .         .        V.
23.583     40.1791      3.91  . Q       .         .         .        V.
23.666     40.2060      3.91  . Q       .         .         .        V.
23.750     40.2329      3.91  . Q       .         .         .        V.
23.833     40.2598      3.90  . Q       .         .         .        V.
23.916     40.2866      3.90  . Q       .         .         .        V.
24.000     40.3135      3.90  . Q       .         .         .        V.
24.083     40.3334      2.89  .Q        .         .         .        V.
24.166     40.3533      2.89  .Q        .         .         .        V.
24.250     40.3732      2.89  .Q        .         .         .        V.
24.333     40.3800      0.99  Q         .         .         .        V.
24.416     40.3869      0.99  Q         .         .         .        V.
24.500     40.3937      0.99  Q         .         .         .        V.
24.583     40.3970      0.48  Q         .         .         .        V.
24.666     40.4003      0.48  Q         .         .         .        V.
24.750     40.4036      0.48  Q         .         .         .        V.
24.833     40.4054      0.25  Q         .         .         .        V.
24.916     40.4071      0.25  Q         .         .         .        V.
25.000     40.4089      0.25  Q         .         .         .        V.
25.083     40.4097      0.12  Q         .         .         .        V.
25.166     40.4106      0.12  Q         .         .         .        V.
25.250     40.4114      0.12  Q         .         .         .        V.
25.333     40.4118      0.06  Q         .         .         .        V.
25.416     40.4123      0.06  Q         .         .         .        V.
25.500     40.4127      0.06  Q         .         .         .        V.
25.583     40.4129      0.03  Q         .         .         .        V.
25.666     40.4131      0.03  Q         .         .         .        V.
```

```
  25.750     40.4132      0.03  Q         .         .         .        V.
  25.833     40.4133      0.01  Q         .         .         .        V.
  25.916     40.4134      0.01  Q         .         .         .        V.
  26.000     40.4135      0.01  Q         .         .         .        V.
  26.083     40.4135      0.00  Q         .         .         .        V.
  26.166     40.4135      0.00  Q         .         .         .        V.
  26.250     40.4135      0.00  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                Duration
       Peak Flow Rate                     (minutes)
   =======================                =========
             0%                            1575.0
            10%                            1020.0
            20%                             690.0
            30%                             525.0
            40%                             480.0
            50%                             375.0
            60%                             225.0
            70%                             180.0
            80%                              45.0
            90%                              30.0


 ****************************************************************************
   FLOW PROCESS FROM NODE      2.00 TO NODE     10.00 IS CODE =   1
 ----------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
 ============================================================================

       (UNIT-HYDROGRAPH ADDED TO STREAM #2)

          WATERSHED AREA =     295.700 ACRES
          BASEFLOW =   0.000 CFS/SQUARE-MILE
          *USER ENTERED "LAG" TIME =    0.322 HOURS
           CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
           THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
           MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
          VALLEY S-GRAPH SELECTED
          UNIFORM MEAN SOIL-LOSS(INCH/HOUR) =  0.358
          LOW SOIL-LOSS RATE PERCENT(DECIMAL) = 0.545
          MINIMUM SOIL-LOSS RATE(INCH/HOUR) =   0.179
          USER-ENTERED RAINFALL =  4.61 INCHES
          RCFC&WCD 24-Hour Storm (15-Minute period) SELECTED
          *USER SPECIFIED PRECIPITATION DEPTH-AREA ADJUSTMENT FACTOR = 1.0000


          UNIT HYDROGRAPH TIME UNIT =  15.000 MINUTES
          UNIT INTERVAL PERCENTAGE OF LAG-TIME =  77.640



 ============================================================================
                      UNIT HYDROGRAPH DETERMINATION

 ----------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
 ----------------------------------------------------------------------------
        1               12.394               147.738
        2               56.184               522.001
```

```
   3                76.848              246.318
   4                85.296              100.709
   5                90.213               58.608
   6                93.486               39.021
   7                95.821               27.826
   8                97.435               19.239
   9                98.351               10.926
  10                98.908                6.643
  11                99.414                6.023
  12                99.765                4.193
  13                99.941                2.097
  14               100.000                0.699
```

```
****************************************************************************
         UNIT              UNIT           UNIT              EFFECTIVE
        PERIOD           RAINFALL       SOIL-LOSS           RAINFALL
       (NUMBER)          (INCHES)        (INCHES)           (INCHES)
----------------------------------------------------------------------------
           1             0.0092           0.0050              0.0042
           2             0.0138           0.0075              0.0063
           3             0.0138           0.0075              0.0063
           4             0.0184           0.0100              0.0084
           5             0.0138           0.0075              0.0063
           6             0.0138           0.0075              0.0063
           7             0.0138           0.0075              0.0063
           8             0.0184           0.0100              0.0084
           9             0.0184           0.0100              0.0084
          10             0.0184           0.0100              0.0084
          11             0.0231           0.0126              0.0105
          12             0.0231           0.0126              0.0105
          13             0.0231           0.0126              0.0105
          14             0.0231           0.0126              0.0105
          15             0.0231           0.0126              0.0105
          16             0.0277           0.0151              0.0126
          17             0.0277           0.0151              0.0126
          18             0.0323           0.0176              0.0147
          19             0.0323           0.0176              0.0147
          20             0.0369           0.0201              0.0168
          21             0.0277           0.0151              0.0126
          22             0.0323           0.0176              0.0147
          23             0.0369           0.0201              0.0168
          24             0.0369           0.0201              0.0168
          25             0.0415           0.0226              0.0189
          26             0.0415           0.0226              0.0189
          27             0.0461           0.0251              0.0210
          28             0.0461           0.0251              0.0210
          29             0.0461           0.0251              0.0210
          30             0.0507           0.0276              0.0231
          31             0.0553           0.0301              0.0252
          32             0.0599           0.0327              0.0273
          33             0.0692           0.0377              0.0315
          34             0.0692           0.0377              0.0315
          35             0.0738           0.0402              0.0336
          36             0.0784           0.0427              0.0357
          37             0.0876           0.0477              0.0399
          38             0.0922           0.0502              0.0420
          39             0.0968           0.0528              0.0440
          40             0.1014           0.0553              0.0461
          41             0.0692           0.0377              0.0315
          42             0.0692           0.0377              0.0315
          43             0.0922           0.0502              0.0420
          44             0.0922           0.0502              0.0420
          45             0.0876           0.0477              0.0399
          46             0.0876           0.0477              0.0399
          47             0.0784           0.0427              0.0357
          48             0.0830           0.0452              0.0378
          49             0.1153           0.0628              0.0524
          50             0.1199           0.0653              0.0545
          51             0.1291           0.0703              0.0587
          52             0.1337           0.0729              0.0608
          53             0.1567           0.0782              0.0785
          54             0.1567           0.0771              0.0797
          55             0.1060           0.0578              0.0482
          56             0.1060           0.0578              0.0482
          57             0.1245           0.0678              0.0566
          58             0.1199           0.0653              0.0545
```

```
          59             0.1199           0.0653              0.0545
          60             0.1153           0.0628              0.0524
          61             0.1106           0.0603              0.0503
          62             0.1060           0.0578              0.0482
          63             0.0876           0.0477              0.0399
          64             0.0876           0.0477              0.0399
          65             0.0184           0.0100              0.0084
          66             0.0184           0.0100              0.0084
          67             0.0138           0.0075              0.0063
          68             0.0138           0.0075              0.0063
          69             0.0231           0.0126              0.0105
          70             0.0231           0.0126              0.0105
          71             0.0231           0.0126              0.0105
          72             0.0184           0.0100              0.0084
          73             0.0184           0.0100              0.0084
          74             0.0184           0.0100              0.0084
          75             0.0138           0.0075              0.0063
          76             0.0092           0.0050              0.0042
          77             0.0138           0.0075              0.0063
          78             0.0184           0.0100              0.0084
          79             0.0138           0.0075              0.0063
          80             0.0092           0.0050              0.0042
          81             0.0138           0.0075              0.0063
          82             0.0138           0.0075              0.0063
          83             0.0138           0.0075              0.0063
          84             0.0092           0.0050              0.0042
          85             0.0138           0.0075              0.0063
          86             0.0092           0.0050              0.0042
          87             0.0138           0.0075              0.0063
          88             0.0092           0.0050              0.0042
          89             0.0138           0.0075              0.0063
          90             0.0092           0.0050              0.0042
          91             0.0092           0.0050              0.0042
          92             0.0092           0.0050              0.0042
          93             0.0092           0.0050              0.0042
          94             0.0092           0.0050              0.0042
          95             0.0092           0.0050              0.0042
          96             0.0092           0.0050              0.0042

         TOTAL STORM RAINFALL(INCHES) =  4.61
         TOTAL SOIL-LOSS(INCHES) =  2.50
         TOTAL EFFECTIVE RAINFALL(INCHES) =  2.11

----------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =      61.5276
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      52.0437
----------------------------------------------------------------------------
```

```
============================================================================

                        2 4 - H O U R   S T O R M
                    R U N O F F   H Y D R O G R A P H

============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       22.5      45.0      67.5      90.0
----------------------------------------------------------------------------
   0.083      0.0043      0.62  Q         .         .         .         .
   0.167      0.0085      0.62  Q         .         .         .         .
   0.250      0.0128      0.62  Q         .         .         .         .
   0.333      0.0343      3.12  VQ        .         .         .         .
   0.417      0.0558      3.12  VQ        .         .         .         .
   0.500      0.0773      3.12  VQ        .         .         .         .
   0.583      0.1134      5.25  V Q       .         .         .         .
   0.667      0.1495      5.25  V Q       .         .         .         .
   0.750      0.1857      5.25  V Q       .         .         .         .
   0.833      0.2304      6.50  V Q       .         .         .         .
   0.917      0.2752      6.50  V Q       .         .         .         .
   1.000      0.3199      6.50  V Q       .         .         .         .
   1.083      0.3732      7.74  V  Q      .         .         .         .
   1.167      0.4265      7.74  V  Q      .         .         .         .
   1.250      0.4798      7.74  V  Q      .         .         .         .
   1.333      0.5311      7.45  V  Q      .         .         .         .
   1.417      0.5824      7.45  V  Q      .         .         .         .
   1.500      0.6337      7.45  V  Q      .         .         .         .
   1.583      0.6842      7.34  V  Q      .         .         .         .
   1.667      0.7348      7.34  V  Q      .         .         .         .
   1.750      0.7853      7.34  V  Q      .         .         .         .
   1.833      0.8384      7.70  V  Q      .         .         .         .
   1.917      0.8914      7.70  V  Q      .         .         .         .
   2.000      0.9445      7.70  V  Q      .         .         .         .
   2.083      1.0053      8.84  V  Q      .         .         .         .
   2.167      1.0662      8.84  V  Q      .         .         .         .
   2.250      1.1271      8.84  V  Q      .         .         .         .
   2.333      1.1918      9.39  V   Q     .         .         .         .
   2.417      1.2564      9.39  V   Q     .         .         .         .
   2.500      1.3210      9.39   V  Q     .         .         .         .
   2.583      1.3894      9.93  .V  Q     .         .         .         .
   2.667      1.4578      9.93  .V  Q     .         .         .         .
   2.750      1.5261      9.93  .V  Q     .         .         .         .
   2.833      1.6030     11.16  .V  Q     .         .         .         .
   2.917      1.6798     11.16  .V  Q     .         .         .         .
   3.000      1.7567     11.16  .V  Q     .         .         .         .
   3.083      1.8377     11.77  .V   Q    .         .         .         .
   3.167      1.9187     11.77  .V   Q    .         .         .         .
   3.250      1.9998     11.77  .V   Q    .         .         .         .
   3.333      2.0827     12.04  .V   Q    .         .         .         .
   3.417      2.1656     12.04  .V   Q    .         .         .         .
   3.500      2.2485     12.04  .V   Q    .         .         .         .
   3.583      2.3326     12.20  .V   Q    .         .         .         .
   3.667      2.4166     12.20  .V   Q    .         .         .         .
   3.750      2.5006     12.20  .V   Q    .         .         .         .
   3.833      2.5875     12.61  .V   Q    .         .         .         .
   3.917      2.6744     12.61  . V  Q    .         .         .         .
   4.000      2.7612     12.61  . V  Q    .         .         .         .
   4.083      2.8561     13.78  . V   Q   .         .         .         .
   4.167      2.9510     13.78  . V   Q   .         .         .         .
   4.250      3.0459     13.78  . V   Q   .         .         .         .
   4.333      3.1468     14.65  . V   Q   .         .         .         .
```

```
4.417      3.2477     14.65  . V   Q   .         .         .         .
4.500      3.3486     14.65  . V   Q   .         .         .         .
4.583      3.4588     15.99  . V    Q  .         .         .         .
4.667      3.5689     15.99  . V    Q  .         .         .         .
4.750      3.6791     15.99  . V    Q  .         .         .         .
4.833      3.7959     16.96  . V    Q  .         .         .         .
4.917      3.9127     16.96  .  V   Q  .         .         .         .
5.000      4.0295     16.96  .  V   Q  .         .         .         .
5.083      4.1517     17.74  .  V   Q  .         .         .         .
5.167      4.2739     17.74  .  V   Q  .         .         .         .
5.250      4.3961     17.74  .  V   Q  .         .         .         .
5.333      4.5102     16.57  .  V   Q  .         .         .         .
5.417      4.6243     16.57  .  V   Q  .         .         .         .
5.500      4.7384     16.57  .  V   Q  .         .         .         .
5.583      4.8574     17.28  .  V   Q  .         .         .         .
5.667      4.9764     17.28  .  V   Q  .         .         .         .
5.750      5.0954     17.28  .  V   Q  .         .         .         .
5.833      5.2240     18.67  .   V   Q .         .         .         .
5.917      5.3526     18.67  .   V   Q .         .         .         .
6.000      5.4812     18.67  .   V   Q .         .         .         .
6.083      5.6162     19.60  .   V   Q .         .         .         .
6.167      5.7512     19.60  .   V   Q .         .         .         .
6.250      5.8862     19.60  .   V   Q .         .         .         .
6.333      6.0305     20.96  .   V    Q.         .         .         .
6.417      6.1749     20.96  .   V    Q.         .         .         .
6.500      6.3193     20.96  .   V    Q.         .         .         .
6.583      6.4704     21.94  .   V    Q.         .         .         .
6.667      6.6214     21.94  .    V   Q.         .         .         .
6.750      6.7725     21.94  .    V   Q.         .         .         .
6.833      6.9333     23.34  .    V    Q         .         .         .
6.917      7.0941     23.34  .    V    Q         .         .         .
7.000      7.2548     23.34  .    V    Q         .         .         .
7.083      7.4206     24.06  .    V    Q         .         .         .
7.167      7.5863     24.06  .    V    Q         .         .         .
7.250      7.7520     24.06  .    V    Q         .         .         .
7.333      7.9222     24.72  .     V   Q         .         .         .
7.417      8.0924     24.72  .     V   Q         .         .         .
7.500      8.2626     24.72  .     V   Q         .         .         .
7.583      8.4439     26.32  .     V   .Q        .         .         .
7.667      8.6252     26.32  .     V   .Q        .         .         .
7.750      8.8065     26.32  .     V   .Q        .         .         .
7.833      9.0020     28.38  .     V   . Q       .         .         .
7.917      9.1974     28.38  .      V  . Q       .         .         .
8.000      9.3929     28.38  .      V  . Q       .         .         .
8.083      9.6058     30.92  .      V  .  Q      .         .         .
8.167      9.8188     30.92  .      V  .  Q      .         .         .
8.250     10.0317     30.92  .      V  .  Q      .         .         .
8.333     10.2661     34.02  .      V  .    Q    .         .         .
8.417     10.5004     34.02  .       V .    Q    .         .         .
8.500     10.7347     34.02  .       V .    Q    .         .         .
8.583     10.9814     35.83  .       V .    Q    .         .         .
8.667     11.2282     35.83  .       V .    Q    .         .         .
8.750     11.4749     35.83  .       V .    Q    .         .         .
8.833     11.7362     37.94  .        V.     Q   .         .         .
8.917     11.9975     37.94  .        V.     Q   .         .         .
9.000     12.2588     37.94  .        V.     Q   .         .         .
9.083     12.5385     40.61  .        V.       Q .         .         .
9.167     12.8182     40.61  .        V.       Q .         .         .
9.250     13.0979     40.61  .         V       Q .         .         .
9.333     13.4019     44.14  .         V        Q.         .         .
9.417     13.7059     44.14  .         V        Q.         .         .
9.500     14.0099     44.14  .         V        Q.         .         .
9.583     14.3343     47.11  .         .V        Q         .         .
9.667     14.6587     47.11  .         .V        Q         .         .
```

```
  9.750     14.9832     47.11  .         .V        Q         .         .
  9.833     15.3261     49.79  .         .V        . Q       .         .
  9.917     15.6690     49.79  .         . V       . Q       .         .
 10.000     16.0119     49.79  .         . V       . Q       .         .
 10.083     16.3556     49.91  .         . V       . Q       .         .
 10.167     16.6993     49.91  .         . V       . Q       .         .
 10.250     17.0431     49.91  .         .  V      . Q       .         .
 10.333     17.3420     43.41  .         .  V     Q.         .         .
 10.417     17.6410     43.41  .         .  V     Q.         .         .
 10.500     17.9400     43.41  .         .  V     Q.         .         .
 10.583     18.2291     41.98  .         .   V   Q .         .         .
 10.667     18.5183     41.98  .         .   V   Q .         .         .
 10.750     18.8074     41.98  .         .   V   Q .         .         .
 10.833     19.1268     46.38  .         .   V     Q         .         .
 10.917     19.4462     46.38  .         .   V     Q         .         .
 11.000     19.7657     46.38  .         .    V    Q         .         .
 11.083     20.0966     48.06  .         .    V    .Q        .         .
 11.167     20.4276     48.06  .         .    V    .Q        .         .
 11.250     20.7586     48.06  .         .    V    .Q        .         .
 11.333     21.0865     47.62  .         .     V   .Q        .         .
 11.417     21.4145     47.62  .         .     V   .Q        .         .
 11.500     21.7425     47.62  .         .     V   .Q        .         .
 11.583     22.0648     46.80  .         .     V   Q         .         .
 11.667     22.3871     46.80  .         .      V  Q         .         .
 11.750     22.7095     46.80  .         .      V  Q         .         .
 11.833     23.0188     44.91  .         .      V Q.         .         .
 11.917     23.3281     44.91  .         .      V Q.         .         .
 12.000     23.6374     44.91  .         .       VQ.         .         .
 12.083     23.9625     47.20  .         .       V Q         .         .
 12.167     24.2876     47.20  .         .       V Q         .         .
 12.250     24.6126     47.20  .         .       V Q         .         .
 12.333     24.9936     55.32  .         .        V.   Q     .         .
 12.417     25.3746     55.32  .         .        V.   Q     .         .
 12.500     25.7555     55.32  .         .        V.   Q     .         .
 12.583     26.1729     60.60  .         .         V     Q   .         .
 12.667     26.5902     60.60  .         .         V     Q   .         .
 12.750     27.0075     60.60  .         .         V     Q   .         .
 12.833     27.4554     65.02  .         .         .V      Q .         .
 12.917     27.9032     65.02  .         .         .V      Q .         .
 13.000     28.3510     65.02  .         .         .V      Q .         .
 13.083     28.8387     70.81  .         .         . V       .Q        .
 13.167     29.3264     70.81  .         .         . V       .Q        .
 13.250     29.8141     70.81  .         .         . V       .Q        .
 13.333     30.3778     81.85  .         .         .  V      .     Q   .
 13.417     30.9415     81.85  .         .         .  V      .     Q   .
 13.500     31.5051     81.85  .         .         .   V     .     Q   .
 13.583     32.0776     83.12  .         .         .   V     .     Q   .
 13.667     32.6501     83.12  .         .         .    V    .     Q   .
 13.750     33.2226     83.12  .         .         .    V    .     Q   .
 13.833     33.7006     69.40  .         .         .    V    Q         .
 13.917     34.1785     69.40  .         .         .     V   Q         .
 14.000     34.6565     69.40  .         .         .     V   Q         .
 14.083     35.1003     64.44  .         .         .     V Q .         .
 14.167     35.5441     64.44  .         .         .      VQ .         .
 14.250     35.9878     64.44  .         .         .      VQ .         .
 14.333     36.4448     66.35  .         .         .       VQ.         .
 14.417     36.9018     66.35  .         .         .       VQ.         .
 14.500     37.3587     66.35  .         .         .       VQ.         .
 14.583     37.8147     66.21  .         .         .        Q.         .
 14.667     38.2707     66.21  .         .         .        Q.         .
 14.750     38.7266     66.21  .         .         .        Q.         .
 14.833     39.1777     65.50  .         .         .        QV         .
 14.917     39.6288     65.50  .         .         .        QV         .
 15.000     40.0799     65.50  .         .         .        QV         .
```

