WQ11-003P

Project Specific
Preliminary Water Quality Management Plan

For: **Bluestone Communities – Arantine Hills Project**

APPROVED
Preliminary
3-2-11
mH

DEVELOPMENT NO: TTM 36294
DESIGN REVIEW NO: DPR10-004

Prepared for:
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REGISTERED PROFESSIONAL ENGINEER
BARBARA P. SHERMAN
No. 54609
Expires 12-31-11
CIVIL
STATE OF CALIFORNIA

Barbara Sherman, P.E.
Barbara Sherman 2-24-11
Date and Signed

P-WQMP Preparation Date: November 29, 2010
Revised Date: February 15, 2011

OWNER'S CERTIFICATION

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

Bluestone Communities by AEI-CASC Consulting for the project, known as Arantine Hills in Corona, California, APN: 279-190-045, 279-240-018, 282-030-003, 282-030-004, 282-030-005, 282-030-006, and 282-030-008.

This P-WQMP is intended to comply with the requirements of the City of Corona for TTM 36294, which includes the requirement for the preparation and implementation of a preliminary project-specific WQMP.

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

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

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

______________________________	______________________________
Owner's Signature	Date
______________________________	______________________________
Owner's Printed Name	Owner's Title/Position

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NOTE- SIGNATURE WILL BE PROVIDED UPON PLAN APPROVAL

Contents

1. Project Description

The Arantine Hills Project includes approximately 274.8 acres located at the foothills of the Santa Ana Mountains in the southeast area of the City of Corona (refer to Appendix B – Vicinity Map). The Projects ultimate development consists of a Master Planned Community which includes residential, commercial, mixed-use (commercial/residential and industrial/commercial) open space and recreational uses. The Master Planned Community has the option of being phased. This P-WQMP is being provided in support of the Specific Plan and entitlement for the Project. A Phase 1 Environmental Assessment has been prepared in support of the Specific Plan and EIR for the Project. As the phased developments move forward, applicable permits such as a 401 Water Quality Certification and 404 US Army Corps of Engineers permit will be provided. As individual planning areas are developed, a Final Water Quality Management Plan (F-WQMP) will be required to be submitted in support of each phased development and its related improvements. The P-WQMP provides basins that have been sized to treat the entire site. The basins have been sized assuming the developed planning areas will be 60% impervious and 40% pervious. The individual F-WQMP's will determine how each phase of development will successfully treat the site knowing the option to treat the flows at the basins is available. The F-WQMP's for each phase of development will need to provide Site Design BMP's and Treatment Control BMP's to ensure no more than 60% imperviousness of the site will be treated at the basins. As F-WQMP's are submitted for each phase, ownership and maintenance of the bmps will be addressed. A Phasing Plan has been provided in Appendix B.

Project Owner:	Gary McMillan and Corona Investment Properties 29379 Rancho California Road, Suite 201 Temecula, Ca 92591 Phone: (951) 676-2045 Contact: Gary McMillan
P-WQMP Preparer:	AEI-CASC Consulting 937 S. Via Lata, Suite 500 Colton, CA 92324 Contact: Barbara Sherman, P.E. Phone: (909) 783-0101 FAX: (909) 783-0108
Project Site Address:	South of Cajalco Road/Bedford Canyon Road Intersection
Planning Area/ Community Name:	Arantine Hills
APN Number(s):	279-190-045, 279-240-018, 282-030-003, 282-030-004, 282-030-005, 282-030-006, and 282-030-008
Thomas Bros. Map:	Page 773 Grid J6 and J7 (2005)
Project Watershed:	Santa Ana Watershed
Sub-watershed:	Bedford Canyon Creek
Project Site Size:	274.8 acres
Activities and Locations:	None at this time. Site to be mass graded.

Location of Facilities:	Refer to Appendix B – Site Map
Material and Storage Areas:	Unknown at this time.
Waste Generated:	The wastes associated with this Project are unknown but anticipated to be similar to the wastes generated by similar developments. Wastes may include: • Debris resulting from landscape maintenance. • Debris that blow into the site during high winds. • If wastes are generated, they will be disposed of in accordance with the local, state, and Federal regulations.
Conditions of Approval:	Not available at this time.
Vicinity Map:	Identifies the Project site in relation to nearly geographic features (Refer to Appendix B – Vicinity Map)
Receiving Waters Exhibit:	Identifies the path of storm flows from the Project site to the Pacific Ocean (Refer to Appendix B – Receiving Waters Exhibit)
Site Plan:	Identifies the following Project features: (Refer to Appendix B – Site Plan) • Location and identification of all structural BMPs • Location of points where onsite (or tributary offsite) flows exit the Project site • Proposed drainage area boundaries • Infrastructure • Location of existing and proposed public and private storm drainage facilities • Pre- and post-project topography
Standard Industrial Classification (SIC) Code:	Unknown at this time.
Formation of Home Owners' Association (HOA) or Property Owners Association (POA):	Unknown at this time.
Additional Permits/ Approvals required for the Project:	Refer to Table 1

AGENCY	Permit required (yes or no)
State Department of Fish and Game, 1601 Streambed Alteration Agreement	Yes
State Water Resources Control Board, Clean Water Act (CWA) section 401 Water Quality Certification	Yes
US Army Corps of Engineers, CWA section 404 permit	Yes
US Fish and Wildlife, Endangered Species Act section 7 biological opinion	No
SWRCB General Construction Permit	Yes
City of Corona Grading Permit	Yes
City of Corona Building Permit	No

Table 1 - Project Permits/Agency Approvals Required

2. Site Characterization

Land Use Designation or Zoning:

- **Current Zoning:** Agricultural
- **Proposed Zoning:** Low Density Residential (LDR), Medium Density Residential (MDR), High Density Residential (HDR), General Commercial (GC), Mixed-Use I (MUI), Mixed-Use II (MUII), Park (P), and Open Space (OS).

Current Property Use: Agriculture

Proposed Property Use: Low Density Residential (LDR), Medium Density Residential (MDR), High Density Residential (HDR), General Commercial (GC), Mixed-Use I (MUI), Mixed-Use II (MUII), Park (P), and Open Space (OS).

Availability of Soils Report: Yes (See Appendix E)

Phase 1 Site Assessment: Prepared by Lor Geotechnical Group, Inc., Dated September 16, 2009.

Receiving Waters for Urban Runoff from Site: Table 2 identifies the following:

- Downstream receiving waters from the Project site to the Prado Dam;
- 2006 Clean Water Act Section 303 (d) list of Water Quality Limited segments requiring TMDLS and impairments;
- Santa Ana Region Basin Plan (Region 8) Designated Beneficial Uses for identified receiving waters; and
- Proximity from the Project site to the receiving water, in miles, for all waters classified as having RARE beneficial uses.

Refer to Appendix B – Receiving Water Exhibit for a map of receiving waters.

Receiving Waters	303(d) List Impairments and [TMDL Pollutants]	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Bedford Canyon Wash	None	None	Not a water body classified as RARE
Temescal Creek – Reach 2	None	AGR, IND, GWR, REC 1, REC 2, LWRM (Intermittent)	Not a water body classified as RARE
Temescal Creek – Reach 1	None	REC 1, REC 2, WARM, WILD	Not a water body classified as RARE
Santa Ana River - Reach 3	Pathogens	AGR, GWR, REC 1, REC 2, WARM, WILD, RARE, SPWN	10 miles

Table 2 - Receiving Waters for Urban Runoff - Table is based on the Basin Plan and TMDLs for 2006, approved in June 2007.

3. Pollutants of Concern

The purpose of this section of the P-WQMP is to identify pollutants and hydrologic conditions of concern that may be associated with the completed Project and that have the potential to impact receiving waters. Pollutants to be considered in this evaluation include pollutants potentially generated by the Project, pollutants generated by facility activities, and pollutants associated with the site that may cause or contribute to exceedance of water quality standards in receiving waters. Conditions to be considered in this evaluation include changes in the pre-development and post-development runoff from the site that may destabilize downstream receiving waters.

3.1 Legacy Pollutants

Approximately two-thirds (2/3) of the site was previously used for grape fruit cultivation and has been cleared, the rest of the site is undeveloped with vegetation. The Bedford Canyon Wash on the south side of the project runs in a north easterly direction and discharges into the Temescal Canyon Wash. Since the site was historically used for agriculture purposes, chemicals typically associated with agriculture have the potential of leaving detectable amounts of toxic material in the soil (i.e., pesticides, herbicides, fertilizers and other soil amendments). A Phase I environmental report has been prepared and submitted to the City. The Phase 1 Environmental Site Assessment Update has revealed no evidence of recognized environmental conditions indicative of releases or threatened releases of hazardous substances on the site, and no further environmental assessment is necessary.

3.2 Pollutant Stressors in Receiving Waters

Table 3 identifies the receiving waters for post-development runoff from the site, and identifies whether the receiving water is: proximate, downstream, TMDL adopted, or 303(d) listed as impaired, and if 303(d) listed – the pollutant(s) causing the impairment.[1, 2]

[1] California Regional Water Quality Control Board, 2006 CWA Section 303(d) List of Water Quality Limited Segments approved by the USEPA on June 28, 2007.
[2] California Regional Water Quality Control Board, Water Quality Control Plan – Santa Ana River Basin (8), February 2008.

Discharge Point(s)	Storm Drains and Receiving Waters	Receiving Water Classification		Primary Hydro Unit Basin No.	303(d) Listing		Adopted TMDL Pollutants
		Proximate	Downstream		Listed?	Pollutant Causing Impairment	
South East Boundary	Bedford Canyon Wash	Yes	No	801.32	No	None	None
	Temescal Creek – Reach 2	No	Yes	801.32	No	None	None
	Temescal Creek – Reach 1	No	Yes	801.25	No	None	None
	Santa Ana River – Reach 3	No	Yes	801.21	Yes	Pathogens	Pathogens

Table 3 - Pollutant Stressors in Receiving Waters

3.3 Potential Project Pollutants

Table 4 presents a summary of pollutants associated with the Land Uses indicated in the Specific Plan.

Discharge Point(s)	Associated Project Pollutant			Is Pollutant?	
	Pollutants	Status	Notes	303(d) listed	TMDL
South/East Boundary	Sediment/Turbidity	Potential	Landscape/open areas	No	No
	Nutrients	Potential	Residential/Commercial areas	No	No
	Organic Compounds	Potential	Commercial areas	No	No
	Trash & Debris	Potential	Residential/Commercial areas	No	No
	Oxygen Demanding Substances	Potential	Residential/Commercial areas	No	No
	Bacteria & Viruses	Potential	Residential/Commercial areas	Yes	Yes
	Oil & Grease	Potential	Residential/Commercial areas	No	No
	Pesticides	Potential	Residential/Commercial areas	No	No
	Metals	Potential	Commercial areas	No	No

Table 4 - Project Land Uses and Associated Pollutants

3.4 Project Pollutants of Concern

The Project pollutants associated with the land uses for the site include sediment/turbidity, nutrients, organic compounds, trash & debris, oxygen demanding substances, bacteria & viruses, oil & grease, pesticides, and metals. A portion of the site was previously used for Citrus Groves. A Phase I Environmental Assessment has been prepared for the site. Per the Assessment, there is no evidence of recognized environmental conditions indicative of release or threatened release of hazardous substances to the site.

Comparison of Table 3 and Table 4 indicate that there are no pollutants potentially associated with both the Project and with impairment of proximate receiving waters. The Guidance Document,[3] DAMP[4], and the Permit[5] stipulate that project-specific P-WQMPs are to completely identify all downstream receiving waters to which a project directly or indirectly discharges. Due to this stipulation, all waters from the Project site to the Prado Dam have been identified, and the selection of treatment controls for this project will be based primarily on protection of proximate receiving waters. Pathogens have been identified as a pollutant for downstream waters only. The Bedford Canyon Wash which is the proximate receiving water is not being impaired, therefore, <u>there are no pollutants of concern for this project.</u>

The Arantine Hills Project is a Master Planned Community tributary to the Bedford Canyon Wash and Temescal Creek. Bedford Canyon Wash is not 303(d) listed for any impairments. The Temescal Creek conveys project flows into the Santa Ana River Reach 3. Santa Ana River Reach 3 is 303 (d) listed for pathogens. The potential source is from dairies. TMDL requires urban discharges to comply with WQMP requirements.

[3] Storm Water Clean Water Protection Program. Riverside County Water Quality Management Plan for Urban Runoff. July 24, 2006 and Errata January 22, 2009.
[4] Storm Water Clean Water Protection Program. Riverside County Drainage Area Management Plan (DAMP) Santa Ana and Santa Margarita Regions. July 2006.
[5] State Water Resources Control Board. National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges associated with Construction Activity (General Permit) Water Quality Order 2009-0009 DWQ

The Project will provide a Regional Basin that will function for both detention and infiltration. As the individual Planning Areas are developed, updates to the Project Specific WQMP will be required to ensure water quality treatment is being satisfied per City requirements. Infiltration is very effective in treating pollutants. However, any additional BMPs required to treat site specific pollutants will need to be addressed in the F-WQMP.

3.5 Findings Regarding Pollutants of Concern

The conclusion supported is that the Project is not expected to have an adverse impact on proximate or downstream receiving waters. This conclusion is based on a qualitative review of the following evidence:

- The proximate receiving water, Bedford Canyon Wash is not 303(d) listed for impairments.
- The downstream receiving waters, Temescal Creek (Reach 1 and 2) are not 303(d) listed for impairments.
- Infiltration which is a Treatment control BMP with a medium to high level of effectiveness at treating Pollutants will be incorporated into the Project design to minimize potential pollutants in Project flows.

4. Hydrologic Conditions of Concern

Impacts to the hydrologic regime resulting from the Project may include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Under certain circumstances, changes could also result in the reduction in the amount of available sediment for transport and storm flows could fill this sediment-carrying capacity by eroding the downstream channel. These changes have the potential to permanently impact downstream channels and habitat integrity. A change to the hydrologic regime of a project's site would be considered a Hydrologic Condition of Concern if the change would have a significant impact on downstream erosion compared to the pre-development condition or have significant impacts on stream habitat, alone or as part of a cumulative impact from development in the watershed.

This project-specific P-WQMP must address the issue of Hydrologic Conditions of Concern unless one of the following conditions is met:

Condition A: Runoff from the Project is discharged directly to a publicly-owned, operated, and maintained MS4; the discharge is in full compliance with Co-Permittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); the discharge would not significantly impact stream habitat in proximate Receiving Waters; and the discharge is authorized by the Co-Permittee.

Condition B: The Project disturbs less than 1 acre. The disturbed area calculation should 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 and 10-year, 24-hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site-design concepts that mimic pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

Basin Lot 16(PA 15) Pre and Post Development conditions

	2 year-24 hour		10 year-24 hour	
	Precondition	Post-condition	Precondition	Post-condition
Discharge (cfs)	8.93	8.58	16.64	15.32
Velocity (fps)*	1.77	1.74	2.26	2.18
Volume (cubic feet)	241,031	474,804	448,947	474,804
Duration (minutes)	1,505	2928	1505	1950

Basin Lot 15(PA 16) Pre and Post Development conditions

	2 year-24 hour		10 year-24 hour	
	Precondition	Post-condition	Precondition	Post-condition
Discharge (cfs)	0.88	0.80	3.76	3.55
Velocity (fps)**	1.4	1.34	2.45	2.4
Volume (cubic feet)	23,191	39,204	50,316	17,424
Duration (minutes)	1,458	2,388	1,458	1,488

*****The velocity is calculated based on the cross section of the Bedford Canyon Wash where Basin A in Lot 16 (PA 15) outlets.
******The velocity is calculated based on the concrete ditch where Basin 2 in Lot 15 (PA 16) outlets.

Upon review of the table providing the Pre and Post Development conditions for the Project, the volumes and duration for the post-development condition exceed the pre-developed condition. This occurs due to the decrease in the soil loss rate for the proposed condition. As a result, the Project proposes the use of a detention/infiltration basin to function for both detention and water quality. Since the duration and volume for the post development condition is larger than the existing condition, the Project does not feasibly meet **Condition A, B, or C.** Methodology A will be used to address the increase in duration and volume for the post development condition of the Project.

4.1 Methodology A

4.1.1 Runoff from the Project will be discharged to a Regional Detention/Infiltration Basin in Lot 16(PA15)and a separate Detention/Infiltration Basin for Lot 15 (PA16).

The Project will ultimately drain to two locations on the Project. A Regional Basin located in Lot 16 (PA15) and a local basin located in Lot 15 (PA16).

- The flows will be conveyed to the Bedford Canyon Wash at a rate such that the post development condition does not exceed the pre-development condition for the 2-year, 24-hour rainfall event per City requirements. Therefore, the discharge meets this requirement. Supporting engineering studies, calculations, and reports are included in Appendix C.
- The proposed basins have been designed to ensure that the 100-year flows exiting the Project site are less than or equal to the existing 100-year storm flows.
- The post developed velocities do not exceed the pre developed velocities thereby minimizing downstream erosion.

4.2 Findings Regarding Hydrologic Conditions of Concern

The Project did not meet the requirements for Condition A, B, or C and Methodology A was used to address the Hydrologic Conditions of Concern. Detention/Water Quality Basins have been designed to attenuate the increase in flows due to developed conditions. The tables above indicate the flows and velocities for post developed conditions are less than the pre developed condition with the addition of the proposed basins. The outlet velocities are controlled such that additional downstream erosion will be minimized and downstream habitat will not likely be impacted as a result of this Project.

5. Best Management Practices

5.1 Site Design BMPs

Project proponents shall implement site design concepts that achieve each of the following:

1) Minimize Urban Runoff
2) Minimize Impervious Footprint
3) Conserve Natural Areas
4) Minimize Directly Connected Impervious Areas (DCIAs)

Site Design BMPs shall incorporate Low Impact Development (LID) techniques where feasible. The design goal of the Site Design BMPs shall be to maintain or replicate the pre-development hydrologic regime through the use of design techniques that create a functionally equivalent post-development hydrologic regime through the use of integrated and distributed infiltration, retention, detention, evapotranspiration, filtration and treatment systems.

5.1.1 Requirement: Minimize Urban Runoff

Table 6 summarizes the site design BMPs to be incorporated into the Project that will minimize urban runoff, with details for each BMP design concept following the table.

5.1.2 Requirement: Minimize Impervious Footprint

Table 7 summarizes the site design BMPs to be incorporated into the Project that will minimize the impervious footprint, with details for each BMP design concept following the table.

5.1.3 Requirement: Conserve Natural Areas

Table 8 summarizes the site design BMPs to be incorporated into the Project that will conserve natural areas, with details for each BMP design concept following the table.

5.1.4 Requirement: Minimize Directly Connected Impervious Areas

Table 9 summarizes the site design BMPs to be incorporated into the Project that will minimize directly connected impervious areas, with details for each BMP design concept following the table.

5.1.5 Parties Responsible for BMP Operations and Maintenance

Refer to Section 6.3 and Table 13 for the party responsible for BMP operation and maintenance.

5.2 SOURCE CONTROL BMPS

The Project will incorporate source control BMPs to reduce and control post-development pollutants from the Project. Table 10 summarizes the source control BMPs to be incorporated into the Project with details for each BMP design concept following the table.

5.2.1 Parties Responsible for BMP Operation and Maintenance

Refer to Section 6.3 and Table 13 for the party responsible for BMP operation and maintenance.

Design Concept	Technique	Specific BMP	Included	BMP Design
Site Design Concept 1	Minimize Urban Runoff	Maximize the permeable area.	Yes	The Specific Plan Land Use Plan indicates areas to be utilized for Open Space and Park Areas which minimizes impermeable areas.
		Incorporate landscaped buffer areas between sidewalks and streets.	Yes	The Specific Plan dictates typical street sections to be utilized. Various sections incorporate landscaping between the curb and sidewalk.
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	Yes	Specific Plan encourages planting of native or drought tolerant plans. Final WQMP to indicate areas where utilized.
		Use natural drainage systems.	Yes	The existing Bedford Creek Wash, to the south of the site, will be improved as necessary to protect the site. Onsite drainage ditches and basins will be provided to provide the opportunity for infiltration prior to draining to the wash.
		Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	No	This Project will not utilize gravel pits. As an alternative, basins will be used for infiltration in order to allow Project flows to be absorbed into the site and minimize the potential for pollutants to be transported to the Bedford Canyon Wash.
		Construct onsite ponding areas or retention facilities to increase opportunities for infiltration consistent with vector control objectives.	Yes	This Project will utilize vegetated retention/detention facilities increasing the potential for infiltration.
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required to describe BMPs and how it addresses site design concept).	No	The retention/detention facilities will be functional at the completion of mass grading. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps utilized to effectively treat Project pollutants.

Table 6 - Site Design BMPs: Minimize Urban Runoff

Design Concept	Technique	Specific BMP	Included	BMP Description
Site Design Concept 2	Minimize Impervious Footprint	Maximize the permeable area.	Yes	The Specific Plan Land Use Plan indicates areas to be utilized for Open Space and Park Areas which minimizes impermeable areas.
		Construct walkways, trails, patios, overflow parking lots, 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.	No	Per the Specific Plan, streets and sidewalks will be constructed to city standards.
		Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.	Yes	Streets will be designed to the minimum widths, meeting City standards.
		Reduce widths of street where off-street parking is available.	No	Streets will be designed to the minimum widths, meeting City standards.
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	Yes	Per the Specific Plan, the development will minimize the use of impervious surfaces in the landscape design.
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMPs and how it addresses site design concept).	No	The retention/detention facilities will be functional at the completion of mass grading. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps utilized to effectively treat Project pollutants.

Table 7 - Site Design BMPs: Minimize the Impervious Footprint

Design Concept	Technique	Specific BMP	Included	BMP Description
Site Design Concept 3	Conserve Natural Areas	Conserve natural areas.	Yes	Open Space Areas to remain per the Specific Plan.
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	Yes	Planting of native or drought tolerant plans will be encouraged per the Specific Plan.
		Use natural drainage systems.	Yes	The existing Bedford Creek Wash to the south of the site will be improved as necessary to protect the site. Onsite drainage ditches and retention/detention basins will be provided to increase the opportunity for infiltration prior to draining to the wash.
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses site design concept).	No	Vegetated retention/detention facilities will be functional at the completion of mass grading. As individual planning areas are developed, a F-WQMP will be developed indicate additional Project specific bmps utilized to effectively treat Project pollutants.