```
15.083     40.5192     63.79  .         .         .       Q .V        .
15.167     40.9586     63.79  .         .         .       Q .V        .
15.250     41.3979     63.79  .         .         .       Q .V        .
15.333     41.8225     61.65  .         .         .      Q  . V       .
15.417     42.2470     61.65  .         .         .      Q  . V       .
15.500     42.6716     61.65  .         .         .      Q  . V       .
15.583     43.0747     58.53  .         .         .     Q   .  V      .
15.667     43.4778     58.53  .         .         .     Q   .  V      .
15.750     43.8808     58.53  .         .         .     Q   .  V      .
15.833     44.2478     53.28  .         .         .  Q      .   V     .
15.917     44.6147     53.28  .         .         .  Q      .   V     .
16.000     44.9816     53.28  .         .         .  Q      .   V     .
16.083     45.2988     46.05  .         .         Q         .   V     .
16.167     45.6160     46.05  .         .         Q         .    V    .
16.250     45.9331     46.05  .         .         Q         .    V    .
16.333     46.1290     28.44  .         . Q       .         .    V    .
16.417     46.3248     28.44  .         . Q       .         .    V    .
16.500     46.5207     28.44  .         . Q       .         .    V    .
16.583     46.6562     19.68  .       Q .         .         .    V    .
16.667     46.7917     19.68  .       Q .         .         .    V    .
16.750     46.9272     19.68  .       Q .         .         .     V   .
16.833     47.0302     14.96  .     Q   .         .         .     V   .
16.917     47.1333     14.96  .     Q   .         .         .     V   .
17.000     47.2364     14.96  .     Q   .         .         .     V   .
17.083     47.3254     12.92  .    Q    .         .         .     V   .
17.167     47.4143     12.92  .    Q    .         .         .     V   .
17.250     47.5033     12.92  .    Q    .         .         .     V   .
17.333     47.5960     13.46  .    Q    .         .         .     V   .
17.417     47.6888     13.46  .    Q    .         .         .     V   .
17.500     47.7815     13.46  .    Q    .         .         .     V   .
17.583     47.8736     13.37  .    Q    .         .         .     V   .
17.667     47.9656     13.37  .    Q    .         .         .     V   .
17.750     48.0577     13.37  .    Q    .         .         .     V   .
17.833     48.1452     12.71  .    Q    .         .         .      V  .
17.917     48.2328     12.71  .    Q    .         .         .      V  .
18.000     48.3204     12.71  .    Q    .         .         .      V  .
18.083     48.3988     11.40  .    Q    .         .         .      V  .
18.167     48.4773     11.40  .    Q    .         .         .      V  .
18.250     48.5558     11.40  .    Q    .         .         .      V  .
18.333     48.6299     10.75  .   Q     .         .         .      V  .
18.417     48.7039     10.75  .   Q     .         .         .      V  .
18.500     48.7780     10.75  .   Q     .         .         .      V  .
18.583     48.8477     10.12  .   Q     .         .         .      V  .
18.667     48.9174     10.12  .   Q     .         .         .      V  .
18.750     48.9870     10.12  .   Q     .         .         .      V  .
18.833     49.0457      8.52  .  Q      .         .         .      V  .
18.917     49.1044      8.52  .  Q      .         .         .      V  .
19.000     49.1630      8.52  .  Q      .         .         .      V  .
19.083     49.2119      7.10  .  Q      .         .         .      V  .
19.167     49.2609      7.10  .  Q      .         .         .      V  .
19.250     49.3098      7.10  .  Q      .         .         .      V  .
19.333     49.3629      7.72  .  Q      .         .         .      V  .
19.417     49.4161      7.72  .  Q      .         .         .      V  .
19.500     49.4692      7.72  .  Q      .         .         .       V .
19.583     49.5289      8.67  .  Q      .         .         .       V .
19.667     49.5886      8.67  .  Q      .         .         .       V .
19.750     49.6483      8.67  .  Q      .         .         .       V .
19.833     49.7018      7.78  .  Q      .         .         .       V .
19.917     49.7554      7.78  .  Q      .         .         .       V .
20.000     49.8090      7.78  .  Q      .         .         .       V .
20.083     49.8549      6.66  . Q       .         .         .       V .
20.167     49.9008      6.66  . Q       .         .         .       V .
20.250     49.9467      6.66  . Q       .         .         .       V .
20.333     49.9957      7.13  .  Q      .         .         .       V .
```

```
20.417     50.0448      7.13  .  Q      .         .         .       V .
20.500     50.0939      7.13  .  Q      .         .         .       V .
20.583     50.1447      7.38  .  Q      .         .         .       V .
20.667     50.1956      7.38  .  Q      .         .         .       V .
20.750     50.2464      7.38  .  Q      .         .         .       V .
20.833     50.2955      7.13  .  Q      .         .         .       V .
20.917     50.3446      7.13  .  Q      .         .         .       V .
21.000     50.3937      7.13  .  Q      .         .         .       V .
21.083     50.4376      6.37  . Q       .         .         .       V .
21.167     50.4814      6.37  . Q       .         .         .       V .
21.250     50.5253      6.37  . Q       .         .         .       V .
21.333     50.5709      6.63  . Q       .         .         .       V .
21.417     50.6166      6.63  . Q       .         .         .       V .
21.500     50.6623      6.63  . Q       .         .         .       V .
21.583     50.7047      6.16  . Q       .         .         .       V .
21.667     50.7472      6.16  . Q       .         .         .        V.
21.750     50.7896      6.16  . Q       .         .         .        V.
21.833     50.8346      6.54  . Q       .         .         .        V.
21.917     50.8796      6.54  . Q       .         .         .        V.
22.000     50.9246      6.54  . Q       .         .         .        V.
22.083     50.9667      6.11  . Q       .         .         .        V.
22.167     51.0088      6.11  . Q       .         .         .        V.
22.250     51.0508      6.11  . Q       .         .         .        V.
22.333     51.0955      6.49  . Q       .         .         .        V.
22.417     51.1401      6.49  . Q       .         .         .        V.
22.500     51.1848      6.49  . Q       .         .         .        V.
22.583     51.2244      5.76  . Q       .         .         .        V.
22.667     51.2641      5.76  . Q       .         .         .        V.
22.750     51.3037      5.76  . Q       .         .         .        V.
22.833     51.3407      5.37  . Q       .         .         .        V.
22.917     51.3777      5.37  . Q       .         .         .        V.
23.000     51.4147      5.37  . Q       .         .         .        V.
23.083     51.4507      5.23  . Q       .         .         .        V.
23.166     51.4867      5.23  . Q       .         .         .        V.
23.250     51.5228      5.23  . Q       .         .         .        V.
23.333     51.5583      5.15  . Q       .         .         .        V.
23.416     51.5937      5.15  . Q       .         .         .        V.
23.500     51.6292      5.15  . Q       .         .         .        V.
23.583     51.6643      5.10  . Q       .         .         .        V.
23.666     51.6995      5.10  . Q       .         .         .        V.
23.750     51.7346      5.10  . Q       .         .         .        V.
23.833     51.7695      5.07  . Q       .         .         .        V.
23.916     51.8044      5.07  . Q       .         .         .        V.
24.000     51.8392      5.07  . Q       .         .         .        V.
24.083     51.8697      4.42  .Q        .         .         .        V.
24.166     51.9001      4.42  .Q        .         .         .        V.
24.250     51.9306      4.42  .Q        .         .         .        V.
24.333     51.9458      2.22  Q         .         .         .        V.
24.416     51.9611      2.22  Q         .         .         .        V.
24.500     51.9764      2.22  Q         .         .         .        V.
24.583     51.9844      1.17  Q         .         .         .        V.
24.666     51.9925      1.17  Q         .         .         .        V.
24.750     52.0006      1.17  Q         .         .         .        V.
24.833     52.0058      0.75  Q         .         .         .        V.
24.916     52.0109      0.75  Q         .         .         .        V.
25.000     52.0160      0.75  Q         .         .         .        V.
25.083     52.0194      0.49  Q         .         .         .        V.
25.166     52.0228      0.49  Q         .         .         .        V.
25.250     52.0262      0.49  Q         .         .         .        V.
25.333     52.0285      0.33  Q         .         .         .        V.
25.416     52.0308      0.33  Q         .         .         .        V.
25.500     52.0330      0.33  Q         .         .         .        V.
25.583     52.0344      0.21  Q         .         .         .        V.
25.666     52.0359      0.21  Q         .         .         .        V.
```

```
   25.750     52.0373      0.21  Q         .         .         .        V.
   25.833     52.0382      0.13  Q         .         .         .        V.
   25.916     52.0391      0.13  Q         .         .         .        V.
   26.000     52.0400      0.13  Q         .         .         .        V.
   26.083     52.0405      0.08  Q         .         .         .        V.
   26.166     52.0411      0.08  Q         .         .         .        V.
   26.250     52.0417      0.08  Q         .         .         .        V.
   26.333     52.0421      0.05  Q         .         .         .        V.
   26.416     52.0424      0.05  Q         .         .         .        V.
   26.500     52.0428      0.05  Q         .         .         .        V.
   26.583     52.0430      0.03  Q         .         .         .        V.
   26.666     52.0432      0.03  Q         .         .         .        V.
   26.750     52.0434      0.03  Q         .         .         .        V.
   26.833     52.0435      0.01  Q         .         .         .        V.
   26.916     52.0436      0.01  Q         .         .         .        V.
   27.000     52.0437      0.01  Q         .         .         .        V.
   27.083     52.0437      0.00  Q         .         .         .         V
   27.166     52.0437      0.00  Q         .         .         .         V
   27.250     52.0437      0.00  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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                            1635.0
              10%                            1035.0
              20%                             705.0
              30%                             540.0
              40%                             480.0
              50%                             420.0
              60%                             240.0
              70%                             195.0
              80%                              60.0
              90%                              30.0


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =   7
 ----------------------------------------------------------------------------
   >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
 ============================================================================


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  11
 ----------------------------------------------------------------------------
   >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
 ============================================================================

             STREAM HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
         (Note: Time indicated is at END of Each Unit Intervals)
 ----------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
 ----------------------------------------------------------------------------
    0.083      0.0112      1.62  Q         .         .         .         .
    0.167      0.0224      1.62  Q         .         .         .         .
    0.250      0.0335      1.62  Q         .         .         .         .
    0.333      0.0784      6.52  VQ        .         .         .         .
    0.417      0.1234      6.52  VQ        .         .         .         .
    0.500      0.1683      6.52  VQ        .         .         .         .
    0.583      0.2378     10.11  V Q       .         .         .         .
```

```
0.667      0.3074     10.11  V Q       .         .         .         .
0.750      0.3770     10.11  V Q       .         .         .         .
0.833      0.4620     12.34  V Q       .         .         .         .
0.917      0.5470     12.34  V Q       .         .         .         .
1.000      0.6320     12.34  V Q       .         .         .         .
1.083      0.7303     14.27  V Q       .         .         .         .
1.167      0.8285     14.27  V Q       .         .         .         .
1.250      0.9268     14.27  V Q       .         .         .         .
1.333      1.0192     13.41  V Q       .         .         .         .
1.417      1.1116     13.41  V Q       .         .         .         .
1.500      1.2040     13.41  V Q       .         .         .         .
1.583      1.2951     13.23  V Q       .         .         .         .
1.667      1.3862     13.23  V Q       .         .         .         .
1.750      1.4774     13.23  V Q       .         .         .         .
1.833      1.5743     14.08  V Q       .         .         .         .
1.917      1.6713     14.08  V Q       .         .         .         .
2.000      1.7682     14.08  V Q       .         .         .         .
2.083      1.8794     16.15  V  Q      .         .         .         .
2.167      1.9906     16.15  V  Q      .         .         .         .
2.250      2.1018     16.15  V  Q      .         .         .         .
2.333      2.2185     16.94  V  Q      .         .         .         .
2.417      2.3351     16.94  .V Q      .         .         .         .
2.500      2.4518     16.94  .V Q      .         .         .         .
2.583      2.5764     18.09  .V Q      .         .         .         .
2.667      2.7010     18.09  .V Q      .         .         .         .
2.750      2.8256     18.09  .V Q      .         .         .         .
2.833      2.9656     20.33  .V  Q     .         .         .         .
2.917      3.1056     20.33  .V  Q     .         .         .         .
3.000      3.2456     20.33  .V  Q     .         .         .         .
3.083      3.3917     21.22  .V  Q     .         .         .         .
3.167      3.5378     21.22  .V  Q     .         .         .         .
3.250      3.6840     21.22  .V  Q     .         .         .         .
3.333      3.8329     21.62  .V  Q     .         .         .         .
3.417      3.9818     21.62  .V  Q     .         .         .         .
3.500      4.1308     21.62  .V  Q     .         .         .         .
3.583      4.2813     21.86  .V  Q     .         .         .         .
3.667      4.4318     21.86  .V  Q     .         .         .         .
3.750      4.5824     21.86  .V  Q     .         .         .         .
3.833      4.7394     22.81  . V Q     .         .         .         .
3.917      4.8965     22.81  . V Q     .         .         .         .
4.000      5.0536     22.81  . V Q     .         .         .         .
4.083      5.2253     24.94  . V Q     .         .         .         .
4.167      5.3970     24.94  . V Q     .         .         .         .
4.250      5.5688     24.94  . V Q     .         .         .         .
4.333      5.7518     26.58  . V  Q    .         .         .         .
4.417      5.9349     26.58  . V  Q    .         .         .         .
4.500      6.1179     26.58  . V  Q    .         .         .         .
4.583      6.3175     28.98  . V  Q    .         .         .         .
4.667      6.5171     28.98  . V  Q    .         .         .         .
4.750      6.7167     28.98  . V  Q    .         .         .         .
4.833      6.9286     30.77  . V   Q   .         .         .         .
4.917      7.1406     30.77  .  V  Q   .         .         .         .
5.000      7.3525     30.77  .  V  Q   .         .         .         .
5.083      7.5704     31.64  .  V  Q   .         .         .         .
5.167      7.7884     31.64  .  V  Q   .         .         .         .
5.250      8.0063     31.64  .  V  Q   .         .         .         .
5.333      8.2089     29.41  .  V Q    .         .         .         .
5.417      8.4114     29.41  .  V Q    .         .         .         .
5.500      8.6140     29.41  .  V Q    .         .         .         .
5.583      8.8290     31.22  .  V  Q   .         .         .         .
5.667      9.0440     31.22  .  V  Q   .         .         .         .
5.750      9.2590     31.22  .   V Q   .         .         .         .
5.833      9.4909     33.67  .   V Q   .         .         .         .
5.917      9.7228     33.67  .   V Q   .         .         .         .
```

```
 6.000      9.9547     33.67  .   V Q   .         .         .         .
 6.083     10.1984     35.38  .   V  Q  .         .         .         .
 6.167     10.4420     35.38  .   V  Q  .         .         .         .
 6.250     10.6857     35.38  .   V  Q  .         .         .         .
 6.333     10.9462     37.82  .   V  Q  .         .         .         .
 6.417     11.2067     37.82  .   V  Q  .         .         .         .
 6.500     11.4672     37.82  .   V  Q  .         .         .         .
 6.583     11.7401     39.63  .    V Q  .         .         .         .
 6.667     12.0131     39.63  .    V Q  .         .         .         .
 6.750     12.2860     39.63  .    V Q  .         .         .         .
 6.833     12.5762     42.13  .    V  Q .         .         .         .
 6.917     12.8664     42.13  .    V  Q .         .         .         .
 7.000     13.1566     42.13  .    V  Q .         .         .         .
 7.083     13.4540     43.19  .    V  Q .         .         .         .
 7.167     13.7515     43.19  .    V  Q .         .         .         .
 7.250     14.0489     43.19  .     V Q .         .         .         .
 7.333     14.3554     44.50  .     V Q .         .         .         .
 7.417     14.6619     44.50  .     V Q .         .         .         .
 7.500     14.9684     44.50  .     V Q .         .         .         .
 7.583     15.2965     47.65  .     V  Q.         .         .         .
 7.667     15.6246     47.65  .     V  Q.         .         .         .
 7.750     15.9528     47.65  .     V  Q.         .         .         .
 7.833     16.3071     51.45  .      V  Q         .         .         .
 7.917     16.6614     51.45  .      V  Q         .         .         .
 8.000     17.0157     51.45  .      V  Q         .         .         .
 8.083     17.4037     56.33  .      V  .Q        .         .         .
 8.167     17.7916     56.33  .      V  .Q        .         .         .
 8.250     18.1795     56.33  .      V  .Q        .         .         .
 8.333     18.6049     61.77  .       V . Q       .         .         .
 8.417     19.0303     61.77  .       V . Q       .         .         .
 8.500     19.4557     61.77  .       V . Q       .         .         .
 8.583     19.9020     64.80  .       V . Q       .         .         .
 8.667     20.3483     64.80  .       V . Q       .         .         .
 8.750     20.7945     64.80  .       V . Q       .         .         .
 8.833     21.2677     68.70  .        V.  Q      .         .         .
 8.917     21.7408     68.70  .        V.  Q      .         .         .
 9.000     22.2140     68.70  .        V.  Q      .         .         .
 9.083     22.7220     73.77  .        V.   Q     .         .         .
 9.167     23.2301     73.77  .         V   Q     .         .         .
 9.250     23.7381     73.77  .         V   Q     .         .         .
 9.333     24.2901     80.15  .         V     Q   .         .         .
 9.417     24.8421     80.15  .         V     Q   .         .         .
 9.500     25.3941     80.15  .         V     Q   .         .         .
 9.583     25.9816     85.30  .         .V     Q  .         .         .
 9.667     26.5691     85.30  .         .V     Q  .         .         .
 9.750     27.1566     85.30  .         .V     Q  .         .         .
 9.833     27.7767     90.04  .         . V     Q .         .         .
 9.917     28.3968     90.04  .         . V     Q .         .         .
10.000     29.0169     90.04  .         . V     Q .         .         .
10.083     29.6240     88.15  .         . V    Q  .         .         .
10.167     30.2310     88.15  .         .  V   Q  .         .         .
10.250     30.8381     88.15  .         .  V   Q  .         .         .
10.333     31.3584     75.54  .         .  V Q    .         .         .
10.417     31.8786     75.54  .         .  V Q    .         .         .
10.500     32.3989     75.54  .         .   VQ    .         .         .
10.583     32.9160     75.09  .         .   VQ    .         .         .
10.667     33.4332     75.09  .         .   VQ    .         .         .
10.750     33.9504     75.09  .         .   VQ    .         .         .
10.833     34.5259     83.57  .         .   V Q   .         .         .
10.917     35.1014     83.57  .         .    VQ   .         .         .
11.000     35.6769     83.57  .         .    VQ   .         .         .
11.083     36.2666     85.62  .         .    V Q  .         .         .
11.167     36.8563     85.62  .         .    V Q  .         .         .
11.250     37.4460     85.62  .         .     VQ  .         .         .
```