Table 8 - Site Design BMPs: Conserve Natural Areas

Design Concept	Technique	Specific BMP	Included	BMP Description
Site Design Concept 4	Minimize Directly Connected Impervious Areas (DCIAs)	Residential and commercial sites must be designed to contain and infiltrate roof runoff, or direct roof runoff to vegetative swales or buffer areas, where feasible.	Yes	Per the Specific Plan, runoff is to be directed to vegetated swales to the maximum extent practicable. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.
		Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	Yes	Per the Specific Plan, landscaped areas shall be incorporated into the functional use of the drainage design. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.
		Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales.	No	The Development consists of mass grading of the site. Re-vegetation will be utilized to stabilize the site to be left natural until the site is developed. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.
		Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	No	Specific Plan dictates the utilization of City standard streets with curb and gutter.
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter.	No	Specific Plan dictates the utilization of City standard streets with curb and gutter.
		Dual drainage system: First flush captured in street storm drain and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to MS4s.	No	The existing Bedford Creek Wash to the south of the site will be improved as necessary to protect the site. Onsite drainage ditches and basins will be provided and re-vegetation of the site will be incorporated throughout the site to provide the opportunity for incidental infiltration prior to draining to the wash.
		Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the MS4.	No	No shared driveway access designed. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.
		Uncovered temporary or guest parking on private residential lots may be paved with a permeable surface, or designed to drain into landscaping prior to discharging to the MS4.	No	The Development consists of mass grading of the site. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.
		Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	No	The Development consists of mass grading of the site. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.
		Overflow parking (parking stalls provided in excess of the Co-Permittees minimum parking requirements) may be constructed with permeable paving.	No	The Development consists of mass grading of the site. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.
		Other comparable and equally effective design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMPs and how it addresses site design concept).	No	Vegetated retention/detention facilities will be functional at the completion of mass grading. As individual planning areas are developed, a F-WQMP will be developed to indicate additional Project specific bmps incorporated into the Project.

Table 9 - Site Design BMPs: Minimize Directly Connected Impervious Areas

BMP Name	**Included**		**Description of Action Taken**
Non-Structural Source Control BMPs	**Yes**	**No**	
Education for Property Owners, Operators, Tenants, Occupants, or Employees	X		Upon completion of the grading, property owner will be provided educational materials which include pamphlets that discuss stormwater pollution prevention.
Activity Restrictions	X		The Development consists of mass grading of the site. Re-vegetation will be utilized to stabilize the site, to be left natural until the site is developed. No activities will be allowed to take place unless a F-WQMP is provided for improvements.
Irrigation System and Landscape Maintenance	X		The Development consists of mass grading of the site. Irrigation will be provided to re-vegetate the site for stabilization and will be left natural until the site is developed.
Common Area Litter Control	X		Access to the site from Public right of way is currently restricted, and therefore, wind blown trash is the only anticipated source of litter. The site will be inspected per the operations and maintenance table provided in Section 6.
Street Sweeping Private Streets and Parking Lots		X	The Development consists of mass grading of the site. Re-vegetation will be utilized to stabilize the site, to be left natural until the site is developed. As individual planning areas are developed, a F-WQMP will be required and will include any additional source control bmps.
Drainage Facility Inspection and Maintenance	X		Bluestone Communities will be responsible for the inspection and maintenance of drainage facilities. The drainage system on site will be inspected on a quarterly basis. Inspections will ensure that accumulated sediment and debris have not accounted for more than 25% of the storage capacity.
Structural Source Control BMPs	**Yes**	**No**	
MS4 Stenciling and Signage		X	The Development consists of mass grading of the site. Re-vegetation will be utilized to stabilize the site, to be left natural until the site is developed. As individual planning areas are developed, a F-WQMP will be required and will include any additional source control bmps.
Landscape and Irrigation System Design	X		The Development consists of mass grading of the site. Irrigation will be provided to re-vegetate the site for stabilization and will be left natural until the site is developed.
Protect Slopes and Channels	X		Slopes and channels will be stabilized with vegetation once mass grading is completed.
Provide Community Car Wash Racks		X	The Development consists of mass grading of the site. Re-vegetation will be utilized to stabilize the site, to be left natural until the site is developed. As individual planning areas are developed, a F-WQMP will be required and will include any additional source control bmps.

Table 10 - Source Control BMPs

Properly Design:	**Yes**	**No**	
Fueling Areas		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Air/Water Supply Area Drainage		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Trash Storage Areas		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Loading Docks		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Maintenance Bays		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Vehicle and Equipment Wash Areas		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Outdoor Material Storage Areas		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Outdoor Work Areas or Processing Areas		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.
Provide Wash Water Controls for Food Preparation Areas		X	Currently not a Project feature. As individual planning areas are developed, a F-WQMP will be required and will include any source control bmps utilized.

Table 10 - Source Control BMPs (Cont.)

5.3 TREATMENT CONTROL BMPS

5.3.1 Treatment Control BMP Selection

Site design and source control BMPs are the first lines of defense and the preferred method for preventing pollutants from entering urban runoff and being discharged from the site. The last line of defense is treatment control BMPs. Treatment control BMPs incorporate one or more physical, chemical, or biological processes for removing pollutants from runoff before it is discharged from the Project site.

Table 11 summarizes the Project's pollutants versus the Pollutants of Concern for the Project. Pollutants of Concern are those Project pollutants that are also associated with impairment of proximate receiving waters. There are no project pollutants that are also pollutants of concern for the Project.

Pollutant	Project Pollutant	Pollutant of Concern
Sediment/Turbidity	Yes	No
Nutrients	Yes	No
Organic Compounds	Yes	No
Trash & Debris	Yes	No
Oxygen Demanding Substances	Yes	No
Bacteria & Viruses	Yes	No
Oil & Grease	Yes	No
Pesticides	Yes	No
Metals	Yes	No

Table 11 - Pollutant Treatment Control Identification

Treatment control BMPs are selected based on pollutants expected from the Project's land use, the pollutants causing impairment in receiving waters, site constraints, hydraulic constraints, costs, and the owner's preference. The site does not have any pollutants of concern. However, the site will incorporate vegetated detention/infiltration basins. The basins will function both for flood control purposes and for water quality purposes. The vegetation will help filter pollutants and allow for infiltration. Infiltration basins provide High to Medium level of effectiveness for removing pollutants such as sediment/turbidity. This reduces the potential for the site to contribute to the pollutant loading of impaired water bodies. The BMP selection matrix (See Table 12) shows BMPs that meet the requirements for medium to high removal effectiveness for the Project's Pollutants of Concern. As individual planning areas are developed, each planning area may be required to incorporate additional treatment BMPs to address that developments particular Project specific pollutants.

5.3.2 TREATMENT CONTROL BMP DESIGN CRITERIA

This site utilizes volume based BMP's as a means of treating project flows prior to leaving the site. All treatment control BMP's will be designed in accordance with the document, Riverside County Water Quality Management Plan for Urban Runoff, including Exhibit C, which contains the document Riverside County Storm Water Quality Best Management Practice Design Handbook. Percolation tests will be required prior to approval of the F-WQMP.

5.4 EQUIVALENT TREATMENT CONTROL ALTERNATIVES

Not a feature of this Project.

5.5 REGIONALLY-BASED TREATMENT CONTROL BMPS

The Project with the exception of Lot 15 (PA16) will drain to a Regional Basin located on Lot 16 (PA15). As development occurs, additional Treatment BMPs as required or necessary shall be included in the F-WQMPs.

Table 12 summarizes the treatment control BMP categories to be incorporated into the Project, with details for each BMP design concept following the table. The blue outlined columns indicate the treatment control BMPs that were chosen for this Project based on the BMPs' ability to remove Pollutants.

Pollutant of Concern		**Treatment Control BMP Categories**(1, 9)							
		Veg. Swale /Veg. Filter Strips(2)	**Detention Basins**(3)	**Infiltration Basins & Trenches/Porous Pavement**(4, 10)	**Wet Ponds or Wetlands**(5)	**Sand Filter or Filtration**(6)	**Water Quality Inlets**	**Hydrodynamic Separator Systems**(7)	**Manufactured/ Proprietary Devices**(8)
Sediment/Turbidity		H/M	M	H/M	H/M	H/M	L	H/M (L for turbidity)	U
Yes/No?	No								
Nutrients		L	M	H/M	H/M	L/M	L	L	U
Yes/No?	No								
Organic Compounds		U	U	U	U	H/M	L	L	U
Yes/No?	No								
Trash & Debris		L	M	U	U	H/M	M	H/M	U
Yes/No?	No								
Oxygen Demanding Substances		L	M	H/M	H/M	H/M	L	L	U
Yes/No?	No								
Bacteria & Viruses		U	U	H/M	U	H/M	L	L	U
Yes/No?	No								
Oils & Grease		H/M	M	U	U	H/M	M	L/M	U
Yes/No?	No								
Pesticides (non-soil bound)		U	U	U	U	U	L	L	U
Yes/No?	No								
Metals		H/M	M	H	H	H	L	L	U
Yes/No?	No								

Table 12 - Treatment Control BMP Selection Matrix

Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

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

(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.

(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this P-WQMP, or newly developed/emerging stormwater treatment technologies.

(9) Project proponents should base BMP designs on the Riverside County Stormwater Quality Best Management Practice Design Handbook. However, project proponents may also wish to reference the California Stormwater BMP Handbook – New Development and Redevelopment (www.cabmphandbooks.com). The Handbook contains additional information on BMP operation and maintenance.

(10) Note: Projects that will utilize infiltration-based treatment control BMPs (e.g., Infiltration Basins, Infiltration Trenches, and Porous Pavement) must include a copy of the property/project soils report as Appendix E to the project-specific P-WQMP. The selection of a treatment control BMP (or BMPs) for the project must specifically consider the effectiveness of the treatment control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.

The location of each Treatment Control BMP is shown on the Site Plan included in Appendix B.

Supporting engineering calculations for Q_{BMP} and/or V_{BMP} and Treatment Control BMP design details are included in Appendix F.

6. Operation and Maintenance Responsibility for Treatment Control BMPs

Table 13 identifies the BMPs, the maintenance requirements, and frequency of maintenance for all structural BMPs and treatment control BMPs.

6.1 BMP Maintenance

Accumulated trash and debris, sediment, and pollutants removed during BMP maintenance will be disposed of in accordance with state and local regulations. In most cases, dry debris and sediment can be disposed in the trash. Wet debris will need to be air dried before disposal. Any debris or sediment expected to contain pollutants at levels exceeding levels acceptable in the local landfill shall be tested and disposed of in accordance with local, state, and federal law based on test results.

Bluestone Communities will conduct visual inspections of the source control and treatment control BMPs in accordance with the schedules set forth in Table 13. Water quality monitoring is not proposed as a part of this Project.

Bluestone Communities will conduct a formal annual inspection of the entire site, document results and observations, and maintain inspection records. Inspection results shall be maintained on file for not less than three years following the date of the inspection.

6.2 BMP Implementation Dates

Operation of the BMPs listed in this P-WQMP will commence upon the completion of construction. Once the Project is completed and BMPs are implemented, the measures set forth in this P-WQMP will continue into perpetuity.

6.3 Parties Responsible for BMP Operations and Maintenance

As shown in Table 13, Bluestone Communities will be the party responsible for all BMP maintenance in accordance with the requirements of this P-WQMP. The following is the contact information for Bluestone Communities representative responsible for BMP operation and maintenance.

Bluestone Communities
41 Corporate Park, Suite 380
Irvine, CA 92606
Phone: (949) 475-4110
Fax: (949) 475-4115
Contact: Bentley Kerr

BMP Requiring Maintenance	Visual Inspection Frequency	Party Responsible for Maintenance and Implementation	Implementation Dates	Maintenance Frequency	Maintenance Requirements	Party Responsible for Funding
Education of Property Owners	Yearly	Bluestone Communities	Post-construction	Yearly	Update educational materials as available from agencies.	Bluestone Communities
Activity Restrictions	Yearly	Bluestone Communities	Post-construction	Yearly	Update restriction/regulations as available.	Bluestone Communities
Re-Vegetated Graded Areas	Quarterly	Bluestone Communities	Post-construction	Twice per Month	Mow, weed, or trim vegetation, and remove cut vegetation. Re-mulch void areas. Remove and replace dead, dying, or diseased vegetation. Inspect areas for the accumulation of trash and debris, and remove noted accumulations.	Bluestone Communities
Detention/ Infiltration Basins	Quarterly After significant storm events	Bluestone Communities	Post-construction	Yearly	Mow, weed, trim vegetation, and remove cut vegetation. Remove and replace dead, dying, or diseased vegetation. Apply pesticides and herbicides in accordance with manufacturer's specifications. Inspect areas for the accumulation of trash and debris, and remove noted accumulations. Observe drawdown rate, inspect for ponding water in excess of 48 hours. If ponding occurs 48 hours after the storm event, scarify and replace the bottom surface of the basin to achieve the required 48 hour drawdown time. Repair erosion at inflow points and repair as necessary. Inspect outflow structures and repair as necessary.	Bluestone Communities
Irrigation Systems	Monthly	Bluestone Communities	Post-construction	As needed	Repair or replace leaky/broken sprinkler heads. Maintain shut off valves in good operating condition and replace as necessary. Inspect timing apparatuses for accuracy and maintain in good operating condition.	Bluestone Communities
Litter Control	Quarterly Prior to storm events	Bluestone Communities	Post-construction	As needed	Inspect areas for accumulation of trash, debris and infestations. Clean up solid waste accordingly and haul off site to City refuse.	Bluestone Communities

Table 13 - BMPs Operation and Maintenance

7. Funding

A source of funding is required for all site design, source control, and treatment control BMPs. For this Project, Bluestone Communities will fund the implementation, operation, and maintenance of BMPs set forth in the P-WQMP. Table 13 identifies the areas and party responsible for funding operation and maintenance of BMPs.

The contact name, address, and telephone number for the owner's on-site representative is as follows:

Bluestone Communities
41 Corporate Park, Suite 380
Irvine, Ca 92606
Phone: (949) 475-4110
Fax: (949) 475-4115
Contact: Bentley Kerr

Appendix A

Conditions of Approval

(To be included in F-WQMP)

Planning Commission Resolution:

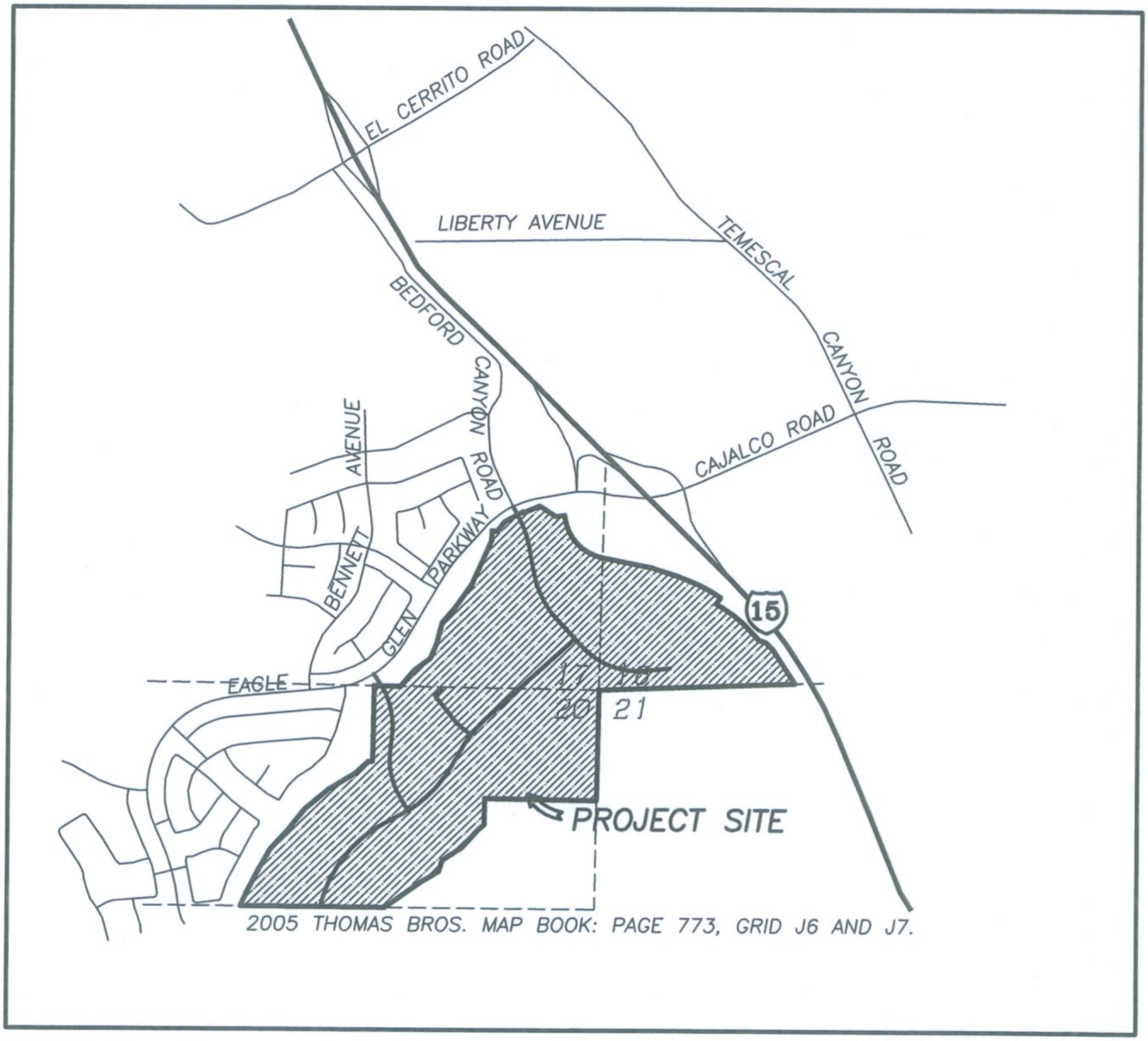
Dated:

____

Appendix B

Exhibits – Vicinity Map, Receiving Waters Map, Site Plan, Land Use Plan and Arantine Hills Master Drainage Facility Map

VICINITY MAP
FOR
TENTATIVE TRACT MAP NO. 36294
IN THE CITY OF CORONA, RIVERSIDE COUNTY



2005 THOMAS BROS. MAP BOOK: PAGE 773, GRID J6 AND J7.

N.T.S.

AEI-CASC CONSULTING
937 SOUTH VIA LATA, SUITE 500
COLTON, CA 92324
PH. (909) 783-0101 FAX (909) 783-0108

RECEIVING WATERS MAP
FOR
TENTATIVE TRACT MAP NO. 36294
IN THE CITY OF CORONA, COUNTY OF RIVERSIDE

LEGEND:

- SANTA ANA RIVER REACH 1
- SANTA ANA RIVER REACH 2
- SANTA ANA RIVER REACH 3

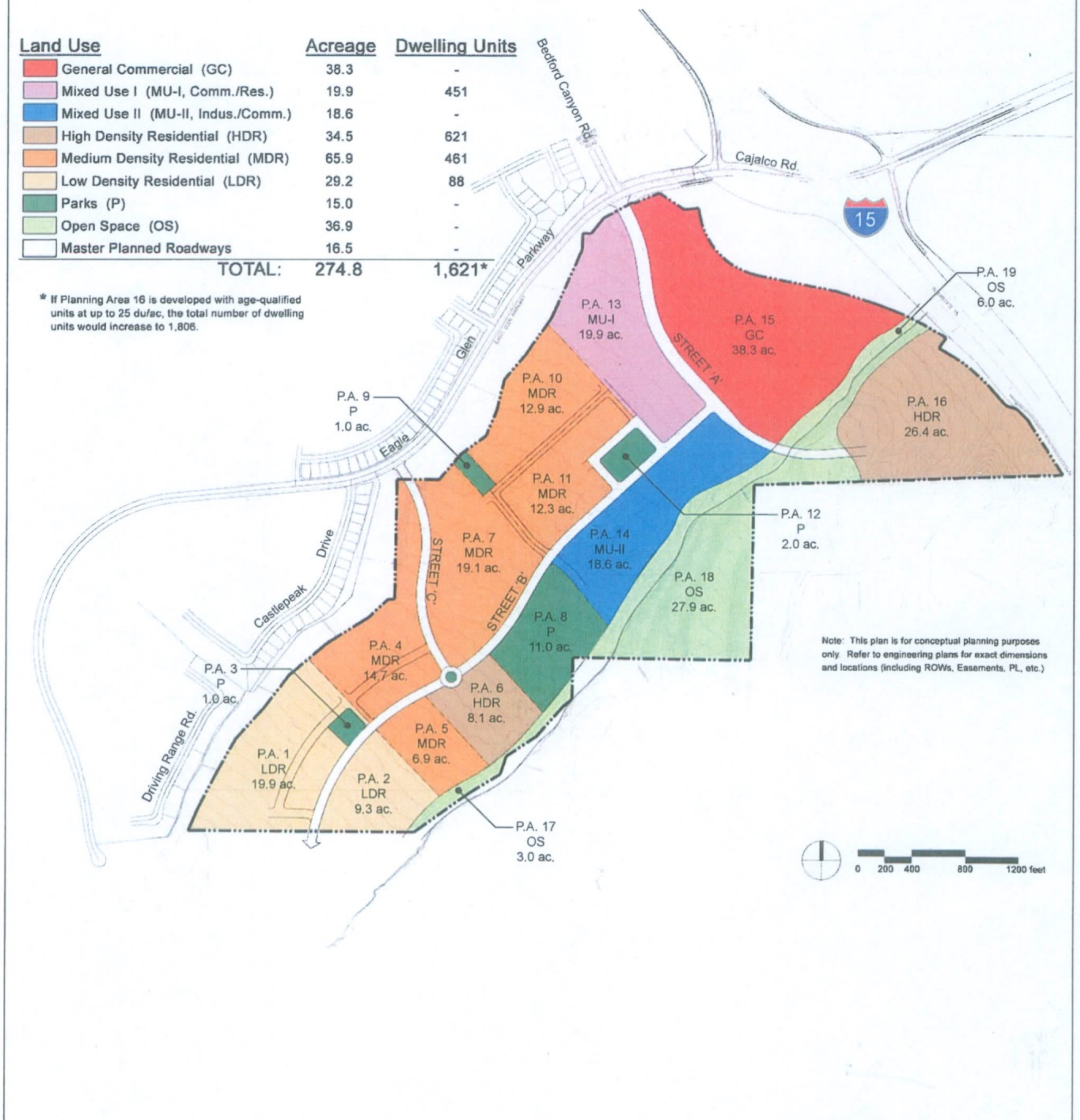
N

N.T.S.