```
11.333     38.0288     84.62  .         .     Q   .         .         .
11.417     38.6116     84.62  .         .     Q   .         .         .
11.500     39.1944     84.62  .         .     Q   .         .         .
11.583     39.7645     82.77  .         .     QV  .         .         .
11.667     40.3345     82.77  .         .     QV  .         .         .
11.750     40.9046     82.77  .         .     QV  .         .         .
11.833     41.4520     79.48  .         .    Q V  .         .         .
11.917     41.9993     79.48  .         .    Q  V .         .         .
12.000     42.5467     79.48  .         .    Q  V .         .         .
12.083     43.1369     85.70  .         .      QV .         .         .
12.167     43.7272     85.70  .         .      QV .         .         .
12.250     44.3174     85.70  .         .      Q V.         .         .
12.333     45.0129    100.98  .         .        VQ         .         .
12.417     45.7084    100.98  .         .        VQ         .         .
12.500     46.4039    100.98  .         .         Q         .         .
12.583     47.1614    109.99  .         .         VQ        .         .
12.667     47.9188    109.99  .         .         VQ        .         .
12.750     48.6763    109.99  .         .         .Q        .         .
12.833     49.4881    117.87  .         .         .V Q      .         .
12.917     50.2998    117.87  .         .         .V Q      .         .
13.000     51.1115    117.87  .         .         . VQ      .         .
13.083     52.0035    129.51  .         .         . V  Q    .         .
13.167     52.8954    129.51  .         .         . V  Q    .         .
13.250     53.7874    129.51  .         .         .  V Q    .         .
13.333     54.8124    148.83  .         .         .  V     Q.         .
13.417     55.8373    148.83  .         .         .   V    Q.         .
13.500     56.8623    148.83  .         .         .   V    Q.         .
13.583     57.8666    145.83  .         .         .    V   Q.         .
13.667     58.8709    145.83  .         .         .    V   Q.         .
13.750     59.8753    145.83  .         .         .    V   Q.         .
13.833     60.7009    119.88  .         .         .  Q  V   .         .
13.917     61.5265    119.88  .         .         .  Q  V   .         .
14.000     62.3522    119.88  .         .         .  Q  V   .         .
14.083     63.1371    113.97  .         .         . Q    V  .         .
14.167     63.9220    113.97  .         .         . Q    V  .         .
14.250     64.7070    113.97  .         .         . Q    V  .         .
14.333     65.5188    117.88  .         .         .  Q    V .         .
14.417     66.3306    117.88  .         .         .  Q    V .         .
14.500     67.1425    117.88  .         .         .  Q     V.         .
14.583     67.9485    117.04  .         .         .  Q     V.         .
14.667     68.7546    117.04  .         .         .  Q     V.         .
14.750     69.5607    117.04  .         .         .  Q      V         .
14.833     70.3573    115.67  .         .         .  Q      V         .
14.917     71.1539    115.67  .         .         .  Q      V         .
15.000     71.9506    115.67  .         .         .  Q      .V        .
15.083     72.7251    112.47  .         .         . Q       .V        .
15.167     73.4997    112.47  .         .         . Q       .V        .
15.250     74.2742    112.47  .         .         . Q       . V       .
15.333     75.0220    108.57  .         .         .Q        . V       .
15.417     75.7697    108.57  .         .         .Q        . V       .
15.500     76.5175    108.57  .         .         .Q        .  V      .
15.583     77.2206    102.10  .         .         Q         .  V      .
15.667     77.9238    102.10  .         .         Q         .  V      .
15.750     78.6270    102.10  .         .         Q         .   V     .
15.833     79.2650     92.63  .         .       Q .         .   V     .
15.917     79.9029     92.63  .         .       Q .         .   V     .
16.000     80.5409     92.63  .         .       Q .         .   V     .
16.083     81.0688     76.65  .         .    Q    .         .    V    .
16.167     81.5967     76.65  .         .    Q    .         .    V    .
16.250     82.1246     76.65  .         .    Q    .         .    V    .
16.333     82.4294     44.26  .       Q .         .         .    V    .
16.417     82.7342     44.26  .       Q .         .         .    V    .
16.500     83.0391     44.26  .       Q .         .         .    V    .
16.583     83.2516     30.86  .     Q   .         .         .     V   .
```

```
16.667     83.4641     30.86  .     Q   .         .         .     V   .
16.750     83.6766     30.86  .     Q   .         .         .     V   .
16.833     83.8373     23.33  .   Q     .         .         .     V   .
16.917     83.9980     23.33  .   Q     .         .         .     V   .
17.000     84.1587     23.33  .   Q     .         .         .     V   .
17.083     84.3032     20.99  .   Q     .         .         .     V   .
17.167     84.4477     20.99  .   Q     .         .         .     V   .
17.250     84.5923     20.99  .   Q     .         .         .     V   .
17.333     84.7493     22.80  .   Q     .         .         .     V   .
17.417     84.9063     22.80  .   Q     .         .         .     V   .
17.500     85.0633     22.80  .   Q     .         .         .     V   .
17.583     85.2209     22.88  .   Q     .         .         .     V   .
17.667     85.3785     22.88  .   Q     .         .         .     V   .
17.750     85.5361     22.88  .   Q     .         .         .      V  .
17.833     85.6862     21.79  .   Q     .         .         .      V  .
17.917     85.8363     21.79  .   Q     .         .         .      V  .
18.000     85.9864     21.79  .   Q     .         .         .      V  .
18.083     86.1212     19.58  .  Q      .         .         .      V  .
18.167     86.2561     19.58  .  Q      .         .         .      V  .
18.250     86.3910     19.58  .  Q      .         .         .      V  .
18.333     86.5199     18.72  .  Q      .         .         .      V  .
18.417     86.6488     18.72  .  Q      .         .         .      V  .
18.500     86.7777     18.72  .  Q      .         .         .      V  .
18.583     86.8982     17.49  .  Q      .         .         .      V  .
18.667     87.0187     17.49  .  Q      .         .         .      V  .
18.750     87.1392     17.49  .  Q      .         .         .      V  .
18.833     87.2383     14.40  . Q       .         .         .      V  .
18.917     87.3375     14.40  . Q       .         .         .      V  .
19.000     87.4366     14.40  . Q       .         .         .      V  .
19.083     87.5210     12.26  . Q       .         .         .      V  .
19.167     87.6054     12.26  . Q       .         .         .      V  .
19.250     87.6898     12.26  . Q       .         .         .      V  .
19.333     87.7858     13.94  . Q       .         .         .      V  .
19.417     87.8818     13.94  . Q       .         .         .       V .
19.500     87.9778     13.94  . Q       .         .         .       V .
19.583     88.0839     15.40  .  Q      .         .         .       V .
19.667     88.1900     15.40  .  Q      .         .         .       V .
19.750     88.2960     15.40  .  Q      .         .         .       V .
19.833     88.3878     13.33  . Q       .         .         .       V .
19.917     88.4797     13.33  . Q       .         .         .       V .
20.000     88.5715     13.33  . Q       .         .         .       V .
20.083     88.6517     11.65  . Q       .         .         .       V .
20.167     88.7319     11.65  . Q       .         .         .       V .
20.250     88.8121     11.65  . Q       .         .         .       V .
20.333     88.9000     12.76  . Q       .         .         .       V .
20.417     88.9879     12.76  . Q       .         .         .       V .
20.500     89.0758     12.76  . Q       .         .         .       V .
20.583     89.1662     13.12  . Q       .         .         .       V .
20.667     89.2565     13.12  . Q       .         .         .       V .
20.750     89.3469     13.12  . Q       .         .         .       V .
20.833     89.4324     12.41  . Q       .         .         .       V .
20.917     89.5179     12.41  . Q       .         .         .       V .
21.000     89.6034     12.41  . Q       .         .         .       V .
21.083     89.6807     11.23  . Q       .         .         .       V .
21.167     89.7580     11.23  . Q       .         .         .       V .
21.250     89.8353     11.23  . Q       .         .         .       V .
21.333     89.9159     11.70  . Q       .         .         .       V .
21.417     89.9965     11.70  . Q       .         .         .       V .
21.500     90.0770     11.70  . Q       .         .         .       V .
21.583     90.1523     10.93  . Q       .         .         .        V.
21.667     90.2275     10.93  . Q       .         .         .        V.
21.750     90.3028     10.93  . Q       .         .         .        V.
21.833     90.3823     11.55  . Q       .         .         .        V.
21.917     90.4618     11.55  . Q       .         .         .        V.
```

```
   22.000     90.5413     11.55  . Q       .         .         .        V.
   22.083     90.6160     10.85  . Q       .         .         .        V.
   22.167     90.6907     10.85  . Q       .         .         .        V.
   22.250     90.7654     10.85  . Q       .         .         .        V.
   22.333     90.8445     11.48  . Q       .         .         .        V.
   22.417     90.9235     11.48  . Q       .         .         .        V.
   22.500     91.0026     11.48  . Q       .         .         .        V.
   22.583     91.0714      9.99  .Q        .         .         .        V.
   22.667     91.1402      9.99  .Q        .         .         .        V.
   22.750     91.2089      9.99  .Q        .         .         .        V.
   22.833     91.2738      9.42  .Q        .         .         .        V.
   22.917     91.3386      9.42  .Q        .         .         .        V.
   23.000     91.4035      9.42  .Q        .         .         .        V.
   23.083     91.4669      9.21  .Q        .         .         .        V.
   23.167     91.5303      9.21  .Q        .         .         .        V.
   23.250     91.5937      9.21  .Q        .         .         .        V.
   23.333     91.6562      9.08  .Q        .         .         .        V.
   23.417     91.7188      9.08  .Q        .         .         .        V.
   23.500     91.7813      9.08  .Q        .         .         .        V.
   23.583     91.8434      9.01  .Q        .         .         .        V.
   23.667     91.9054      9.01  .Q        .         .         .        V.
   23.750     91.9675      9.01  .Q        .         .         .        V.
   23.833     92.0292      8.96  .Q        .         .         .        V.
   23.917     92.0910      8.96  .Q        .         .         .        V.
   24.000     92.1527      8.96  .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                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
              0%                             1445.0
             10%                             1020.0
             20%                              705.0
             30%                              525.0
             40%                              480.0
             50%                              420.0
             60%                              240.0
             70%                              180.0
             80%                               60.0
             90%                               30.0


 ****************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE = 3.1
 ----------------------------------------------------------------------------
   >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #2<<<<<
 ============================================================================

                      INFLOW
                    (STREAM 2)
                         |
                         |
                         V                __effective depth
                     -----------          |   (and volume)
                    |           |    |    |
                    |           |    |....V........
                    | detention |<-->|           outflow
                    |   basin   |    |.........________
                     -----------     |    ^    |  \
                         |           |  dead   |   basin outlet
                         V           | storage |
```

```
                     OUTFLOW         ---------
                   (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) =    0.00


         BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

          INTERVAL    DEPTH      OUTFLOW     STORAGE
           NUMBER      (FT)       (CFS)        (AF)
               1        0.00        0.00       0.000
               2        1.00        0.01      12.220
               3        2.00        0.02      24.740
               4        2.70        0.03      33.660
               5        3.00       33.61      37.530
               6        4.00      303.14      50.660


============================================================================
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-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                                             MEAN
            TIME  DEAD-STORAGE  INFLOW    LOSS   EFFECTIVE OUTFLOW  EFFECTIVE
           (HRS)   FILLED(AF)    (CFS)    (CFS)  DEPTH(FT)  (CFS)   VOLUME(AF)
----------------------------------------------------------------------------
           0.083        0.000     1.62     0.00      0.00      0.0      0.011
           0.167        0.000     1.62     0.00      0.00      0.0      0.022
           0.250        0.000     1.62     0.00      0.00      0.0      0.034
           0.333        0.000     6.52     0.00      0.01      0.0      0.078
           0.417        0.000     6.52     0.00      0.01      0.0      0.123
           0.500        0.000     6.52     0.00      0.01      0.0      0.168
           0.583        0.000    10.11     0.00      0.02      0.0      0.238
           0.667        0.000    10.11     0.00      0.03      0.0      0.307
           0.750        0.000    10.11     0.00      0.03      0.0      0.377
           0.833        0.000    12.34     0.00      0.04      0.0      0.462
           0.917        0.000    12.34     0.00      0.04      0.0      0.547
           1.000        0.000    12.34     0.00      0.05      0.0      0.632
           1.083        0.000    14.27     0.00      0.06      0.0      0.730
           1.167        0.000    14.27     0.00      0.07      0.0      0.829
           1.250        0.000    14.27     0.00      0.08      0.0      0.927
           1.333        0.000    13.41     0.00      0.08      0.0      1.019
           1.417        0.000    13.41     0.00      0.09      0.0      1.112
           1.500        0.000    13.41     0.00      0.10      0.0      1.204
           1.583        0.000    13.23     0.00      0.11      0.0      1.295
           1.667        0.000    13.23     0.00      0.11      0.0      1.386
           1.750        0.000    13.23     0.00      0.12      0.0      1.477
           1.833        0.000    14.08     0.00      0.13      0.0      1.574
           1.917        0.000    14.08     0.00      0.14      0.0      1.671
           2.000        0.000    14.08     0.00      0.14      0.0      1.768
           2.083        0.000    16.15     0.00      0.15      0.0      1.879
           2.167        0.000    16.15     0.00      0.16      0.0      1.990
           2.250        0.000    16.15     0.00      0.17      0.0      2.102
           2.333        0.000    16.94     0.00      0.18      0.0      2.218
           2.417        0.000    16.94     0.00      0.19      0.0      2.335
```

```
2.500        0.000   16.94    0.00     0.20     0.0     2.452
2.583        0.000   18.09    0.00     0.21     0.0     2.576
2.667        0.000   18.09    0.00     0.22     0.0     2.701
2.750        0.000   18.09    0.00     0.23     0.0     2.825
2.833        0.000   20.33    0.00     0.24     0.0     2.965
2.917        0.000   20.33    0.00     0.25     0.0     3.105
3.000        0.000   20.33    0.00     0.27     0.0     3.245
3.083        0.000   21.22    0.00     0.28     0.0     3.391
3.167        0.000   21.22    0.00     0.29     0.0     3.538
3.250        0.000   21.22    0.00     0.30     0.0     3.684
3.333        0.000   21.62    0.00     0.31     0.0     3.833
3.417        0.000   21.62    0.00     0.33     0.0     3.981
3.500        0.000   21.62    0.00     0.34     0.0     4.130
3.583        0.000   21.86    0.00     0.35     0.0     4.281
3.667        0.000   21.86    0.00     0.36     0.0     4.431
3.750        0.000   21.86    0.00     0.37     0.0     4.582
3.833        0.000   22.81    0.00     0.39     0.0     4.739
3.917        0.000   22.81    0.00     0.40     0.0     4.896
4.000        0.000   22.81    0.00     0.41     0.0     5.053
4.083        0.000   24.94    0.00     0.43     0.0     5.225
4.167        0.000   24.94    0.00     0.44     0.0     5.396
4.250        0.000   24.94    0.00     0.46     0.0     5.568
4.333        0.000   26.58    0.00     0.47     0.0     5.751
4.417        0.000   26.58    0.00     0.49     0.0     5.934
4.500        0.000   26.58    0.00     0.50     0.0     6.117
4.583        0.000   28.98    0.00     0.52     0.0     6.317
4.667        0.000   28.98    0.00     0.53     0.0     6.516
4.750        0.000   28.98    0.00     0.55     0.0     6.716
4.833        0.000   30.77    0.00     0.57     0.0     6.928
4.917        0.000   30.77    0.00     0.58     0.0     7.140
5.000        0.000   30.77    0.00     0.60     0.0     7.351
5.083        0.000   31.64    0.00     0.62     0.0     7.569
5.167        0.000   31.64    0.00     0.64     0.0     7.787
5.250        0.000   31.64    0.00     0.66     0.0     8.005
5.333        0.000   29.41    0.00     0.67     0.0     8.208
5.417        0.000   29.41    0.00     0.69     0.0     8.410
5.500        0.000   29.41    0.00     0.70     0.0     8.613
5.583        0.000   31.22    0.00     0.72     0.0     8.828
5.667        0.000   31.22    0.00     0.74     0.0     9.043
5.750        0.000   31.22    0.00     0.76     0.0     9.257
5.833        0.000   33.67    0.00     0.78     0.0     9.489
5.917        0.000   33.67    0.00     0.80     0.0     9.721
6.000        0.000   33.67    0.00     0.81     0.0     9.953
6.083        0.000   35.38    0.00     0.83     0.0    10.197
6.167        0.000   35.38    0.00     0.85     0.0    10.440
6.250        0.000   35.38    0.00     0.87     0.0    10.684
6.333        0.000   37.82    0.00     0.90     0.0    10.944
6.417        0.000   37.82    0.00     0.92     0.0    11.205
6.500        0.000   37.82    0.00     0.94     0.0    11.465
6.583        0.000   39.63    0.00     0.96     0.0    11.738
6.667        0.000   39.63    0.00     0.98     0.0    12.011
6.750        0.000   39.63    0.00     1.01     0.0    12.284
6.833        0.000   42.13    0.00     1.03     0.0    12.574
6.917        0.000   42.13    0.00     1.05     0.0    12.864
7.000        0.000   42.13    0.00     1.07     0.0    13.154
7.083        0.000   43.19    0.00     1.10     0.0    13.451
7.167        0.000   43.19    0.00     1.12     0.0    13.749
7.250        0.000   43.19    0.00     1.15     0.0    14.046
7.333        0.000   44.50    0.00     1.17     0.0    14.353
7.417        0.000   44.50    0.00     1.19     0.0    14.659
7.500        0.000   44.50    0.00     1.22     0.0    14.965
7.583        0.000   47.65    0.00     1.25     0.0    15.293
7.667        0.000   47.65    0.00     1.27     0.0    15.621
7.750        0.000   47.65    0.00     1.30     0.0    15.949
```

```
   7.833         0.000    51.45     0.00      1.33      0.0     16.304
   7.917         0.000    51.45     0.00      1.35      0.0     16.658
   8.000         0.000    51.45     0.00      1.38      0.0     17.012
   8.083         0.000    56.33     0.00      1.41      0.0     17.400
   8.167         0.000    56.33     0.00      1.44      0.0     17.788
   8.250         0.000    56.33     0.00      1.48      0.0     18.176
   8.333         0.000    61.77     0.00      1.51      0.0     18.601
   8.417         0.000    61.77     0.00      1.54      0.0     19.026
   8.500         0.000    61.77     0.00      1.58      0.0     19.451
   8.583         0.000    64.80     0.00      1.61      0.0     19.898
   8.667         0.000    64.80     0.00      1.65      0.0     20.344
   8.750         0.000    64.80     0.00      1.68      0.0     20.790
   8.833         0.000    68.70     0.00      1.72      0.0     21.263
   8.917         0.000    68.70     0.00      1.76      0.0     21.736
   9.000         0.000    68.70     0.00      1.80      0.0     22.209
   9.083         0.000    73.77     0.00      1.84      0.0     22.717
   9.167         0.000    73.77     0.00      1.88      0.0     23.225
   9.250         0.000    73.77     0.00      1.92      0.0     23.733
   9.333         0.000    80.15     0.00      1.96      0.0     24.284
   9.417         0.000    80.15     0.00      2.01      0.0     24.836
   9.500         0.000    80.15     0.00      2.05      0.0     25.388
   9.583         0.000    85.30     0.00      2.10      0.0     25.975
   9.667         0.000    85.30     0.00      2.14      0.0     26.563
   9.750         0.000    85.30     0.00      2.19      0.0     27.150
   9.833         0.000    90.04     0.00      2.24      0.0     27.770
   9.917         0.000    90.04     0.00      2.29      0.0     28.390
  10.000         0.000    90.04     0.00      2.34      0.0     29.010
  10.083         0.000    88.15     0.00      2.38      0.0     29.617
  10.167         0.000    88.15     0.00      2.43      0.0     30.224
  10.250         0.000    88.15     0.00      2.48      0.0     30.830
  10.333         0.000    75.54     0.00      2.52      0.0     31.351
  10.417         0.000    75.54     0.00      2.56      0.0     31.871
  10.500         0.000    75.54     0.00      2.60      0.0     32.391
  10.583         0.000    75.09     0.00      2.64      0.0     32.908
  10.667         0.000    75.09     0.00      2.68      0.0     33.425
  10.750         0.000    75.09     0.00      2.72      1.2     33.933
  10.833         0.000    83.57     0.00      2.76      4.8     34.476
  10.917         0.000    83.57     0.00      2.80      9.3     34.987
  11.000         0.000    83.57     0.00      2.84     13.6     35.469
  11.083         0.000    85.62     0.00      2.88     17.8     35.936
  11.167         0.000    85.62     0.00      2.91     21.7     36.377
  11.250         0.000    85.62     0.00      2.94     25.4     36.791
  11.333         0.000    84.62     0.00      2.97     28.9     37.175
  11.417         0.000    84.62     0.00      3.00     32.1     37.537
  11.500         0.000    84.62     0.00      3.03     37.1     37.864
  11.583         0.000    82.77     0.00      3.05     43.3     38.136
  11.667         0.000    82.77     0.00      3.06     48.5     38.372
  11.750         0.000    82.77     0.00      3.08     53.0     38.577
  11.833         0.000    79.48     0.00      3.09     56.7     38.734
  11.917         0.000    79.48     0.00      3.10     59.7     38.870
  12.000         0.000    79.48     0.00      3.11     62.3     38.988
  12.083         0.000    85.70     0.00      3.12     65.0     39.131
  12.167         0.000    85.70     0.00      3.13     67.7     39.254
  12.250         0.000    85.70     0.00      3.14     70.1     39.362
  12.333         0.000   100.98     0.00      3.15     73.2     39.553
  12.417         0.000   100.98     0.00      3.17     76.9     39.720
  12.500         0.000   100.98     0.00      3.18     80.0     39.864
  12.583         0.000   109.99     0.00      3.19     83.4     40.047
  12.667         0.000   109.99     0.00      3.20     86.9     40.206
  12.750         0.000   109.99     0.00      3.21     90.0     40.344
  12.833         0.000   117.87     0.00      3.23     93.1     40.514
  12.917         0.000   117.87     0.00      3.24     96.4     40.662
  13.000         0.000   117.87     0.00      3.25     99.2     40.791
  13.083         0.000   129.51     0.00      3.26    102.5     40.977
```

```
13.167        0.000   129.51     0.00      3.27    106.0     41.139
13.250        0.000   129.51     0.00      3.29    109.1     41.279
13.333        0.000   148.83     0.00      3.30    113.1     41.525
13.417        0.000   148.83     0.00      3.32    117.8     41.739
13.500        0.000   148.83     0.00      3.33    121.9     41.924
13.583        0.000   145.83     0.00      3.35    125.3     42.066
13.667        0.000   145.83     0.00      3.35    128.0     42.189
13.750        0.000   145.83     0.00      3.36    130.3     42.295
13.833        0.000   119.88     0.00      3.36    130.7     42.221
13.917        0.000   119.88     0.00      3.35    129.2     42.157
14.000        0.000   119.88     0.00      3.35    128.0     42.101
14.083        0.000   113.97     0.00      3.34    126.5     42.014
14.167        0.000   113.97     0.00      3.34    124.9     41.939
14.250        0.000   113.97     0.00      3.33    123.4     41.874
14.333        0.000   117.88     0.00      3.33    122.5     41.842
14.417        0.000   117.88     0.00      3.33    121.8     41.815
14.500        0.000   117.88     0.00      3.32    121.3     41.791
14.583        0.000   117.04     0.00      3.32    120.8     41.765
14.667        0.000   117.04     0.00      3.32    120.3     41.743
14.750        0.000   117.04     0.00      3.32    119.9     41.723
14.833        0.000   115.67     0.00      3.32    119.4     41.697
14.917        0.000   115.67     0.00      3.32    118.9     41.675
15.000        0.000   115.67     0.00      3.31    118.5     41.655
15.083        0.000   112.47     0.00      3.31    117.9     41.618
15.167        0.000   112.47     0.00      3.31    117.2     41.585
15.250        0.000   112.47     0.00      3.31    116.6     41.557
15.333        0.000   108.57     0.00      3.30    115.8     41.507
15.417        0.000   108.57     0.00      3.30    114.8     41.464
15.500        0.000   108.57     0.00      3.30    114.0     41.427
15.583        0.000   102.10     0.00      3.29    112.9     41.353
15.667        0.000   102.10     0.00      3.29    111.4     41.289
15.750        0.000   102.10     0.00      3.28    110.2     41.233
15.833        0.000    92.63     0.00      3.27    108.5     41.124
15.917        0.000    92.63     0.00      3.27    106.4     41.029
16.000        0.000    92.63     0.00      3.26    104.6     40.947
16.083        0.000    76.65     0.00      3.25    102.0     40.772
16.167        0.000    76.65     0.00      3.24     98.6     40.621
16.250        0.000    76.65     0.00      3.23     95.7     40.490
16.333        0.000    44.26     0.00      3.20     91.1     40.167
16.417        0.000    44.26     0.00      3.18     84.9     39.888
16.500        0.000    44.26     0.00      3.16     79.5     39.645
16.583        0.000    30.86     0.00      3.14     74.0     39.348
16.667        0.000    30.86     0.00      3.12     68.3     39.090
16.750        0.000    30.86     0.00      3.10     63.3     38.866
16.833        0.000    23.33     0.00      3.08     58.6     38.624
16.917        0.000    23.33     0.00      3.07     53.9     38.413
17.000        0.000    23.33     0.00      3.05     49.9     38.231
17.083        0.000    20.99     0.00      3.04     46.2     38.057
17.167        0.000    20.99     0.00      3.03     42.9     37.906
17.250        0.000    20.99     0.00      3.02     40.0     37.775
17.333        0.000    22.80     0.00      3.01     37.6     37.673
17.417        0.000    22.80     0.00      3.00     35.6     37.585
17.500        0.000    22.80     0.00      3.00     34.1     37.507
17.583        0.000    22.88     0.00      2.99     33.1     37.437
17.667        0.000    22.88     0.00      2.99     32.5     37.370
17.750        0.000    22.88     0.00      2.98     32.0     37.308
17.833        0.000    21.79     0.00      2.98     31.4     37.242
17.917        0.000    21.79     0.00      2.97     30.8     37.180
18.000        0.000    21.79     0.00      2.97     30.3     37.121
18.083        0.000    19.58     0.00      2.96     29.8     37.051
18.167        0.000    19.58     0.00      2.96     29.2     36.985
18.250        0.000    19.58     0.00      2.95     28.6     36.923
18.333        0.000    18.72     0.00      2.95     28.1     36.858
18.417        0.000    18.72     0.00      2.94     27.5     36.798
```

```
18.500        0.000    18.72     0.00      2.94     27.0     36.741
18.583        0.000    17.49     0.00      2.93     26.5     36.679
18.667        0.000    17.49     0.00      2.93     26.0     36.620
18.750        0.000    17.49     0.00      2.93     25.5     36.565
18.833        0.000    14.40     0.00      2.92     24.9     36.493
18.917        0.000    14.40     0.00      2.91     24.3     36.424
19.000        0.000    14.40     0.00      2.91     23.7     36.360
19.083        0.000    12.26     0.00      2.90     23.1     36.285
19.167        0.000    12.26     0.00      2.90     22.5     36.215
19.250        0.000    12.26     0.00      2.89     21.9     36.148
19.333        0.000    13.94     0.00      2.89     21.4     36.097
19.417        0.000    13.94     0.00      2.89     21.0     36.048
19.500        0.000    13.94     0.00      2.88     20.6     36.003
19.583        0.000    15.40     0.00      2.88     20.2     35.970
19.667        0.000    15.40     0.00      2.88     19.9     35.938
19.750        0.000    15.40     0.00      2.87     19.7     35.909
19.833        0.000    13.33     0.00      2.87     19.4     35.867
19.917        0.000    13.33     0.00      2.87     19.0     35.828
20.000        0.000    13.33     0.00      2.87     18.7     35.791
20.083        0.000    11.65     0.00      2.86     18.3     35.745
20.167        0.000    11.65     0.00      2.86     17.9     35.702
20.250        0.000    11.65     0.00      2.86     17.6     35.661
20.333        0.000    12.76     0.00      2.85     17.3     35.630
20.417        0.000    12.76     0.00      2.85     17.0     35.601
20.500        0.000    12.76     0.00      2.85     16.8     35.574
20.583        0.000    13.12     0.00      2.85     16.5     35.550
20.667        0.000    13.12     0.00      2.84     16.3     35.528
20.750        0.000    13.12     0.00      2.84     16.1     35.507
20.833        0.000    12.41     0.00      2.84     16.0     35.483
20.917        0.000    12.41     0.00      2.84     15.7     35.460
21.000        0.000    12.41     0.00      2.84     15.6     35.438
21.083        0.000    11.23     0.00      2.84     15.3     35.410
21.167        0.000    11.23     0.00      2.83     15.1     35.383
21.250        0.000    11.23     0.00      2.83     14.9     35.358
21.333        0.000    11.70     0.00      2.83     14.7     35.337
21.417        0.000    11.70     0.00      2.83     14.5     35.318
21.500        0.000    11.70     0.00      2.83     14.3     35.300
21.583        0.000    10.93     0.00      2.83     14.2     35.278
21.667        0.000    10.93     0.00      2.82     14.0     35.257
21.750        0.000    10.93     0.00      2.82     13.8     35.237
21.833        0.000    11.55     0.00      2.82     13.7     35.222
21.917        0.000    11.55     0.00      2.82     13.5     35.209
22.000        0.000    11.55     0.00      2.82     13.4     35.196
22.083        0.000    10.85     0.00      2.82     13.3     35.179
22.167        0.000    10.85     0.00      2.82     13.1     35.163
22.250        0.000    10.85     0.00      2.82     13.0     35.148
22.333        0.000    11.48     0.00      2.81     12.9     35.138
22.417        0.000    11.48     0.00      2.81     12.8     35.129
22.500        0.000    11.48     0.00      2.81     12.7     35.121
22.583        0.000     9.99     0.00      2.81     12.6     35.102
22.667        0.000     9.99     0.00      2.81     12.5     35.085
22.750        0.000     9.99     0.00      2.81     12.3     35.069
22.833        0.000     9.42     0.00      2.81     12.2     35.050
22.917        0.000     9.42     0.00      2.81     12.0     35.032
23.000        0.000     9.42     0.00      2.81     11.9     35.015
23.083        0.000     9.21     0.00      2.80     11.7     34.998
23.167        0.000     9.21     0.00      2.80     11.6     34.982
23.250        0.000     9.21     0.00      2.80     11.4     34.966
23.333        0.000     9.08     0.00      2.80     11.3     34.951
23.417        0.000     9.08     0.00      2.80     11.2     34.937
23.500        0.000     9.08     0.00      2.80     11.1     34.923
23.583        0.000     9.01     0.00      2.80     10.9     34.910
23.667        0.000     9.01     0.00      2.80     10.8     34.897
23.750        0.000     9.01     0.00      2.80     10.7     34.886
```

```
          23.833        0.000     8.96     0.00      2.79     10.6     34.874
          23.917        0.000     8.96     0.00      2.79     10.5     34.864
----------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =     92.457 AF
    BASIN  STORAGE =     31.539 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =     60.910 AF
    LOSS    VOLUME =      0.000 AF
============================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

APPENDIX E- HYDRAULIC ANALYSIS FOR PEAKFLOW Q_{100}

NORMAL DEPTH

E.1 – DRAINAGE FACILITIES BASED ON NORMAL DEPTH METHOD

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.
Thursday, Oct 15 2020

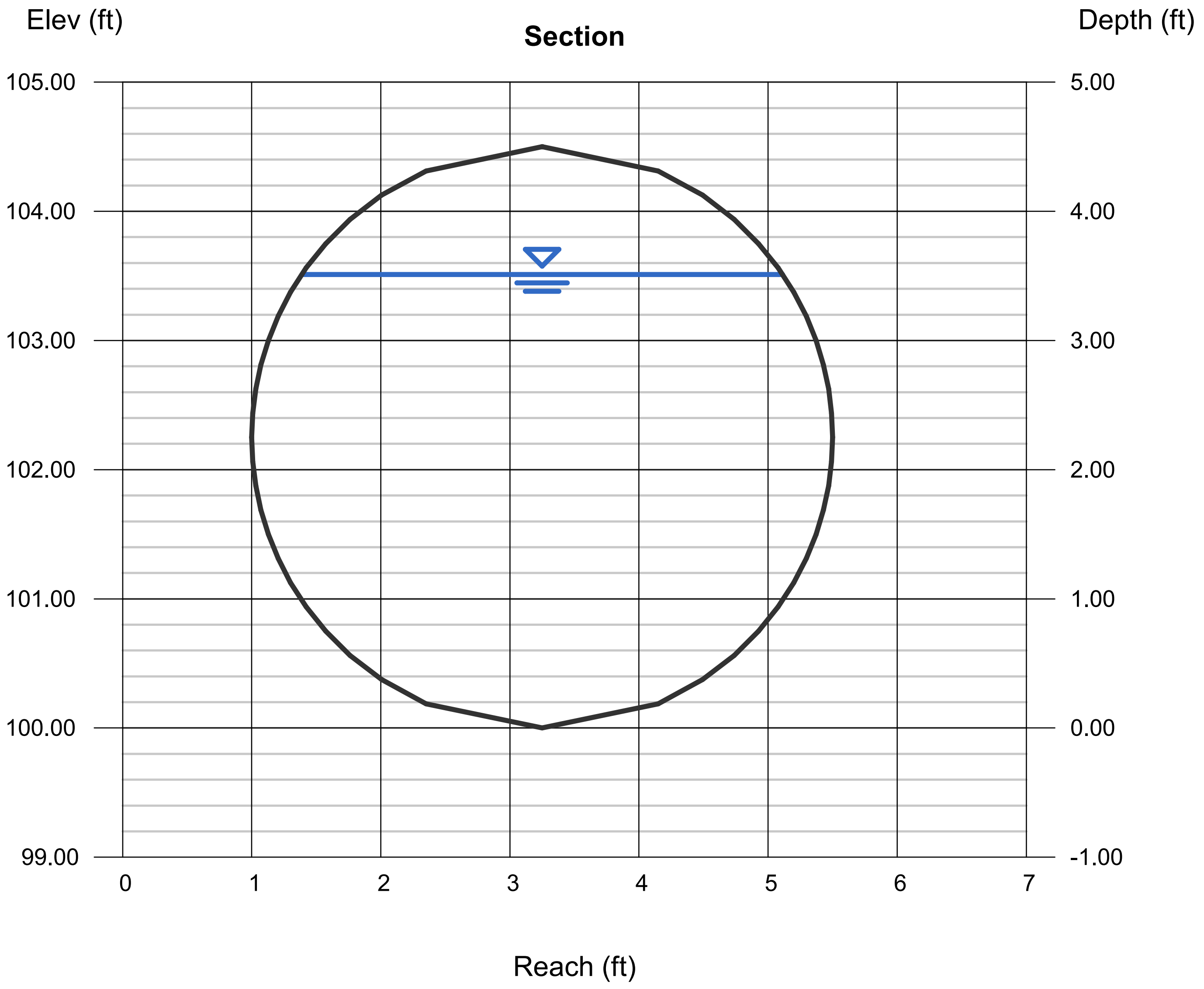
STORM DRAIN LINE-A (NODE 9-16)

Circular
Diameter (ft) = 4.50

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 187.00

Highlighted
Depth (ft) = 3.51
Q (cfs) = 187.00
Area (sqft) = 13.34
Velocity (ft/s) = 14.01
Wetted Perim (ft) = 9.77
Crit Depth, Yc (ft) = 3.94
Top Width (ft) = 3.72
EGL (ft) = 6.56



Channel Report

STORM DRAIN LINE-A (NODE 16-21)

Circular

Diameter (ft) = 5.00

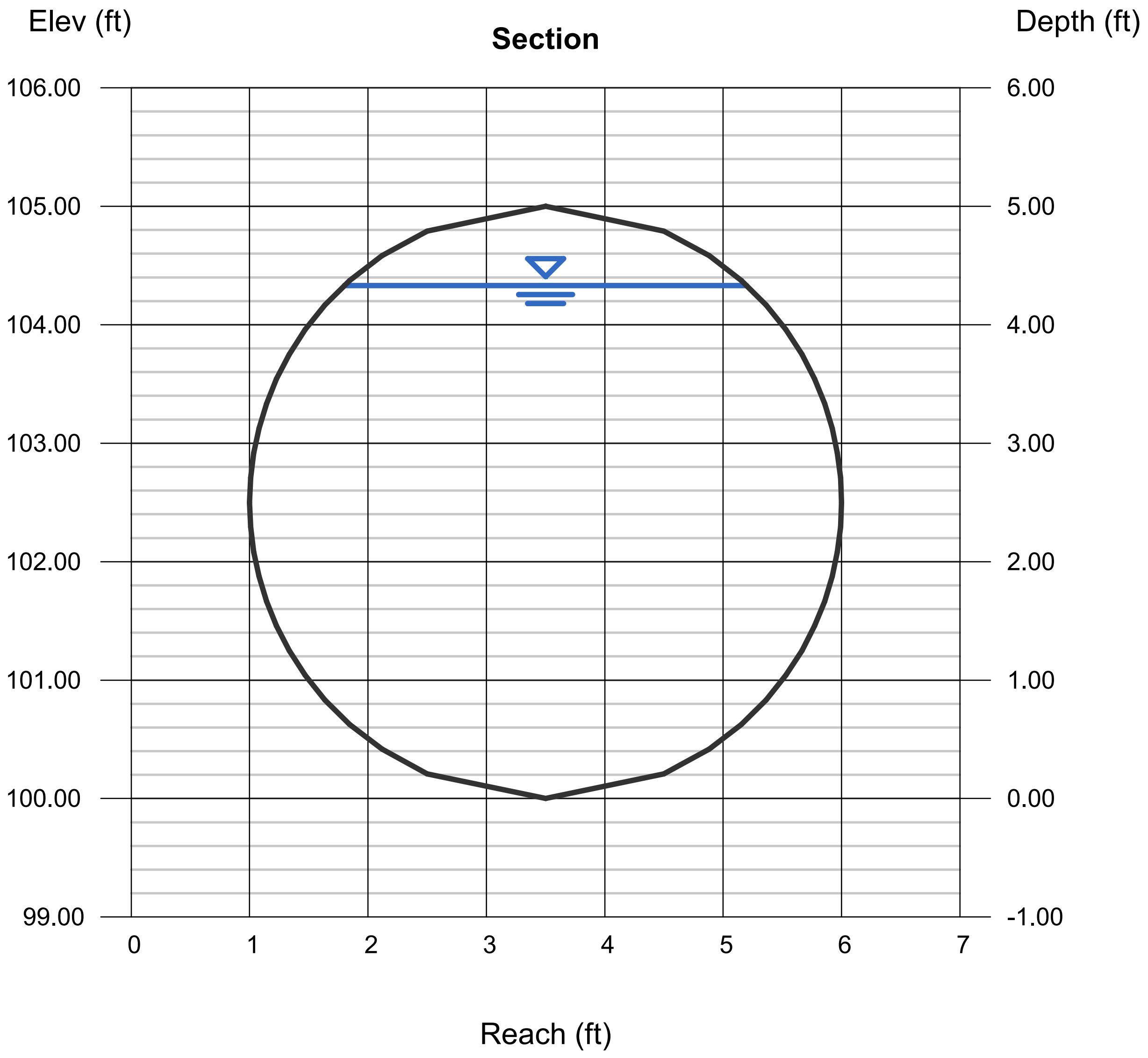
Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations

Compute by: Known Q
Known Q (cfs) = 272.00

Highlighted

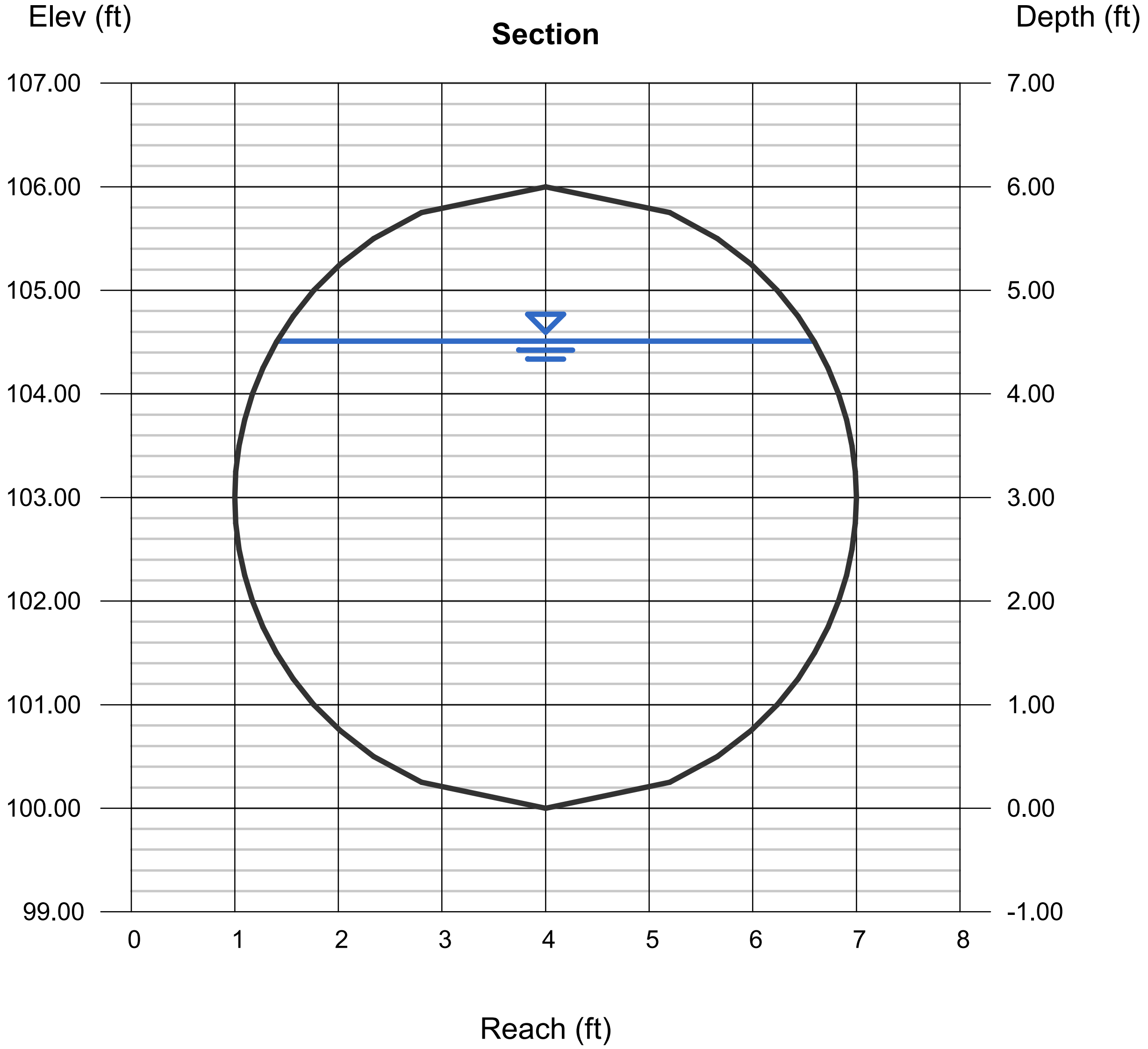
Depth (ft) = 4.33
Q (cfs) = 272.00
Area (sqft) = 18.08
Velocity (ft/s) = 15.04
Wetted Perim (ft) = 11.98
Crit Depth, Yc (ft) = 4.55
Top Width (ft) = 3.40
EGL (ft) = 7.85