AEI CASC
CONSULTING

937 SOUTH VIA LATA, SUITE 500
COLTON, CA 92324
PH. (909) 783-0101 FAX (909) 783-0108

O:\word processing\...ated\337 - McMillan Prop\337-113 - Arantine Hills - Specific Plan Support\P-WQMP\EXHIBITS\...294-RECEIVING WATERS.dwg 05/26/10 15:09



Land Use	Acreage	Dwelling Units
General Commercial (GC)	38.3	-
Mixed Use I (MU-I, Comm./Res.)	19.9	451
Mixed Use II (MU-II, Indus./Comm.)	18.6	-
High Density Residential (HDR)	34.5	621
Medium Density Residential (MDR)	65.9	461
Low Density Residential (LDR)	29.2	88
Parks (P)	15.0	-
Open Space (OS)	36.9	-
Master Planned Roadways	16.5	-
TOTAL:	274.8	1,621*

* If Planning Area 16 is developed with age-qualified units at up to 25 du/ac, the total number of dwelling units would increase to 1,806.

Note: This plan is for conceptual planning purposes only. Refer to engineering plans for exact dimensions and locations (including ROWs, Easements, PL, etc.)

SOURCE CONTROL BMP's

1. LITTER CONTROL
2. DRAINAGE FACILITY INSPECTION AND MAINTENANCE
3. EFFICIENT IRRIGATION
4. SLOPE PROTECTION

SITE DESIGN BMP's

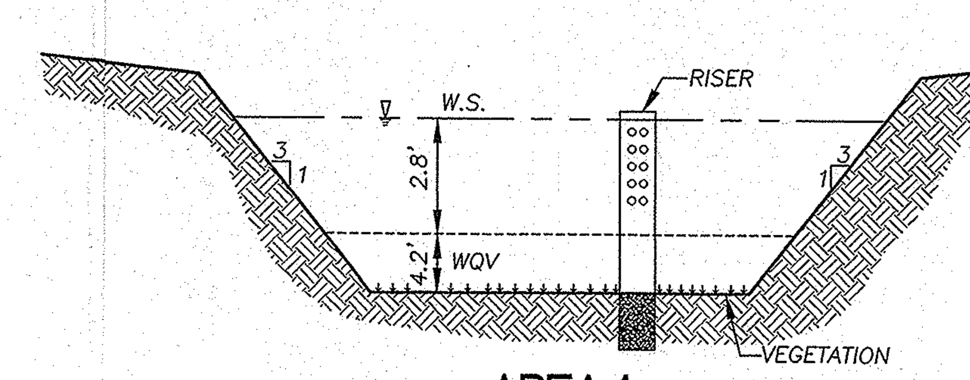
5. RE-VEGETATION TO STABLIZE SITE
6. NATURAL DRAINAGE SYSTEM

TREATMENT CONTROL BMP's

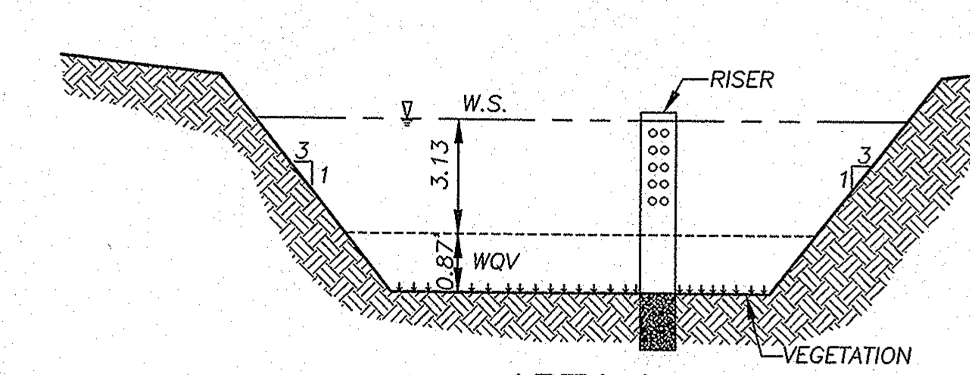
7. DETENTION/INFILTRATION BASIN

RE-VEGETATED GROUND PERVIOUS AREAS

AREA DESIGNATION	ACRE	SF
AREA 1	238.66	10,395,532
AREA 2	23.33	1,016,282



AREA 1
DETENTION /INFILTRATION BASIN "A"
N.T.S.



AREA 2
DETENTION /INFILTRATION BASIN "B"
N.T.S.

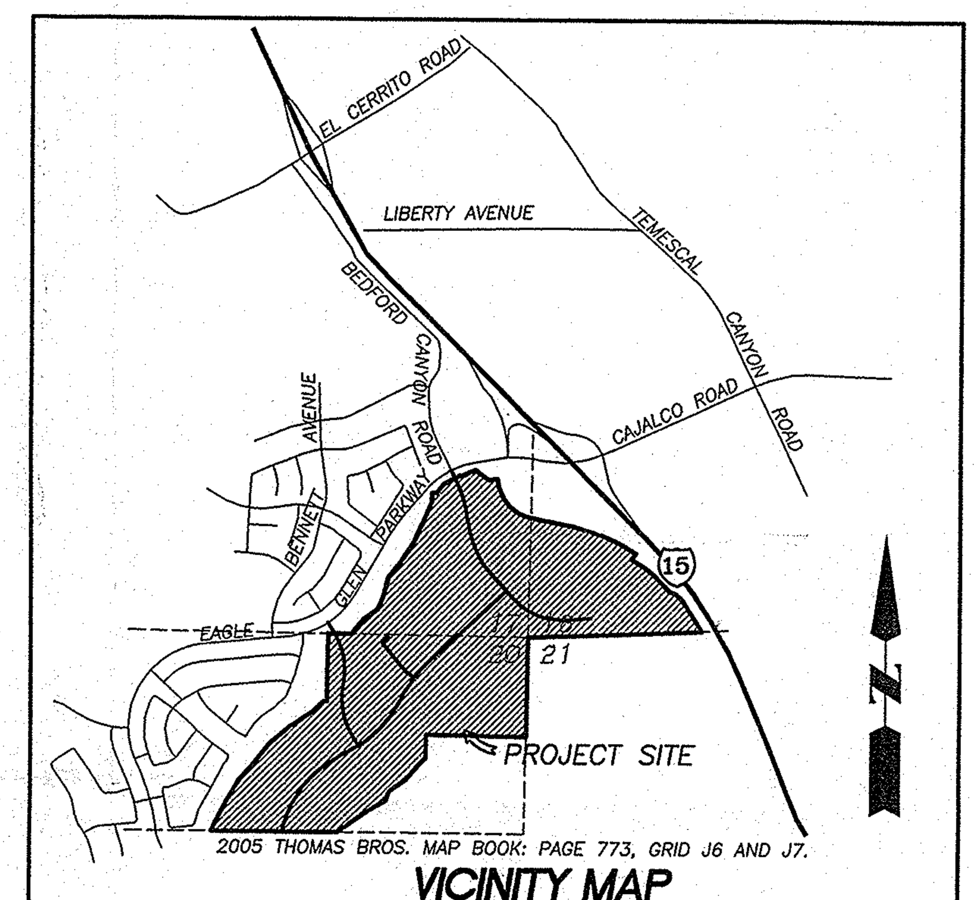
OWNER:
GARY MCMILLAN AND CORONA INVESTMENT PROPERTIES
29379 RANCHO CALIFORNIA ROAD, SUITE 201
TEMECULA, CA 92591

DEVELOPER:
BLUESTONE COMMUNITIES
41 CORPORATE PARK, SUITE 380
IRVINE, CA 92606

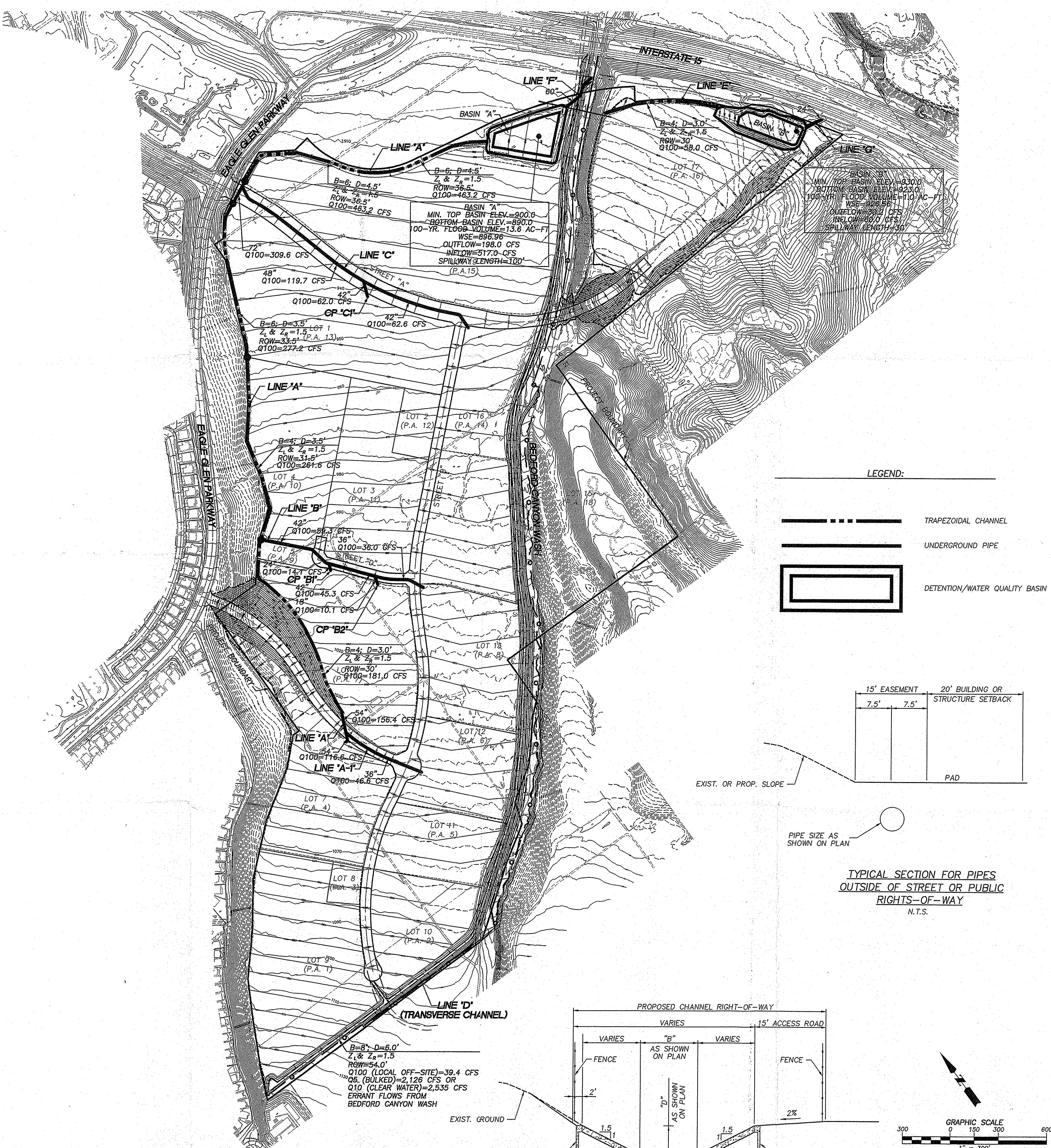
PRELIMINARY WQMP SITE PLAN TENTATIVE TRACT MAP NO. 36294 (ARANTINE HILLS)

AEI CASC CONSULTING
937 SOUTH VIA LATA, SUITE 500
COLTON, CA 92324
PH. (909) 783-0101; FAX (909) 783-0108

EXHIBIT "A" : ARANTINE HILLS
MASTER DRAINAGE PLAN FACILITY MAP
(TENTATIVE TRACT MAP NO. 36294)



VICINITY MAP
N.T.S.