Channel Report

STORM DRAIN LINE-A (NODE 21-30)

Circular		**Highlighted**	
Diameter (ft)	= 6.00	Depth (ft)	= 4.51
		Q (cfs)	= 387.00
		Area (sqft)	= 22.82
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 16.96
Slope (%)	= 1.00	Wetted Perim (ft)	= 12.60
N-Value	= 0.013	Crit Depth, Yc (ft)	= 5.28
		Top Width (ft)	= 5.18
Calculations		EGL (ft)	= 8.98
Compute by:	Known Q		
Known Q (cfs)	= 387.00		



Channel Report

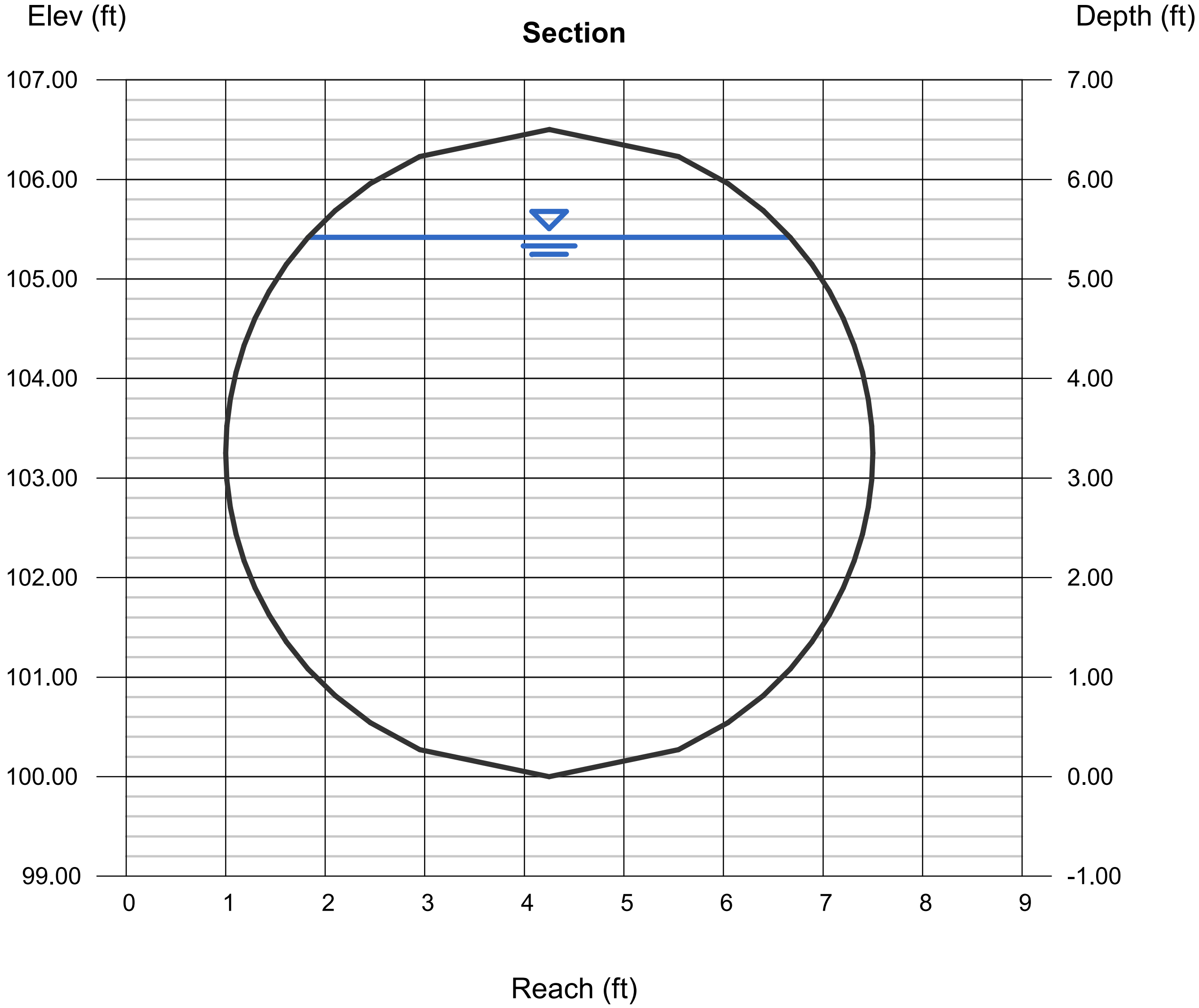
STORM DRAIN LINE-A (NODE 30-40)

Circular
Diameter (ft) = 6.50

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 532.00

Highlighted
Depth (ft) = 5.42
Q (cfs) = 532.00
Area (sqft) = 29.60
Velocity (ft/s) = 17.97
Wetted Perim (ft) = 14.98
Crit Depth, Yc (ft) = 5.94
Top Width (ft) = 4.83
EGL (ft) = 10.44



Channel Report

STORM DRAIN LINE-2A (NODE 21-25)

Circular

Diameter (ft) = 4.00

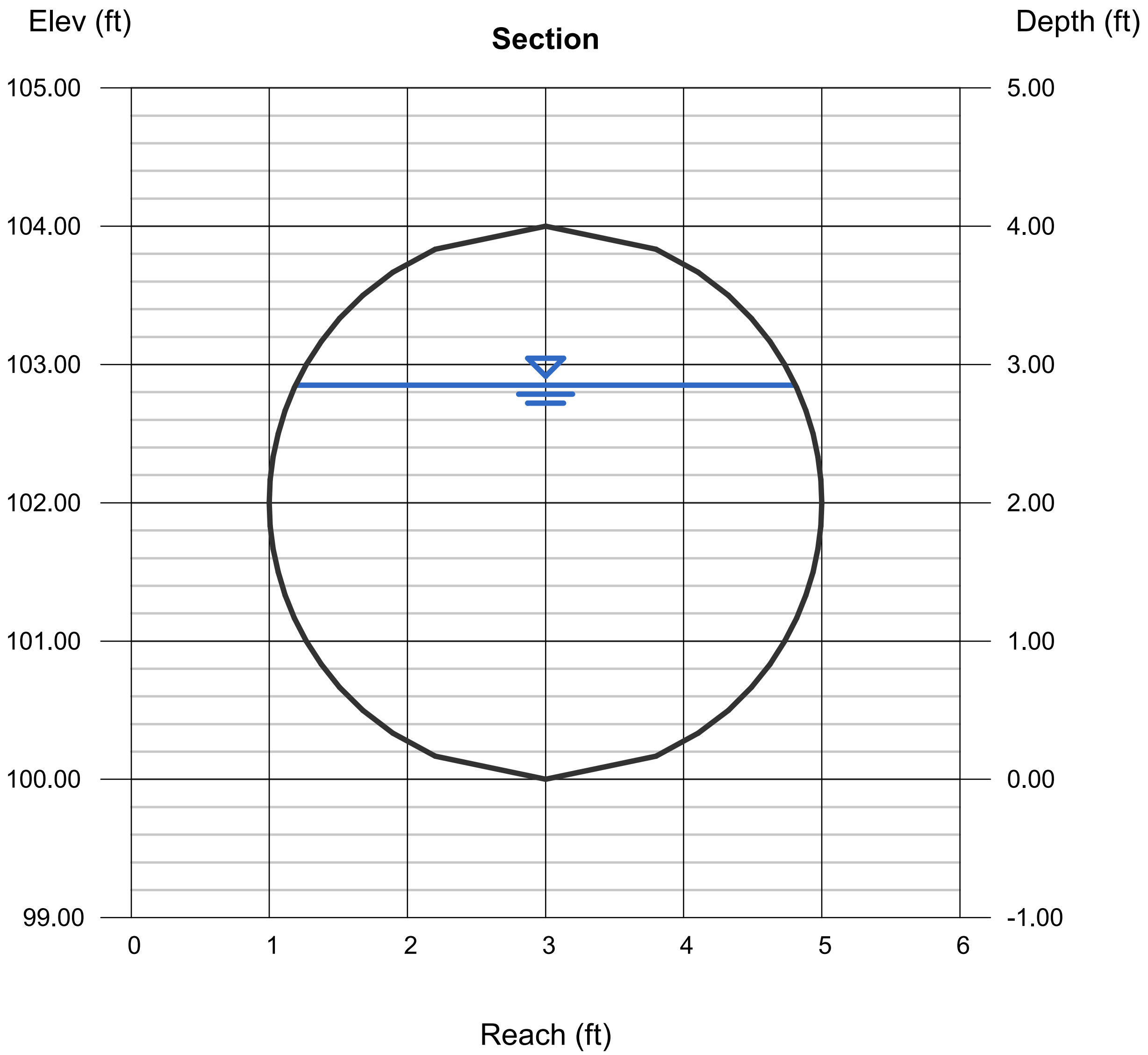
Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations

Compute by: Known Q
Known Q (cfs) = 123.00

Highlighted

Depth (ft) = 2.85
Q (cfs) = 123.00
Area (sqft) = 9.58
Velocity (ft/s) = 12.84
Wetted Perim (ft) = 8.04
Crit Depth, Yc (ft) = 3.34
Top Width (ft) = 3.62
EGL (ft) = 5.41



Channel Report

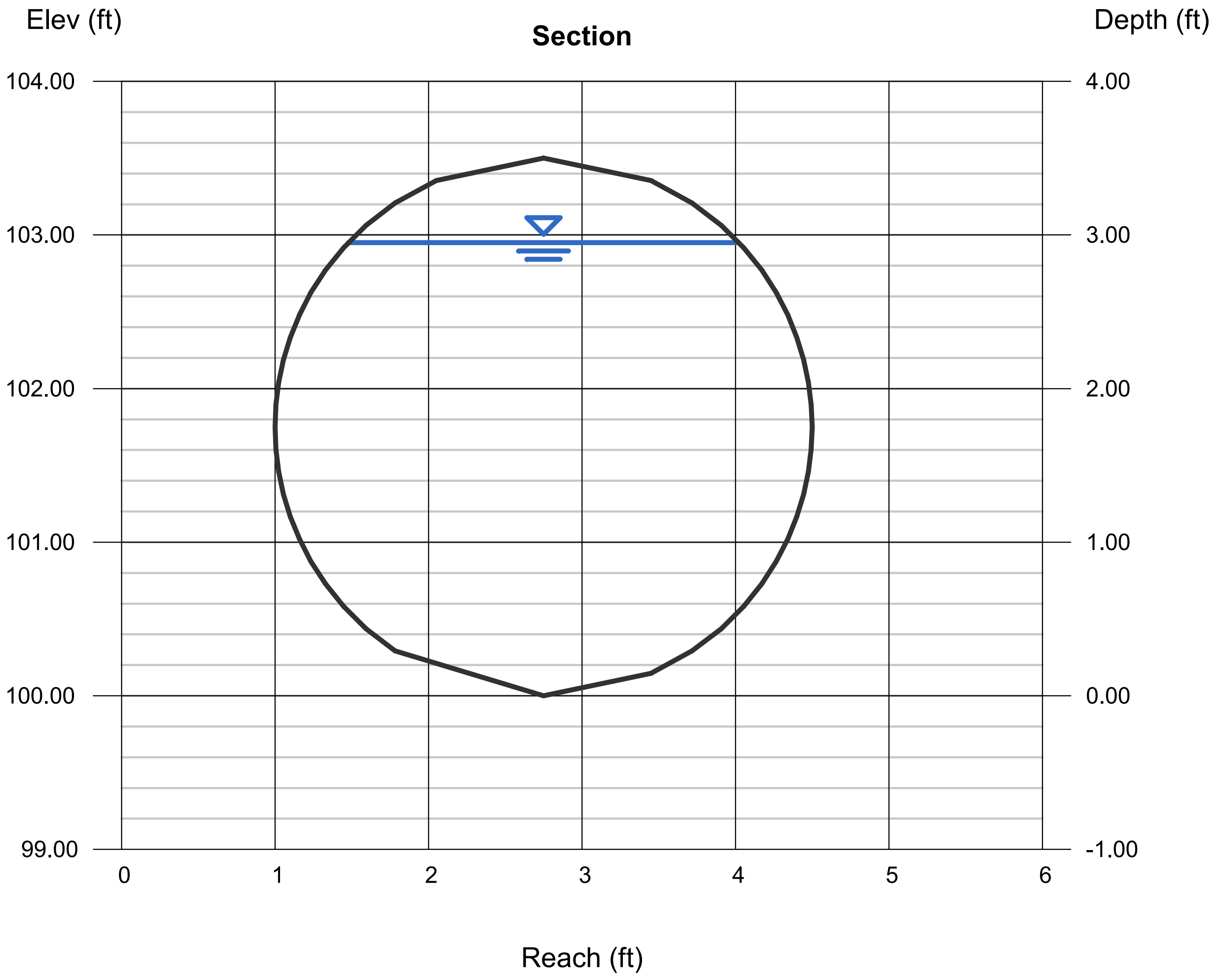
STORM DRAIN LINE-2A (NODE 25-24)

Circular
Diameter (ft) = 3.50

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 103.00

Highlighted
Depth (ft) = 2.95
Q (cfs) = 103.00
Area (sqft) = 8.66
Velocity (ft/s) = 11.89
Wetted Perim (ft) = 8.16
Crit Depth, Yc (ft) = 3.10
Top Width (ft) = 2.54
EGL (ft) = 5.15



Channel Report

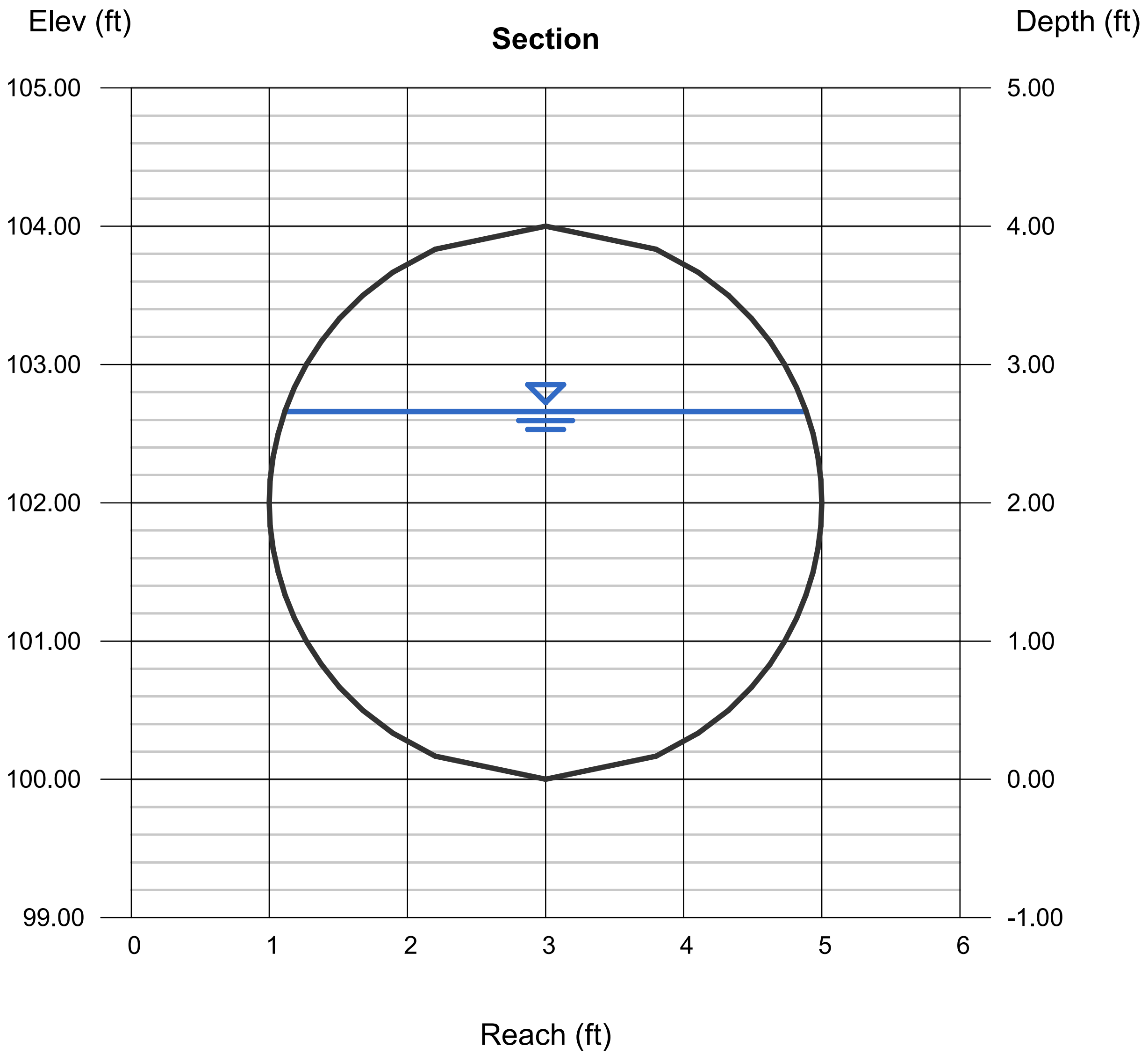
STORM DRAIN LINE-3A (NODE 34-30)

Circular
Diameter (ft) = 4.00

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 112.00

Highlighted
Depth (ft) = 2.66
Q (cfs) = 112.00
Area (sqft) = 8.90
Velocity (ft/s) = 12.59
Wetted Perim (ft) = 7.64
Crit Depth, Yc (ft) = 3.20
Top Width (ft) = 3.77
EGL (ft) = 5.12



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.   Thursday, Oct 15 2020

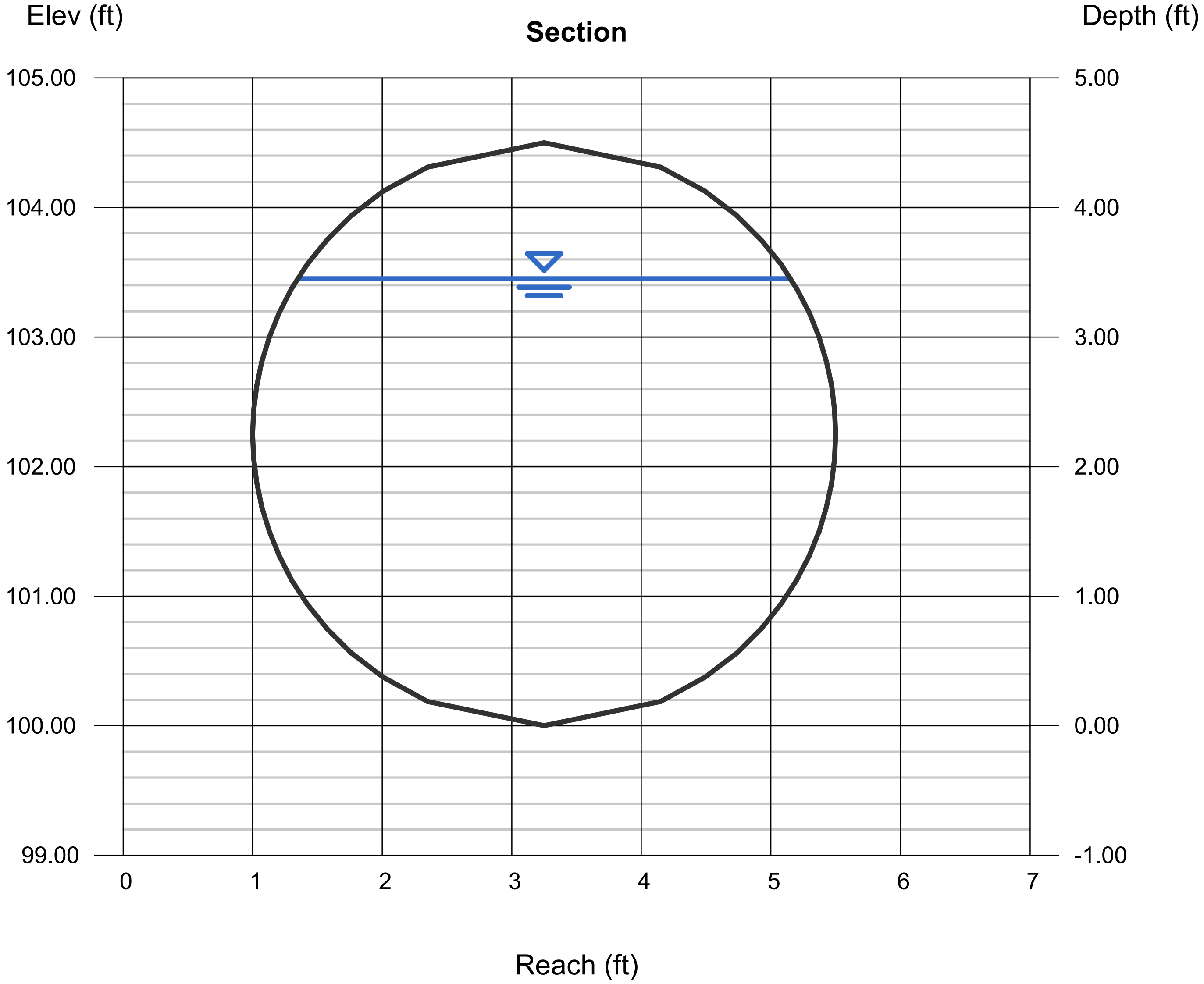
STORM DRAIN LINE-B (NODE 140-160)

Circular
Diameter (ft) = 4.50

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 184.00

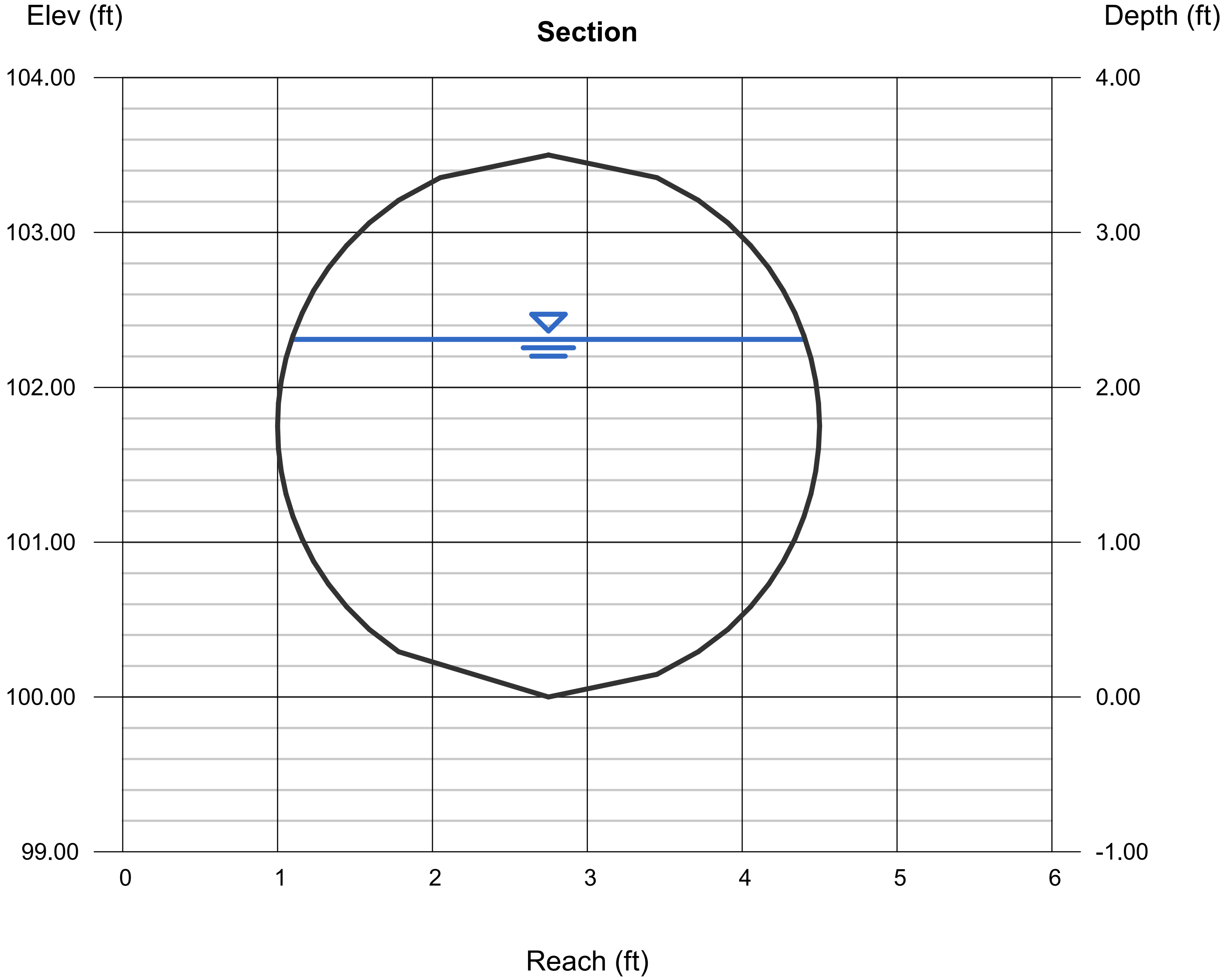
Highlighted
Depth (ft) = 3.45
Q (cfs) = 184.00
Area (sqft) = 13.10
Velocity (ft/s) = 14.05
Wetted Perim (ft) = 9.61
Crit Depth, Yc (ft) = 3.92
Top Width (ft) = 3.80
EGL (ft) = 6.52



Channel Report

STORM DRAIN LINE-B (NODE 158-150)

Circular		**Highlighted**	
Diameter (ft)	= 3.50	Depth (ft)	= 2.31
		Q (cfs)	= 78.00
		Area (sqft)	= 6.76
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 11.55
Slope (%)	= 1.00	Wetted Perim (ft)	= 6.65
N-Value	= 0.013	Crit Depth, Yc (ft)	= 2.76
		Top Width (ft)	= 3.31
Calculations		EGL (ft)	= 4.38
Compute by:	Known Q		
Known Q (cfs)	= 78.00		

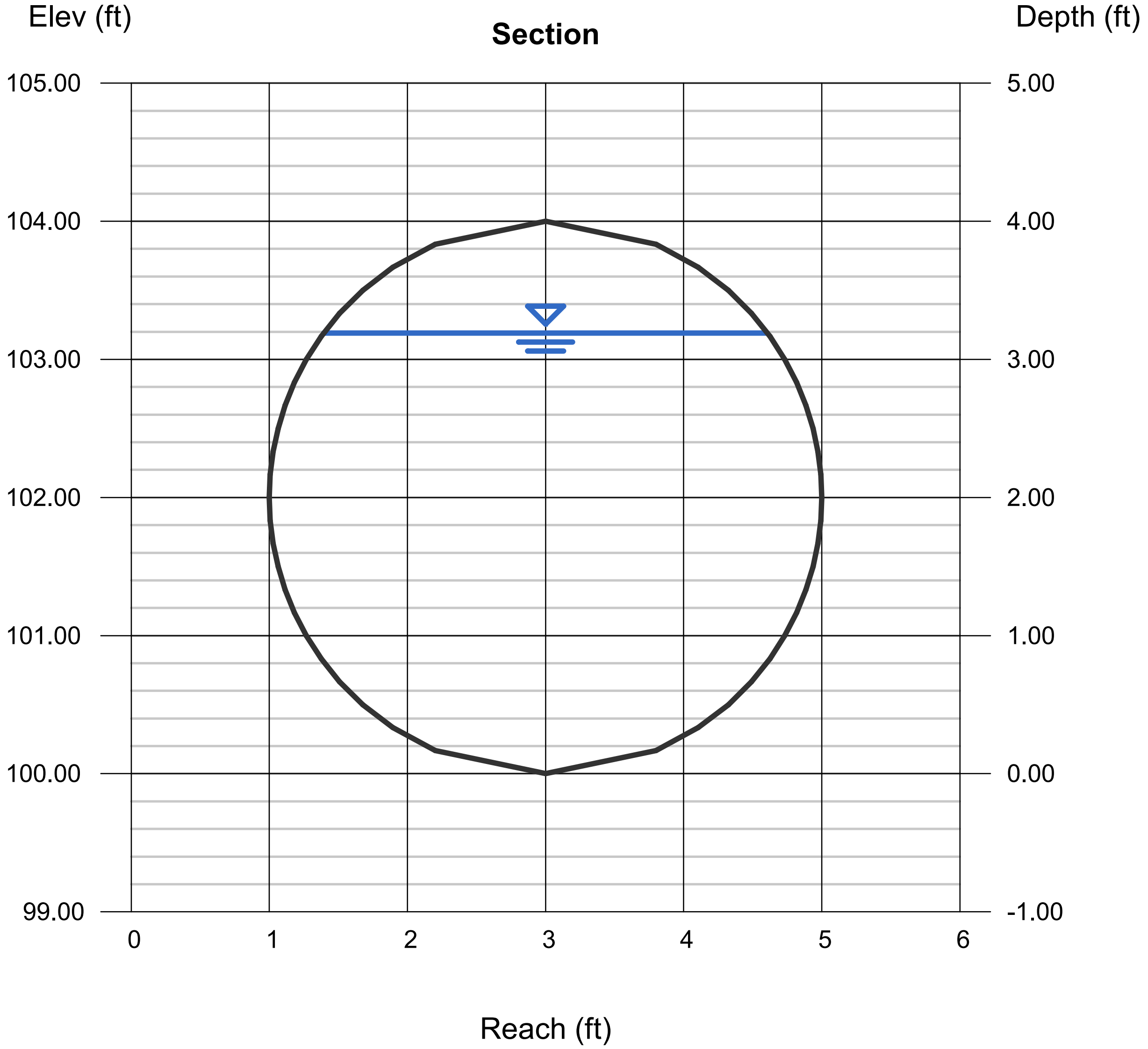


Channel Report

STORM DRAIN LINE-B (NODE 160-158)

Circular

Diameter (ft)	= 4.00		**Highlighted**	
			Depth (ft)	= 3.19
			Q (cfs)	= 140.00
			Area (sqft)	= 10.76
Invert Elev (ft)	= 100.00		Velocity (ft/s)	= 13.02
Slope (%)	= 1.00		Wetted Perim (ft)	= 8.84
N-Value	= 0.013		Crit Depth, Yc (ft)	= 3.51
			Top Width (ft)	= 3.21
Calculations			EGL (ft)	= 5.82
Compute by:	Known Q			
Known Q (cfs)	= 140.00			



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Oct 15 2020

STORM DRAIN LINE-B (NODE 180-140)

Circular

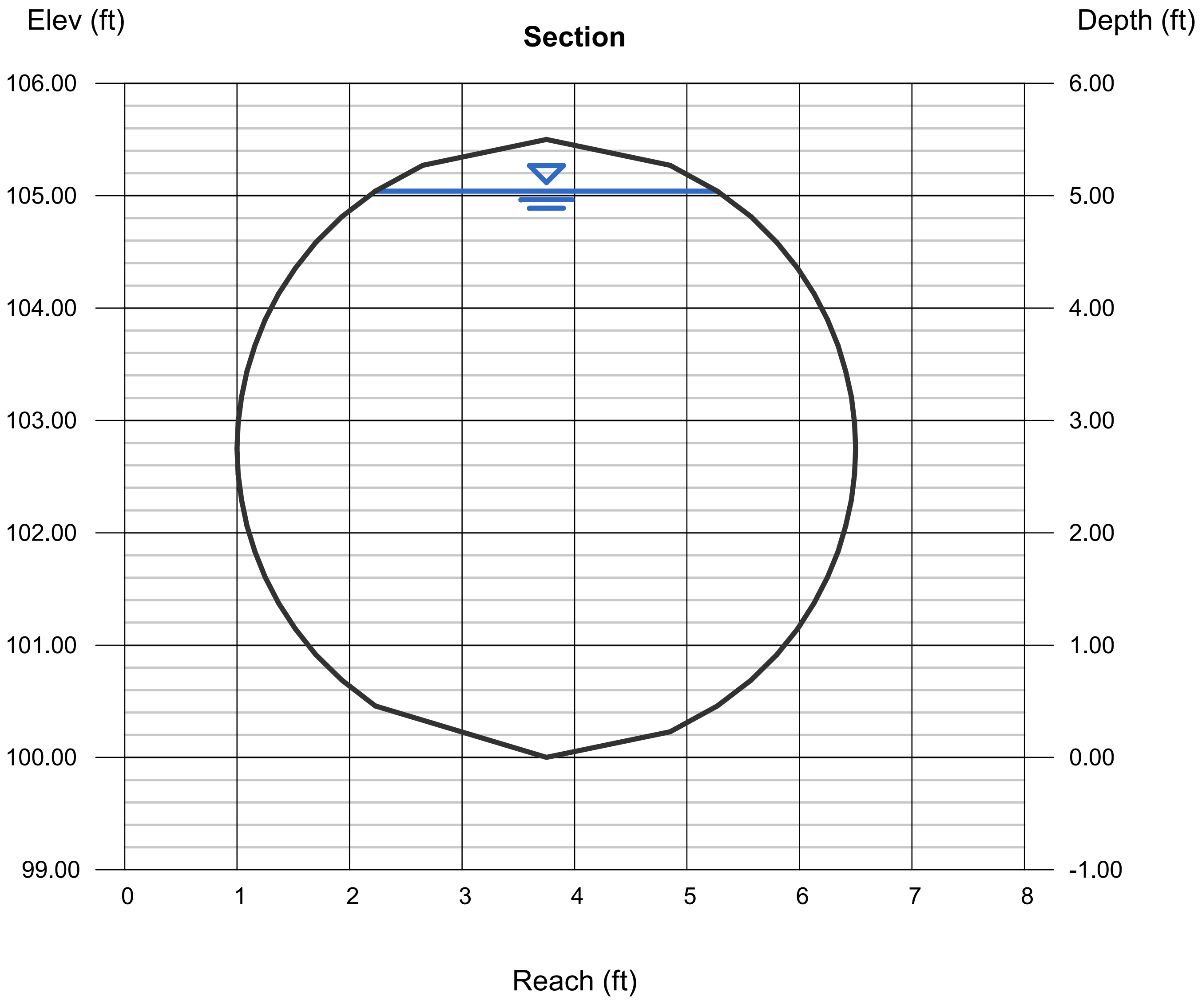
Diameter (ft)	= 5.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 360.00

Highlighted

Depth (ft)	= 5.04
Q (cfs)	= 360.00
Area (sqft)	= 22.81
Velocity (ft/s)	= 15.78
Wetted Perim (ft)	= 14.05
Crit Depth, Yc (ft)	= 5.07
Top Width (ft)	= 3.04
EGL (ft)	= 8.91



Channel Report

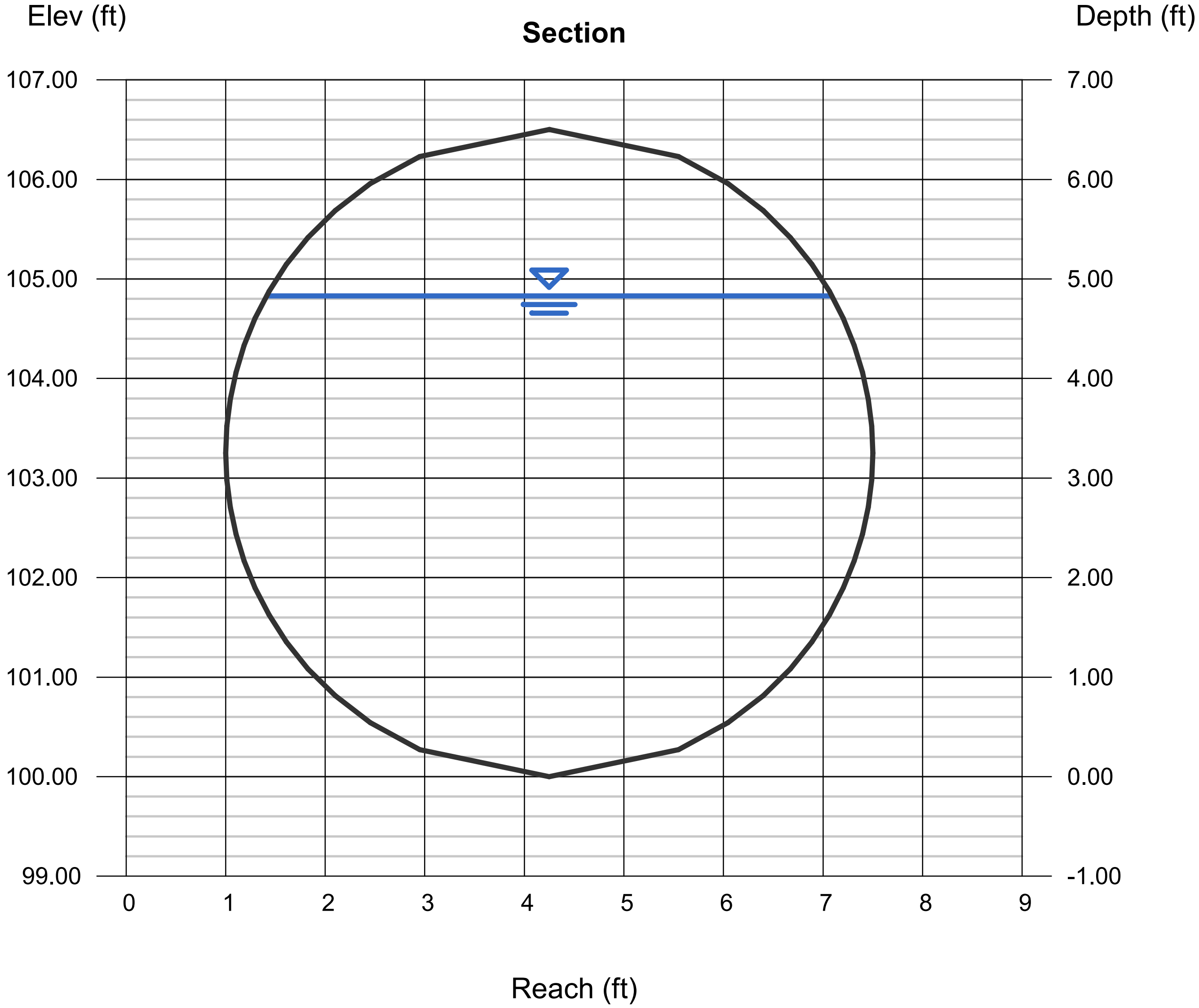
STORM DRAIN LINE-B (NODE 195-180)

Circular
Diameter (ft) = 6.50

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 472.00

Highlighted
Depth (ft) = 4.83
Q (cfs) = 472.00
Area (sqft) = 26.47
Velocity (ft/s) = 17.83
Wetted Perim (ft) = 13.52
Crit Depth, Yc (ft) = 5.71
Top Width (ft) = 5.68
EGL (ft) = 9.78



Channel Report

STORM DRAIN LINE-2B (NODE 110-106)