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937 SOUTH VIA LATA, SUITE 500
COLTON, CA 92324
PH. (909) 783-0101; FAX (909) 783-0108

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Appendix C

Supporting Detail Related to Hydrologic Conditions of Concern

(Refer to Section 4 of this P-WQMP for all related information)

BASIN A ROUTING
2 YR-24 HOUR

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2001
Study date: 11/19/10

ARANTINE HILLS-TRACT MAP 36294
FLOOD HYDROGRAPH ROUTING FOR BASIN A
FOR 2YR.-24 HR.
FN:BASINA24

TRI-8 Builders - S/N 615

******************** HYDROGRAPH INFORMATION *********************

From study/file name: A1UHMDP242.rte

***************************HYDROGRAPH DATA****************************

Number of intervals = 150
Time interval = 10.0 (Min.)
Maximum/Peak flow rate = 29.477 (CFS)
Total volume = 18.346 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++

Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 150
Hydrograph time unit = 10.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.300	2.500	0.283	0.317
2.000	1.500	4.500	1.469	1.531
3.000	3.200	5.800	3.160	3.240
4.000	5.600	6.800	5.553	5.647
5.000	8.200	7.800	8.146	8.254
6.000	10.900	8.900	10.839	10.961

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time Inflow Outflow Storage Depth

(Hours)	(CFS)	(CFS)	(Ac.Ft)	.0 7.4 14.74 22.11 29.48	(Ft.)
0.167	0.53	0.03	0.003	O	0.01
0.333	1.61	0.14	0.017	OI	0.06
0.500	1.92	0.32	0.038	O I	0.13
0.667	2.27	0.51	0.061	O I	0.20
0.833	2.78	0.73	0.087	O I	0.29
1.000	2.95	0.96	0.115	O I	0.38
1.167	2.94	1.18	0.141	O I	0.47
1.333	2.75	1.36	0.163	OI	0.54
1.500	2.71	1.51	0.181	OI	0.60
1.667	2.80	1.64	0.197	O I	0.66
1.833	3.00	1.78	0.213	O I	0.71
2.000	3.06	1.91	0.230	OI	0.77
2.167	3.18	2.04	0.245	OI	0.82
2.333	3.41	2.18	0.262	OI	0.87
2.500	3.48	2.32	0.278	OI	0.93
2.667	3.73	2.46	0.295	O I	0.98
2.833	4.18	2.53	0.315	O I	1.01
3.000	4.31	2.56	0.339	O I	1.03
3.167	4.37	2.60	0.363	O I	1.05
3.333	4.41	2.65	0.387	O I	1.07
3.500	4.42	2.69	0.411	O I	1.09
3.667	4.55	2.73	0.436	O I	1.11
3.833	4.76	2.77	0.462	O I	1.13
4.000	4.82	2.82	0.489	O I	1.16
4.167	5.06	2.86	0.518	O I	1.18
4.333	5.51	2.92	0.551	O I	1.21
4.500	5.64	2.98	0.588	O I	1.24
4.667	5.92	3.04	0.626	O I	1.27
4.833	6.38	3.11	0.668	O I	1.31
5.000	6.52	3.19	0.714	O I	1.34
5.167	6.38	3.26	0.758	O I	1.38
5.333	5.98	3.33	0.798	O I	1.41
5.500	5.88	3.39	0.833	O I	1.44
5.667	6.15	3.45	0.869	O I	1.47
5.833	6.77	3.52	0.910	O I	1.51
6.000	6.94	3.59	0.955	O I	1.55
6.167	7.22	3.67	1.003	O I	1.59
6.333	7.70	3.76	1.054	O I	1.63
6.500	7.85	3.85	1.109	O I	1.67
6.667	8.14	3.94	1.166	O I	1.72
6.833	8.60	4.04	1.226	O I	1.77
7.000	8.74	4.15	1.289	O I	1.82
7.167	8.92	4.25	1.353	O I	1.88
7.333	9.17	4.36	1.418	O I	1.93
7.500	9.25	4.47	1.484	O I	1.99
7.667	9.71	4.54	1.552	O I	2.03
7.833	10.60	4.60	1.629	O I	2.08
8.000	10.85	4.66	1.713	O I	2.13
8.167	11.50	4.73	1.802	O I	2.18
8.333	12.64	4.81	1.903	O I	2.24
8.500	12.99	4.89	2.013	O I	2.30
8.667	13.47	4.98	2.127	O I	2.37
8.833	14.20	5.07	2.248	O I	2.44
9.000	14.43	5.17	2.375	O I	2.51
9.167	15.19	5.27	2.507	O I	2.59
9.333	16.53	5.38	2.652	O I	2.68
9.500	16.93	5.50	2.808	O I	2.77
9.667	17.54	5.62	2.968	O I	2.86
9.833	18.50	5.75	3.138	O I	2.96
10.000	18.80	5.85	3.315	O I	3.05
10.167	17.59	5.92	3.485	O I	3.12
10.333	14.83	5.98	3.626	O I	3.18
10.500	14.07	6.03	3.743	O I	3.23
10.667	14.80	6.07	3.858	O I	3.27
10.833	16.77	6.13	3.991	O I	3.33
11.000	17.26	6.19	4.141	O I	3.39

```
11.167   17.22    6.26      4.293   |     O |       | I     |       |     3.46
11.333   16.94    6.32      4.441   |     O |       | I     |       |     3.52
11.500   16.91    6.38      4.587   |     O |       | I     |       |     3.58
11.667   16.62    6.44      4.730   |     O |       | I     |       |     3.64
11.833   15.94    6.49      4.865   |      O|       |I      |       |     3.69
12.000   15.74    6.55      4.993   |      O|       |I      |       |     3.75
12.167   17.33    6.60      5.130   |      O|       | I     |       |     3.80
12.333   20.75    6.68      5.301   |      O|       |     I |       |     3.88
12.500   21.70    6.76      5.501   |      O|       |      I|       |     3.96
12.667   22.75    6.84      5.713   |      O|       |       I       |     4.04
12.833   24.30    6.93      5.943   |      O|       |       | I     |     4.13
13.000   24.82    7.02      6.185   |      O|       |       | I     |     4.22
13.167   26.27    7.12      6.439   |      O|       |       |   I   |     4.32
13.333   28.75    7.23      6.719   |      O|       |       |      I|     4.43
13.500   29.48    7.35      7.020   |      O|       |       |       I     4.55
13.667   27.51    7.46      7.310   |       O       |       |    I  |     4.66
13.833   22.91    7.55      7.554   |       O       |       I       |     4.75
14.000   21.67    7.63      7.757   |       O       |      I|       |     4.83
14.167   21.88    7.70      7.951   |       O       |      I|       |     4.90
14.333   23.06    7.78      8.154   |       O       |       |I      |     4.98
14.500   23.28    7.87      8.365   |       O       |       |I      |     5.06
14.667   23.09    7.95      8.576   |       O       |       |I      |     5.14
14.833   22.77    8.04      8.781   |       O       |       I       |     5.22
15.000   22.71    8.12      8.983   |       O       |       I       |     5.29
15.167   22.29    8.20      9.181   |       O       |       I       |     5.36
15.333   21.39    8.28      9.368   |       O       |      I|       |     5.43
15.500   21.12    8.35      9.546   |       |O      |     I |       |     5.50
15.667   20.05    8.42      9.714   |       |O      |    I  |       |     5.56
15.833   18.03    8.48      9.860   |       |O      |  I    |       |     5.61
16.000   17.45    8.53      9.987   |       |O      | I     |       |     5.66
16.167   13.99    8.57     10.086   |       |O     I|       |       |     5.70
16.333    7.35    8.58     10.115   |      I|O      |       |       |     5.71
16.500    5.44    8.57     10.085   |    I  |O      |       |       |     5.70
16.667    4.32    8.55     10.034   |   I   |O      |       |       |     5.68
16.833    3.42    8.52      9.970   |  I    |O      |       |       |     5.66
17.000    3.02    8.49      9.897   |  I    |O      |       |       |     5.63
17.167    3.15    8.46      9.823   |  I    |O      |       |       |     5.60
17.333    3.99    8.43      9.756   |   I   |O      |       |       |     5.58
17.500    4.21    8.41      9.696   |   I   |O      |       |       |     5.55
17.667    4.20    8.39      9.639   |   I   |O      |       |       |     5.53
17.833    4.05    8.36      9.580   |   I   |O      |       |       |     5.51
18.000    4.02    8.34      9.521   |   I   |O      |       |       |     5.49
18.167    3.92    8.31      9.461   |   I   |O      |       |       |     5.47
18.333    3.69    8.29      9.399   |   I   O       |       |       |     5.44
18.500    3.62    8.26      9.335   |  I    O       |       |       |     5.42
18.667    3.27    8.24      9.269   |  I    O       |       |       |     5.40
18.833    2.60    8.21      9.196   | I     O       |       |       |     5.37
19.000    2.41    8.17      9.118   | I     O       |       |       |     5.34
19.167    2.53    8.14      9.040   | I     O       |       |       |     5.31
19.333    2.92    8.11      8.965   |  I    O       |       |       |     5.28
19.500    3.01    8.08      8.895   |  I    O       |       |       |     5.26
19.667    2.83    8.05      8.824   |  I    O       |       |       |     5.23
19.833    2.43    8.02      8.749   | I     O       |       |       |     5.20
20.000    2.33    7.99      8.672   | I     O       |       |       |     5.17
20.167    2.39    7.96      8.594   | I     O       |       |       |     5.15
20.333    2.58    7.93      8.519   | I     O       |       |       |     5.12
20.500    2.62    7.90      8.446   | I     O       |       |       |     5.09
20.667    2.53    7.87      8.373   | I     O       |       |       |     5.06
20.833    2.32    7.84      8.298   | I     O       |       |       |     5.04
21.000    2.27    7.81      8.222   | I     O       |       |       |     5.01
21.167    2.25    7.78      8.145   | I     O       |       |       |     4.98
21.333    2.24    7.75      8.069   | I     O       |       |       |     4.95
21.500    2.23    7.72      7.994   | I     O       |       |       |     4.92
21.667    2.22    7.69      7.918   | I     O       |       |       |     4.89
21.833    2.22    7.66      7.843   | I     O       |       |       |     4.86
22.000    2.22    7.63      7.768   | I     O       |       |       |     4.83
22.167    2.22    7.61      7.694   | I     O       |       |       |     4.81
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22.333   2.22   7.58   7.620  | I      O        |       |       |     4.78
22.500   2.22   7.55   7.546  | I      O        |       |       |     4.75
22.667   2.11   7.52   7.472  | I      O        |       |       |     4.72
22.833   1.90   7.49   7.396  | I      O        |       |       |     4.69
23.000   1.84   7.46   7.319  |I       O        |       |       |     4.66
23.167   1.81   7.43   7.242  |I       O        |       |       |     4.63
23.333   1.79   7.40   7.164  |I       O        |       |       |     4.60
23.500   1.78   7.37   7.087  |I       O        |       |       |     4.57
23.667   1.78   7.34   7.010  |I      O|        |       |       |     4.54
23.833   1.78   7.31   6.934  |I      O|        |       |       |     4.51
24.000   1.78   7.28   6.858  |I      O|        |       |       |     4.48
24.167   1.35   7.25   6.779  |I      O|        |       |       |     4.45
24.333   0.49   7.22   6.692  I       O|        |       |       |     4.42
24.500   0.24   7.18   6.598  I       O|        |       |       |     4.38
24.667   0.13   7.15   6.502  I       O|        |       |       |     4.35
24.833   0.07   7.11   6.405  I       O|        |       |       |     4.31
25.000   0.03   7.07   6.308  I       O|        |       |       |     4.27
25.167   0.00   7.04   6.211  I       O|        |       |       |     4.24
25.333   0.00   7.00   6.115  I       O|        |       |       |     4.20
25.500   0.00   6.96   6.019  I       O|        |       |       |     4.16
25.667   0.00   6.92   5.923  I       O|        |       |       |     4.12
25.833   0.00   6.89   5.828  I       O|        |       |       |     4.09
26.000   0.00   6.85   5.733  I       O|        |       |       |     4.05
26.167   0.00   6.82   5.639  I       O|        |       |       |     4.02
26.333   0.00   6.78   5.545  I       O|        |       |       |     3.98
26.500   0.00   6.74   5.452  I       O|        |       |       |     3.94
26.667   0.00   6.70   5.360  I       O|        |       |       |     3.90
26.833   0.00   6.66   5.268  I       O|        |       |       |     3.86
27.000   0.00   6.62   5.176  I       O|        |       |       |     3.82
27.167   0.00   6.59   5.085  I       O|        |       |       |     3.79
27.333   0.00   6.55   4.995  I       O|        |       |       |     3.75
27.500   0.00   6.51   4.905  I       O|        |       |       |     3.71
27.667   0.00   6.47   4.815  I       O|        |       |       |     3.67
27.833   0.00   6.44   4.727  I     O |        |       |       |     3.64
28.000   0.00   6.40   4.638  I     O |        |       |       |     3.60
28.167   0.00   6.36   4.550  I     O |        |       |       |     3.56
28.333   0.00   6.33   4.463  I     O |        |       |       |     3.53
28.500   0.00   6.29   4.376  I     O |        |       |       |     3.49
28.667   0.00   6.25   4.290  I     O |        |       |       |     3.45
28.833   0.00   6.22   4.204  I     O |        |       |       |     3.42
29.000   0.00   6.18   4.118  I     O |        |       |       |     3.38
29.167   0.00   6.15   4.033  I     O |        |       |       |     3.35
29.333   0.00   6.11   3.949  I     O |        |       |       |     3.31
29.500   0.00   6.08   3.865  I     O |        |       |       |     3.28
29.667   0.00   6.04   3.782  I     O |        |       |       |     3.24
29.833   0.00   6.01   3.699  I     O |        |       |       |     3.21
30.000   0.00   5.97   3.616  I     O |        |       |       |     3.17
30.167   0.00   5.94   3.534  I     O |        |       |       |     3.14
30.333   0.00   5.91   3.452  I     O |        |       |       |     3.11
30.500   0.00   5.87   3.371  I     O |        |       |       |     3.07
30.667   0.00   5.84   3.291  I     O |        |       |       |     3.04
30.833   0.00   5.80   3.211  I     O |        |       |       |     3.00
31.000   0.00   5.75   3.131  I     O |        |       |       |     2.96
31.167   0.00   5.69   3.052  I     O |        |       |       |     2.91
31.333   0.00   5.63   2.974  I     O |        |       |       |     2.87
31.500   0.00   5.57   2.897  I     O |        |       |       |     2.82
31.667   0.00   5.51   2.821  I    O  |        |       |       |     2.78
31.833   0.00   5.45   2.745  I    O  |        |       |       |     2.73
32.000   0.00   5.40   2.671  I    O  |        |       |       |     2.69
32.167   0.00   5.34   2.597  I    O  |        |       |       |     2.65
32.333   0.00   5.28   2.524  I    O  |        |       |       |     2.60
32.500   0.00   5.23   2.451  I    O  |        |       |       |     2.56
32.667   0.00   5.17   2.380  I    O  |        |       |       |     2.52
32.833   0.00   5.12   2.309  I    O  |        |       |       |     2.48
33.000   0.00   5.06   2.239  I    O  |        |       |       |     2.43
33.167   0.00   5.01   2.169  I    O  |        |       |       |     2.39
33.333   0.00   4.96   2.101  I    O  |        |       |       |     2.35
```
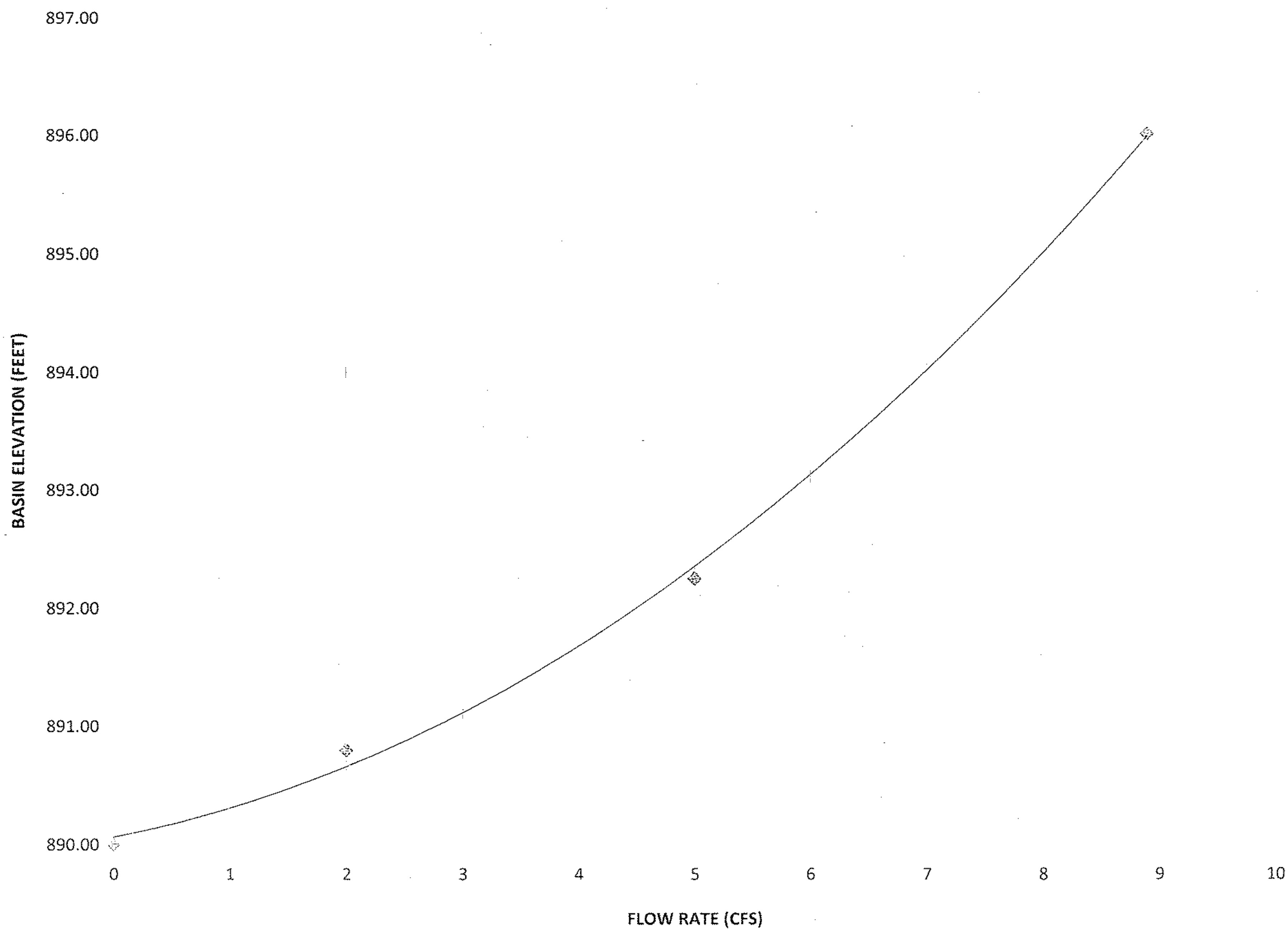

33.500	0.00	4.91	2.033	I O	2.31
33.667	0.00	4.86	1.965	I O	2.27
33.833	0.00	4.80	1.899	I O	2.23
34.000	0.00	4.75	1.833	I O	2.20
34.167	0.00	4.70	1.768	I O	2.16
34.333	0.00	4.66	1.703	I O	2.12
34.500	0.00	4.61	1.640	I O	2.08
34.667	0.00	4.56	1.576	I O	2.04
34.833	0.00	4.51	1.514	I O	2.01
35.000	0.00	4.42	1.452	I O	1.96
35.167	0.00	4.32	1.392	I O	1.91
35.333	0.00	4.22	1.333	I O	1.86
35.500	0.00	4.13	1.276	I O	1.81
35.667	0.00	4.03	1.220	I O	1.77
35.833	0.00	3.94	1.165	I O	1.72
36.000	0.00	3.85	1.111	I O	1.68
36.167	0.00	3.76	1.059	I O	1.63
36.333	0.00	3.68	1.007	I O	1.59
36.500	0.00	3.60	0.957	I O	1.55
36.667	0.00	3.51	0.908	I O	1.51
36.833	0.00	3.43	0.861	I O	1.47
37.000	0.00	3.36	0.814	I O	1.43
37.167	0.00	3.28	0.768	I O	1.39
37.333	0.00	3.21	0.723	I O	1.35
37.500	0.00	3.13	0.680	I O	1.32
37.667	0.00	3.06	0.637	I O	1.28
37.833	0.00	2.99	0.595	I O	1.25
38.000	0.00	2.92	0.555	I O	1.21
38.167	0.00	2.86	0.515	I O	1.18
38.333	0.00	2.79	0.476	I O	1.15
38.500	0.00	2.73	0.438	I O	1.11
38.667	0.00	2.67	0.401	I O	1.08
38.833	0.00	2.61	0.364	I O	1.05
39.000	0.00	2.55	0.329	I O	1.02
39.167	0.00	2.45	0.294	I O	0.98
39.333	0.00	2.19	0.262	I O	0.87
39.500	0.00	1.95	0.234	I O	0.78
39.667	0.00	1.74	0.209	IO	0.70
39.833	0.00	1.55	0.186	IO	0.62
40.000	0.00	1.38	0.166	IO	0.55
40.167	0.00	1.23	0.148	IO	0.49
40.333	0.00	1.10	0.132	IO	0.44
40.500	0.00	0.98	0.117	IO	0.39
40.667	0.00	0.87	0.105	O	0.35
40.833	0.00	0.78	0.093	O	0.31
41.000	0.00	0.69	0.083	O	0.28
41.167	0.00	0.62	0.074	O	0.25
41.333	0.00	0.55	0.066	O	0.22
41.500	0.00	0.49	0.059	O	0.20
41.667	0.00	0.44	0.053	O	0.18
41.833	0.00	0.39	0.047	O	0.16
42.000	0.00	0.35	0.042	O	0.14
42.167	0.00	0.31	0.037	O	0.12
42.333	0.00	0.28	0.033	O	0.11
42.500	0.00	0.25	0.030	O	0.10
42.667	0.00	0.22	0.026	O	0.09
42.833	0.00	0.20	0.023	O	0.08
43.000	0.00	0.17	0.021	O	0.07
43.167	0.00	0.16	0.019	O	0.06
43.333	0.00	0.14	0.017	O	0.06
43.500	0.00	0.12	0.015	O	0.05
43.667	0.00	0.11	0.013	O	0.04
43.833	0.00	0.10	0.012	O	0.04

Remaining water in basin = 0.01 (Ac.Ft)