Circular

Diameter (ft) = 3.00

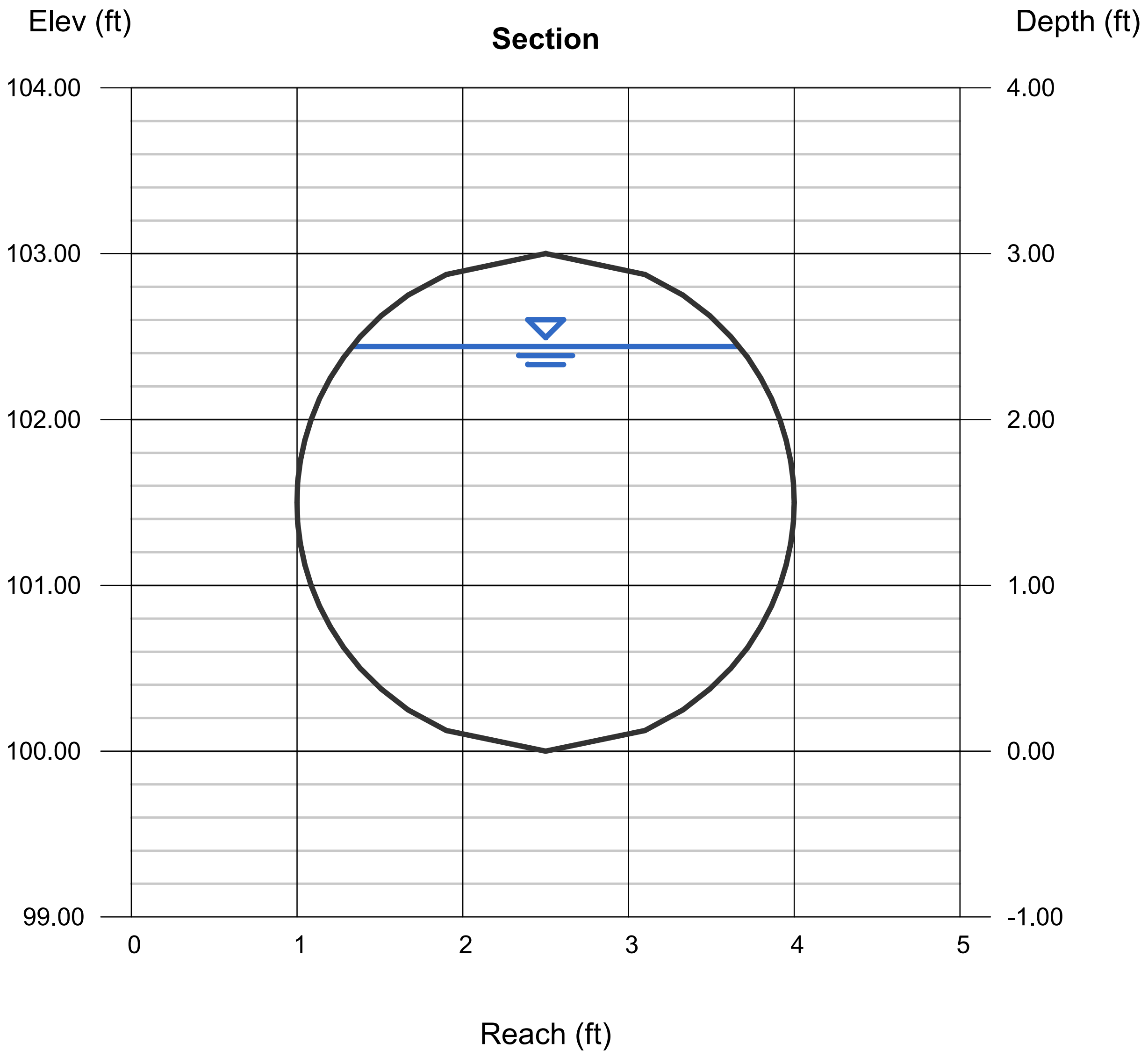
Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations

Compute by: Known Q
Known Q (cfs) = 66.00

Highlighted

Depth (ft) = 2.44
Q (cfs) = 66.00
Area (sqft) = 6.16
Velocity (ft/s) = 10.71
Wetted Perim (ft) = 6.75
Crit Depth, Yc (ft) = 2.61
Top Width (ft) = 2.33
EGL (ft) = 4.22



Channel Report

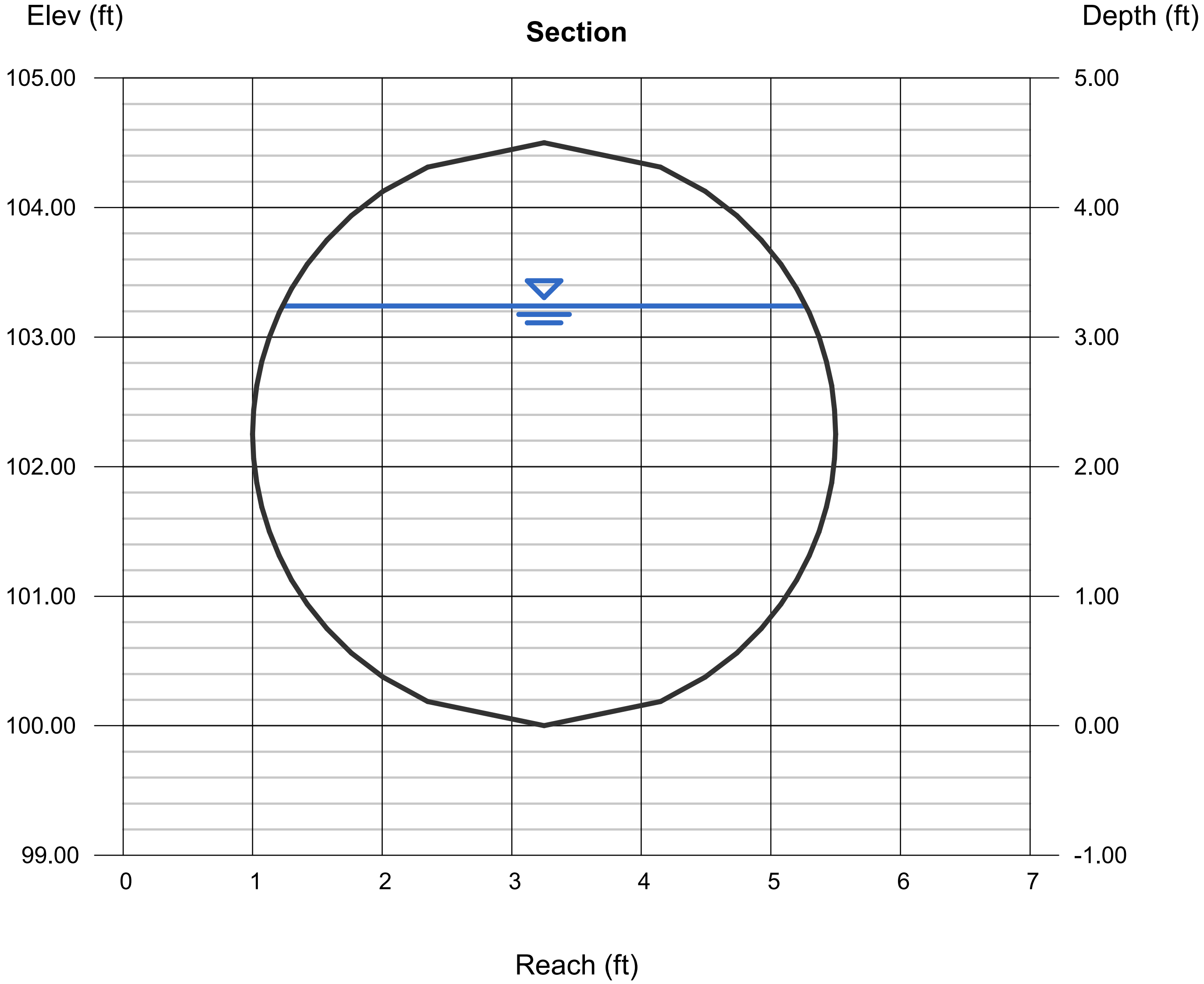
STORM DRAIN LINE-2B (NODE 130-110)

Circular
Diameter (ft) = 4.50

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 171.00

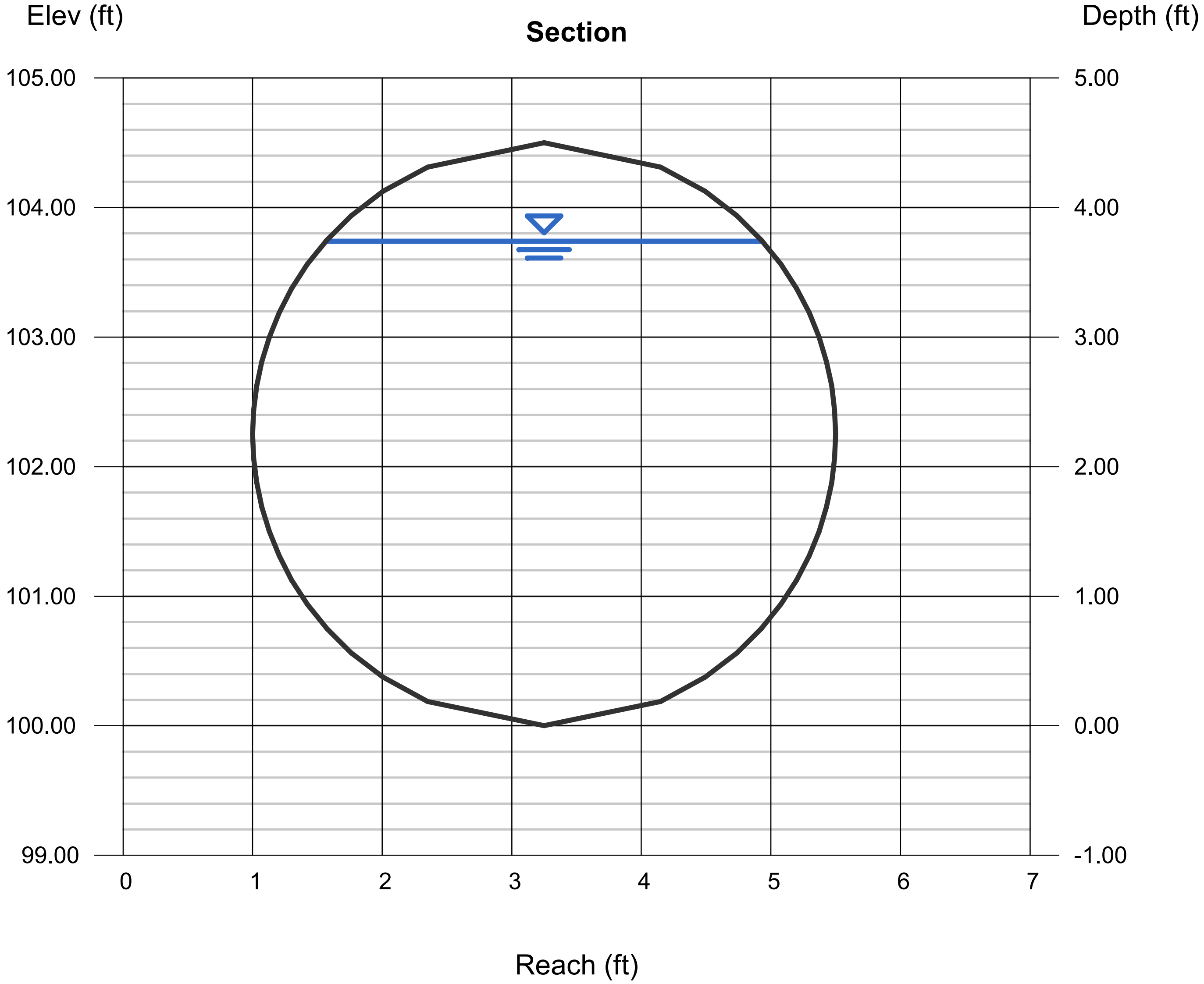
Highlighted
Depth (ft) = 3.24
Q (cfs) = 171.00
Area (sqft) = 12.29
Velocity (ft/s) = 13.92
Wetted Perim (ft) = 9.13
Crit Depth, Yc (ft) = 3.80
Top Width (ft) = 4.03
EGL (ft) = 6.25



Channel Report

STORM DRAIN LINE-2B (NODE 140-130)

Circular		**Highlighted**	
Diameter (ft)	= 4.50	Depth (ft)	= 3.74
		Q (cfs)	= 199.00
		Area (sqft)	= 14.13
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 14.08
Slope (%)	= 1.00	Wetted Perim (ft)	= 10.33
N-Value	= 0.013	Crit Depth, Yc (ft)	= 4.03
		Top Width (ft)	= 3.37
Calculations		EGL (ft)	= 6.82
Compute by:	Known Q		
Known Q (cfs)	= 199.00		



Channel Report

STORM DRAIN LINE-3B (NODE 160-165)

Circular

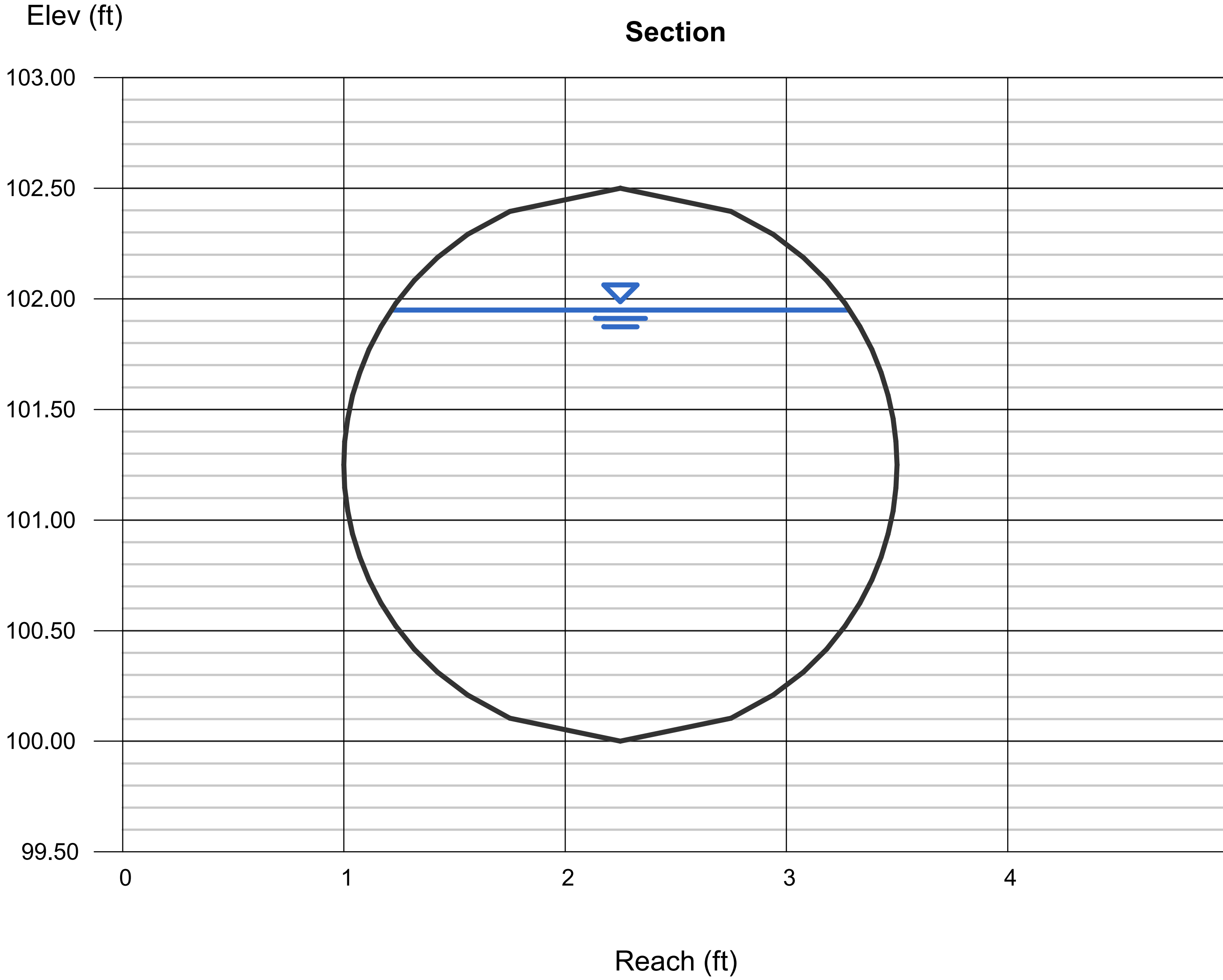
Diameter (ft)	= 2.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 39.00

Highlighted

Depth (ft)	= 1.95
Q (cfs)	= 39.00
Area (sqft)	= 4.12
Velocity (ft/s)	= 9.47
Wetted Perim (ft)	= 5.43
Crit Depth, Yc (ft)	= 2.11
Top Width (ft)	= 2.06
EGL (ft)	= 3.34



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Oct 15 2020

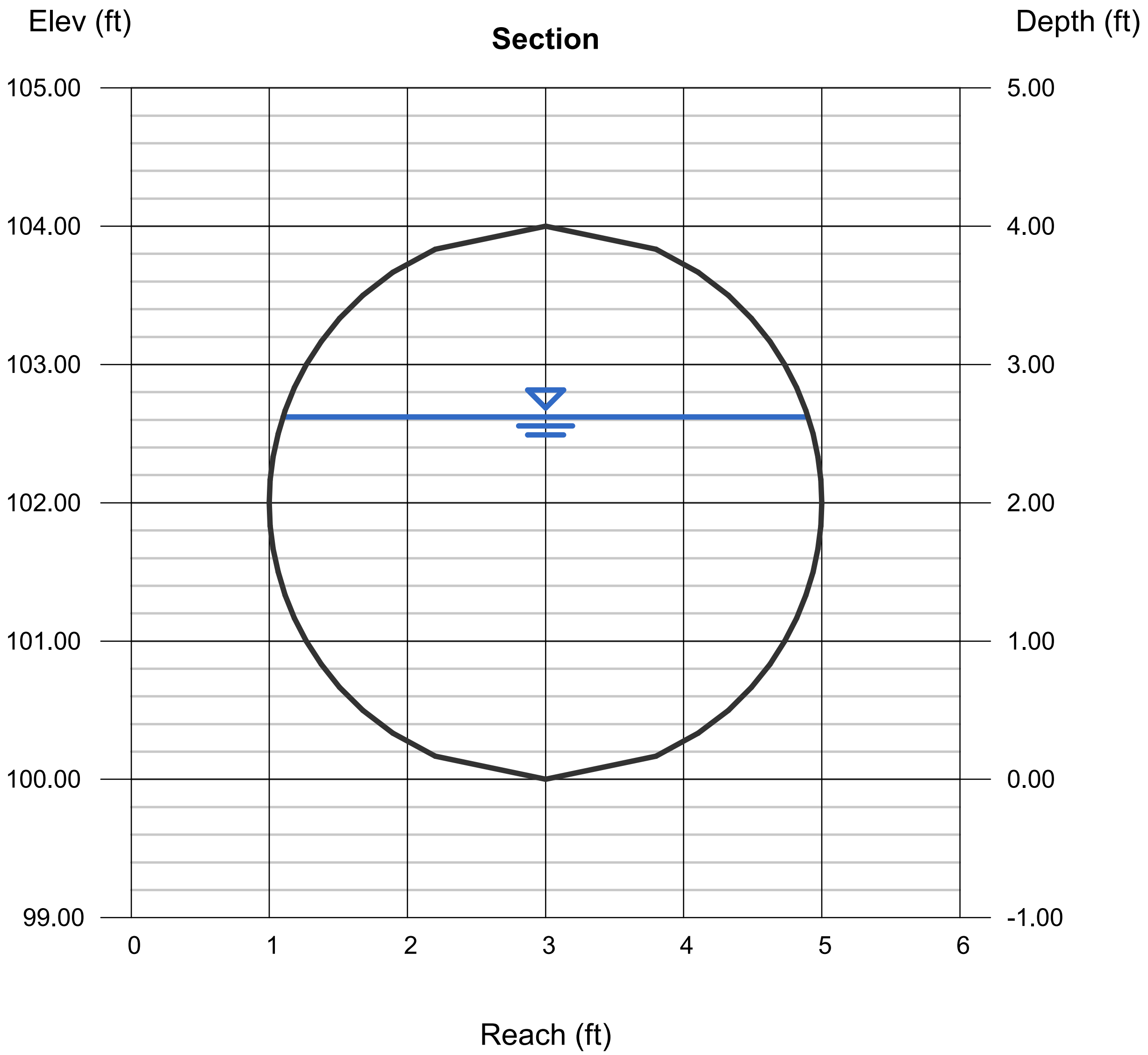
STORM DRAIN LINE-4B (NODE 180-186)

Circular
Diameter (ft) = 4.00

Invert Elev (ft) = 100.00
Slope (%) = 1.00
N-Value = 0.013

Calculations
Compute by: Known Q
Known Q (cfs) = 110.00

Highlighted
Depth (ft) = 2.62
Q (cfs) = 110.00
Area (sqft) = 8.75
Velocity (ft/s) = 12.57
Wetted Perim (ft) = 7.56
Crit Depth, Yc (ft) = 3.17
Top Width (ft) = 3.80
EGL (ft) = 5.08



Channel Report

STORM DRAIN LINE-4B (NODE 186-184)

Circular

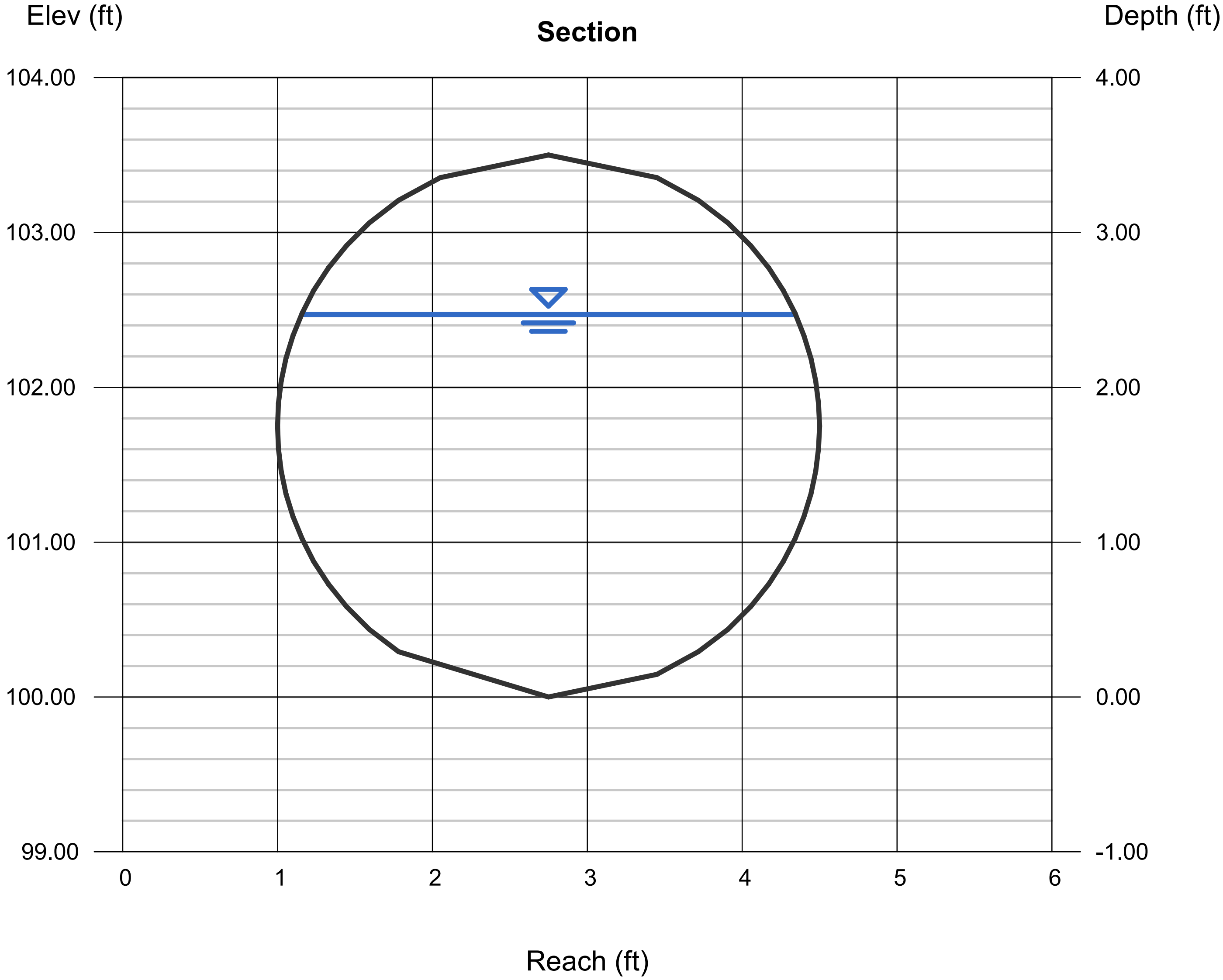
Diameter (ft)	= 3.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 85.00

Highlighted

Depth (ft)	= 2.47
Q (cfs)	= 85.00
Area (sqft)	= 7.26
Velocity (ft/s)	= 11.71
Wetted Perim (ft)	= 6.98
Crit Depth, Yc (ft)	= 2.87
Top Width (ft)	= 3.19
EGL (ft)	= 4.60



```
DATE:  9/23/2021
TIME:  9:19
                                        WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING                              PAGE    1

 CARD  SECT  CHN   NO OF  AVE PIER  HEIGHT 1  BASE    ZL    ZR   INV   Y(1)  Y(2)  Y(3)  Y(4)  Y(5)  Y(6)  Y(7)  Y(8)  Y(9)  Y(10)
 CODE   NO   TYPE  PIERS   WIDTH    DIAMETER  WIDTH              DROP

 CD     36    4                        3.00
 CD     48    4                        4.00
 CD     54    4                        4.50
 CD     60    4                        5.00
 CD     66    4                        5.50
 CD     72    4                        6.00


 PAGE NO   3

                            WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

                              TRAVERTINE

HEADING LINE NO 2 IS -

                              BASIN OUTLET PIPE

HEADING LINE NO 3 IS -

                              09-23-2021
```

```
                            WATER SURFACE PROFILE - ELEMENT CARD LISTING

 ELEMENT NO   1 IS A SYSTEM OUTLET     *         *     *
                     U/S DATA   STATION    INVERT  SECT                                     W S ELEV
                                  1000.00  -10.00   66                                         15.60
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

 ELEMENT NO   2 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT               N                                RADIUS  ANGLE  ANG PT  MAN H
                                  1200.00    1.00   66              0.013                                0.00   0.00    0.00     0

 ELEMENT NO   3 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT               N                                RADIUS  ANGLE  ANG PT  MAN H
                                  1982.00   10.00   66              0.013                               45.00  78.00    0.00     0

 ELEMENT NO   4 IS A JUNCTION          *         *     *     *                  *                   *               *
                     U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3       Q4    INVERT-3 INVERT-4  PHI 3   PHI 4
                                  1982.00   11.00   66    36     0  0.014    143.4      0.0    12.00     0.00  60.00    0.00

 ELEMENT NO   5 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT               N                                RADIUS  ANGLE  ANG PT  MAN H
                                  2043.00   12.00   66              0.013                                0.00   0.00    0.00     0

 ELEMENT NO   6 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT               N                                RADIUS  ANGLE  ANG PT  MAN H
                                  2323.00   16.00   66              0.013                                0.00   0.00    0.00     0

 ELEMENT NO   7 IS A SYSTEM HEADWORKS                  *                      *
                     U/S DATA   STATION    INVERT  SECT                                     W S ELEV
                                  2323.00   16.00   66                                          0.00
NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
```

```
 PAGE    1
                                                   WATER SURFACE PROFILE LISTING
                         TRAVERTINE
                         BASIN OUTLET PIPE
                         09-23-2021

 STATION    INVERT   DEPTH     W.S.        Q       VEL     VEL     ENERGY   SUPER  CRITICAL           HGT/   BASE/    ZL   NO  AVBPR
             ELEV   OF FLOW    ELEV                        HEAD   GRD.EL.   ELEV    DEPTH             DIA    ID NO.       PIER

 L/ELEM      SO                                           SF AVE     HF                    NORM DEPTH                 ZR
***********************************************************************************************************************************

  1000.00   -10.00   25.600    15.600     286.9   12.08    2.264    17.864   0.00    4.682             5.50    0.00  0.00   0   0.00

   200.00  0.05500                                       .007299     1.46                     2.296                  0.00

  1200.00     1.00   16.060    17.060     286.9   12.08    2.264    19.324   0.00    4.682             5.50    0.00  0.00   0   0.00

   782.00  0.01151                                       .007299     5.71                     3.709                  0.00

  1982.00    10.00   13.189    23.189     286.9   12.08    2.264    25.453   0.00    4.682             5.50    0.00  0.00   0   0.00

JUNCT STR  0.00000                                       .005292     0.00                                            0.00

  1982.00    11.00   13.887    24.887     143.5    6.04    0.566    25.453   0.00    3.339             5.50    0.00  0.00   0   0.00

    61.00  0.01639                                       .001826     0.11                     2.188                  0.00

  2043.00    12.00   12.999    24.999     143.5    6.04    0.566    25.565   0.00    3.339             5.50    0.00  0.00   0   0.00

   280.00  0.01429                                       .001826     0.51                     2.273                  0.00

  2323.00    16.00    9.510    25.510     143.5    6.04    0.566    26.076   0.00    3.339             5.50    0.00  0.00   0   0.00
```

APPENDIX F – SPILLWAY CALCULATIONS

Spillway Calculations:

Spillway to handle the proposed 6 hour 100 year unit hydrograph peak flow. Split evenly over two spillways. This assumes both outlet pipes are blocked, basins can hold their full volume and difference goes over the two spillways.

Q_{100}=287 cfs

$$L = \frac{Q}{CH^{3/2}}$$

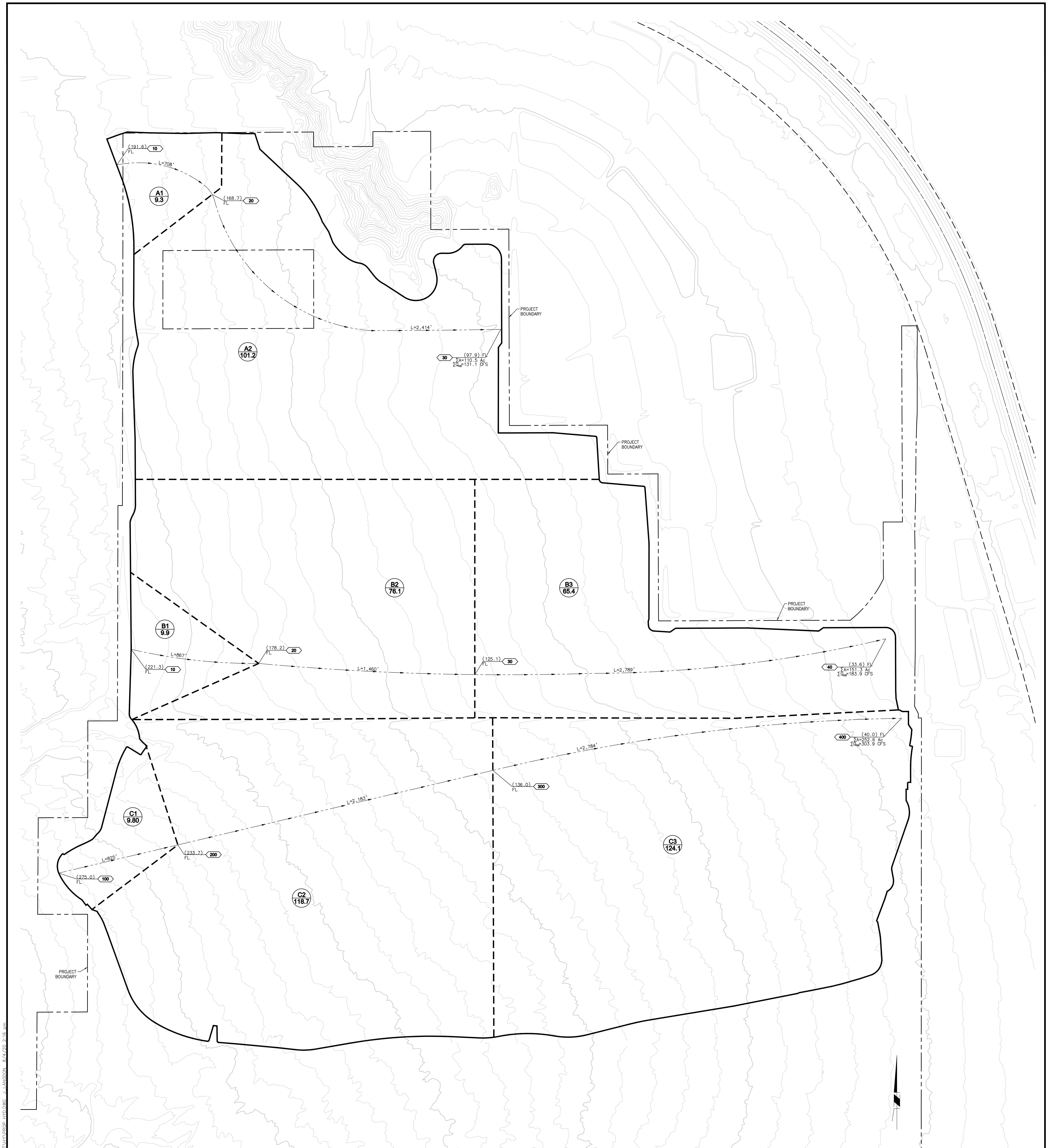
Given:
½ x Q_{100}=143.5 cfs
H=1.0'
C=2.64

L=54.4'

Basin top elevation 31.0'.
Design spillway to have 1' of freeboard below top of basin.
Design spillway with 1' depth of flow.
Therefore spillway elevation = 29.0'

APPENDIX G - LIST OF MAPS

EXISTING HYDROLOGY MAP



LEGEND

A-88	SUBAREA NO.
2.8	SUBAREA AREA – Acre
X XXX.X	NODE NO. & ELEVATION
Q_{100}= 1.2 CFS	FLOW AT NODE – YR STORM
━━	AREA TRIBUTARY BOUNDARY
– – –	SUBAREA TRIBUTARY BOUNDARY

200 100 0 200 400 600

SCALE: 1"=200'

PROACTIVE
ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.NET (949) 716-7460
27042 Towne Centre Drive, Suite 110, Foothill Ranch, CA 92610

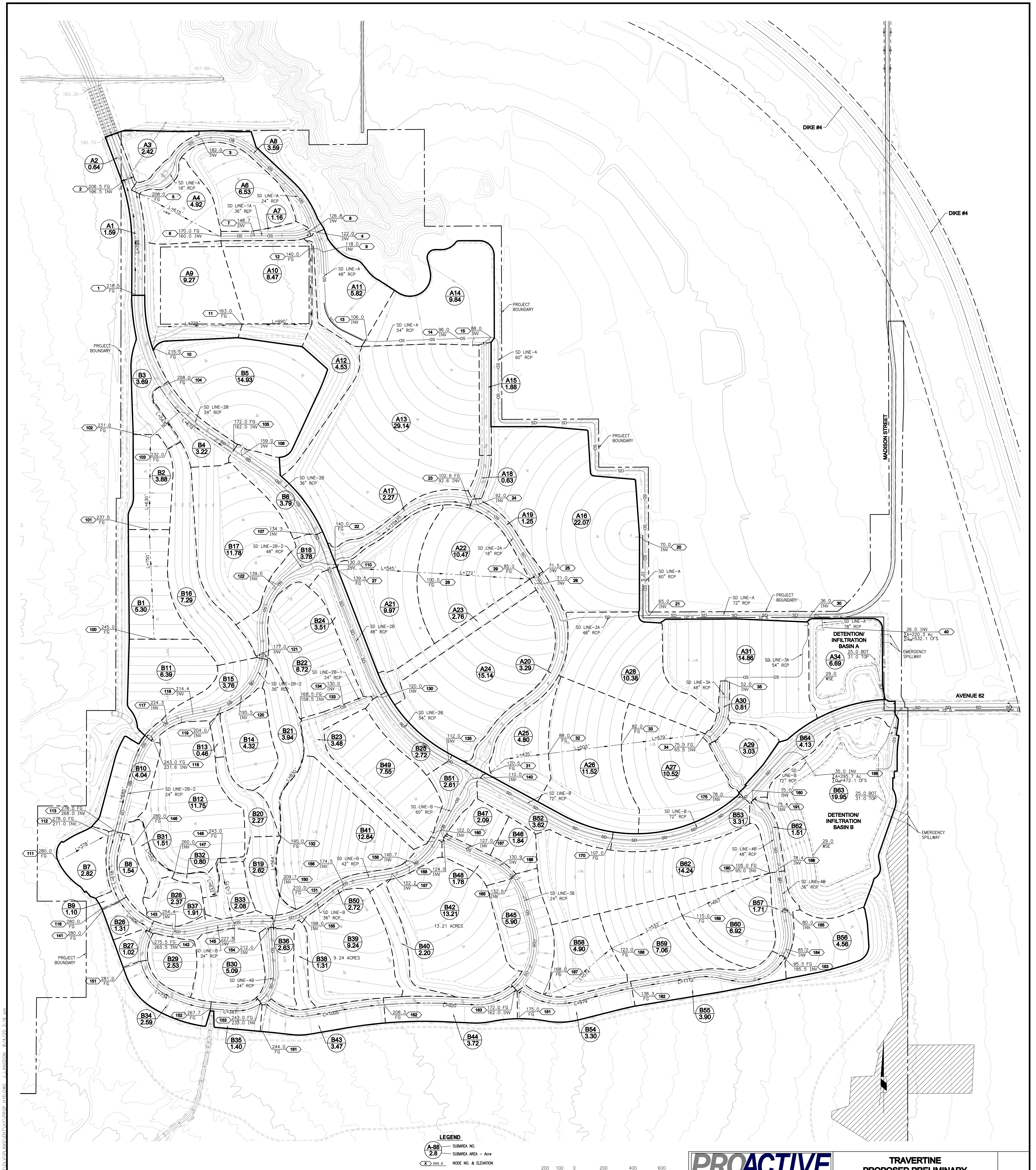
TRAVERTINE
EXIST PRELIMINARY
HYDROLOGY EXHIBIT

CITY OF LA QINTA

1 OF 1

N:\20.053.000\DLV\PLANS\ENT\HY\PROP HYD.DWG J_LANGDON 8/4/20 2:16 pm

PROPOSED HYDROLOGY MAP



LEGEND

A-88	SUBAREA NO.
2.8	SUBAREA AREA – Acre
X xxx.x	NODE NO. & ELEVATION
Q_{100}= 1.2 CFS	FLOW AT NODE – YR STORM
▬	AREA TRIBUTARY BOUNDARY
– – – –	SUBAREA TRIBUTARY BOUNDARY

200 100 0 200 400 600

SCALE: 1"=200'

PROACTIVE
ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.NET (949) 716-7460
27042 Towne Centre Drive, Suite 110, Foothill Ranch, CA 92610

TRAVERTINE PROPOSED PRELIMINARY HYDROLOGY EXHIBIT

CITY OF LA QINTA

1 OF 1

N:\20.053.000.DLV\PLANS\ENT\HY\PROP HYD.DWG J_LANGDON 8/4/20 2:16 pm

Appendix G

AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS, BMP MAINTENANCE AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

Not applicable; project is in the preliminary phase.

Appendix H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

Not applicable; project is in the preliminary phase.

Appendix I

PROJECT-SPECIFIC WQMP SUMMARY DATA FORM

Project-Specific WQMP Summary Data Form

Applicant Information	
Name and Title	Lisa Hofmann Morgan
Company	Hofmann Land Development Co.
Phone	(925) 478-2000
Email	
Project Information	
Project Name (as shown on project application/project-specific WQMP)	Travertine Project (TTM 37387)
Street Address	West Madison, East of Jefferson Street along Avenue 62, La Quinta CA
Nearest Cross Streets	Madison Street and Avenue 62
Municipality (City or Unincorporated County)	City of La Quinta
Zip Code	
Tract Number(s) and/or Assessor Parcel Number(s)	766-110-003, 766-110-004, 766-110-007, 766-110-009, 766-120-001, 766-120-002, 766-120-003, 766-120-006, 766-120-016, 766-120-018, 766-120-015, 766-120-021, 766-120-023, 766-280-057, 764-280-059, 764-280-061, 753-040-014, 753-040-017, 753-040-016, 743-050-029, 753-050-007, 753-060-003
Other (other information to help identify location of project)	

Indicate type of project.	**Priority Development Projects (Use an "X" in cell preceding project type):**	
		SF hillside residence; impervious area ≥ 10,000 sq. ft.; Slope ≥ 25%
		SF hillside residence; impervious area ≥ 10,000 sq. ft.; Slope ≥ 10% & erosive soils
		Commercial or Industrial ≥ 100,000 sq. ft.
		Automotive repair shop
		Retail Gasoline Outlet disturbing > 5,000 sq. ft.
		Restaurant disturbing > 5,000 sq. ft.
	X	Home subdivision ≥ 10 housing units
	X	Parking lot ≥ 5,000 sq. ft. or ≥ 25 parking spaces

Date Project-Specific WQMP Submitted	
Size of Project Area (nearest 0.1 acre)	855.4 acres, 514.2 acres disturbed
Will the project replace more than 50% of the impervious surfaces on an existing developed site?	No
Project Area managed with LID/Site Design BMPs (nearest 0.1 acre)	516
Are Treatment Control BMPs required?	No
Is the project subject to onsite retention by ordinance or policy?	Yes, partial
Did the project meet the 100% LID/Site Design Measurable Goal?	Yes
Name of the entity that will implement, operate, and maintain the post-construction BMPs	Pending
Contact Name	Pending – Preliminary Phase
Street or Mailing Address	Pending – Preliminary Phase
City	Pending – Preliminary Phase
Zip Code	Pending – Preliminary Phase
Phone	Pending – Preliminary Phase
Space Below for Use by City/County Staff Only	
Preceding Information Verified by (consistent with information in project-specific WQMP)	**Name:** **Date:**
Date Project-Specific WQMP Approved:	
Data Entered by	**Name:**

	Date:
Other Comments	