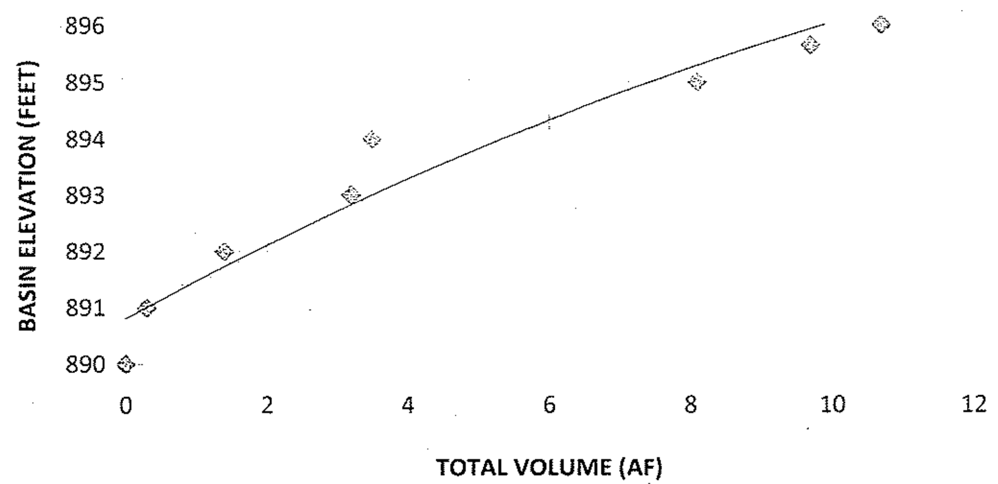
```
****************************HYDROGRAPH DATA****************************
            Number of intervals =   263
            Time interval =   10.0 (Min.)
            Maximum/Peak flow rate =        8.580 (CFS)
            Total volume =      18.335 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************

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


BASIN ELEVATION (FEET)
897.00
896.00
895.00
894.00
893.00
892.00
891.00
890.00
0
1
2
3
4
5
6
7
8
9
10
FLOW RATE (CFS)

TTM 36294-ARANTINE HILLS - BASIN "A" -2 YR.-24HR.

BASIN STORAGE VOLUME CURVE

TOTAL VOLUME (AF)	BASIN ELEVATION (FEET)
0.0	890.0
0.3	891.0
1.5	892.0
3.2	893.0
5.6	894.0
8.2	895.0
10.9	896.0
13.7	897.0
16.7	897.0
19.8	899.0
23.0	900.0



1. These were the numbers you provided the other day using the spreadsheet below.
2. The chart to the right above is created to see if your volume calculation results are accurate

TTM. 36294-ARANTINE HILLS

2-YR.-24 HR. VOLUME CAPACITY CALCULATIONS FOR BASIN "A"					
ELEVATION	DEPTH	AREA (SF)	AREA (AC)	VOLUME (AC-FT)	VOLUME TOTAL (AC-FT)
890		1185.5	0.0	0.0	0.0
	1				
891		35488.4	0.8	0.3	0.3
	1				
892		64800.6	1.5	1.1	1.5
	1				
893		90225.5	2.1	1.8	3.2
	1				
894		112058.9	2.6	2.3	5.6
	1				
895		116450.4	2.7	2.6	8.2
	1				
896		120902.3	2.8	2.7	10.9
	1				
897		125638.4	2.9	2.8	13.7
	1				
898		131072.9	3.0	2.9	16.7
	1				
899		137011.7	3.1	3.1	19.8
	1				
900		143423.6	3.3	3.2	23.0

BASIN A ROUTING
10 YR-24 HOUR

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2001
Study date: 11/19/10

ARANTINE HILLS-TRACT MAP 36294
FLOOD HYDROGRAPH ROUTING FOR BASIN A
FOR 10 YR.-24 HR.
FN:BASINA24

TRI-8 Builders - S/N 615

******************** HYDROGRAPH INFORMATION *********************

From study/file name: A1UHMDP2410.rte

****************************HYDROGRAPH DATA****************************

Number of intervals = 150
Time interval = 10.0 (Min.)
Maximum/Peak flow rate = 35.020 (CFS)
Total volume = 25.335 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++

Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 150
Hydrograph time unit = 10.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.300	4.000	0.272	0.328
2.000	1.500	8.000	1.445	1.555
3.000	3.200	11.000	3.124	3.276
4.000	5.600	13.000	5.510	5.690
5.000	8.200	15.000	8.097	8.303
6.000	10.900	17.300	10.781	11.019

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time Inflow Outflow Storage Depth

```
 (Hours)   (CFS)    (CFS)    (Ac.Ft) .0        8.8   17.51     26.27     35.02 (Ft.)
  0.167     0.98     0.08     0.006  O         |         |         |         |   0.02
  0.333     3.00     0.40     0.030  O I       |         |         |         |   0.10
  0.500     3.57     0.89     0.067  O   I     |         |         |         |   0.22
  0.667     4.22     1.40     0.105  |O  I     |         |         |         |   0.35
  0.833     5.18     1.95     0.146  |O   I    |         |         |         |   0.49
  1.000     5.49     2.52     0.189  | O   I   |         |         |         |   0.63
  1.167     5.47     3.02     0.226  | O  I    |         |         |         |   0.75
  1.333     5.12     3.40     0.255  |   OI    |         |         |         |   0.85
  1.500     5.05     3.68     0.276  |   OI    |         |         |         |   0.92
  1.667     5.22     3.93     0.295  |   OI    |         |         |         |   0.98
  1.833     5.59     4.05     0.314  |   O I   |         |         |         |   1.01
  2.000     5.69     4.12     0.336  |   O I   |         |         |         |   1.03
  2.167     5.92     4.19     0.358  |   O I   |         |         |         |   1.05
  2.333     6.36     4.28     0.385  |   O I   |         |         |         |   1.07
  2.500     6.49     4.38     0.413  |    OI   |         |         |         |   1.09
  2.667     6.95     4.48     0.445  |    O I  |         |         |         |   1.12
  2.833     7.78     4.61     0.484  |    O   I|         |         |         |   1.15
  3.000     8.03     4.76     0.528  |    O   I|         |         |         |   1.19
  3.167     8.15     4.91     0.573  |    O   I|         |         |         |   1.23
  3.333     8.21     5.06     0.617  |    O   I|         |         |         |   1.26
  3.500     8.24     5.20     0.660  |    O   I|         |         |         |   1.30
  3.667     8.47     5.34     0.702  |    O   I|         |         |         |   1.34
  3.833     8.87     5.49     0.747  |     O   I         |         |         |   1.37
  4.000     8.98     5.64     0.793  |     O   I         |         |         |   1.41
  4.167     9.43     5.80     0.841  |     O   I         |         |         |   1.45
  4.333    10.27     5.99     0.896  |     O   |I        |         |         |   1.50
  4.500    10.51     6.18     0.955  |     O   |I        |         |         |   1.55
  4.667    11.02     6.39     1.017  |     O   |  I      |         |         |   1.60
  4.833    11.89     6.62     1.085  |      O  |  I      |         |         |   1.65
  5.000    12.15     6.86     1.158  |      O  |   I     |         |         |   1.71
  5.167    11.89     7.09     1.227  |      O  |  I      |         |         |   1.77
  5.333    11.14     7.29     1.287  |      O  |  I      |         |         |   1.82
  5.500    10.95     7.46     1.337  |      O  |  I      |         |         |   1.86
  5.667    11.46     7.63     1.388  |      O  |  I      |         |         |   1.91
  5.833    12.62     7.82     1.447  |        O|   I     |         |         |   1.96
  6.000    12.92     8.02     1.514  |        O|   I     |         |         |   2.01
  6.167    13.44     8.15     1.584  |        O|    I    |         |         |   2.05
  6.333    14.34     8.29     1.662  |        O|     I   |         |         |   2.10
  6.500    14.62     8.43     1.746  |        O|     I   |         |         |   2.14
  6.667    15.16     8.59     1.834  |        O|     I   |         |         |   2.20
  6.833    16.02     8.76     1.929  |         O       I |         |         |   2.25
  7.000    16.28     8.94     2.030  |         O       I |         |         |   2.31
  7.167    16.61     9.12     2.132  |         O        I|         |         |   2.37
  7.333    17.08     9.30     2.237  |         O        I|         |         |   2.43
  7.500    17.22     9.49     2.344  |         O        I|         |         |   2.50
  7.667    18.09     9.69     2.455  |         O         I         |         |   2.56
  7.833    19.74     9.91     2.581  |         |O        |  I      |         |   2.64
  8.000    20.21    10.15     2.718  |         |O        |  I      |         |   2.72
  8.167    21.41    10.41     2.863  |         |O        |   I     |         |   2.80
  8.333    23.55    10.70     3.027  |         |O        |      I  |         |   2.90
  8.500    24.19    11.01     3.207  |         |  O      |       I |         |   3.00
  8.667    25.09    11.16     3.393  |         |  O      |       I |         |   3.08
  8.833    26.45    11.33     3.594  |         |  O      |         I         |   3.16
  9.000    26.88    11.50     3.804  |         |  O      |         I         |   3.25
  9.167    28.29    11.69     4.024  |         |  O      |         |I        |   3.34
  9.333    30.80    11.89     4.268  |         |  O      |         |    I    |   3.45
  9.500    31.53    12.11     4.532  |         |   O     |         |    I    |   3.56
  9.667    32.67    12.34     4.806  |         |   O     |         |      I  |   3.67
  9.833    34.46    12.58     5.097  |         |   O     |         |        I|   3.79
 10.000    35.02    12.83     5.400  |         |   O     |         |         I   3.92
 10.167    32.76    13.07     5.689  |         |   O     |         |      I  |   4.03
 10.333    27.62    13.25     5.923  |         |     O   |         |I        |   4.12
 10.500    26.21    13.39     6.111  |         |     O   |        I|         |   4.20
 10.667    27.57    13.54     6.296  |         |     O   |         |I        |   4.27
 10.833    31.23    13.70     6.513  |         |     O   |         |    I    |   4.35
 11.000    32.14    13.89     6.759  |         |     O   |         |      I  |   4.45
```

```
11.167   32.08   14.08      7.009   |       |   O   |       |    I  |    4.54
11.333   31.56   14.27      7.252   |       |    O  |       |   I   |    4.64
11.500   31.50   14.45      7.488   |       |    O  |       |   I   |    4.73
11.667   30.96   14.63      7.718   |       |    O  |       |   I   |    4.81
11.833   29.69   14.79      7.933   |       |    O  |       |  I    |    4.90
12.000   29.31   14.95      8.135   |       |    O  |       | I     |    4.97
12.167   23.19   15.08      8.290   |       |    O  |    I  |       |    5.03
12.333   11.10   15.10      8.318   |       | I  O  |       |       |    5.04
12.500    8.10   15.04      8.243   |      I|    O  |       |       |    5.02
12.667    9.05   14.96      8.154   |       I    O  |       |       |    4.98
12.833   12.84   14.92      8.099   |       |  I O  |       |       |    4.96
13.000   14.09   14.91      8.079   |       |   IO  |       |       |    4.95
13.167   18.43   14.92      8.098   |       |    O  I       |       |    4.96
13.333   26.81   15.00      8.203   |       |    O  |       I       |    5.00
13.500   29.71   15.16      8.385   |       |    O  |       |  I    |    5.07
13.667   24.19   15.29      8.546   |       |    O  |     I |       |    5.13
13.833   10.47   15.32      8.574   |       |I   O  |       |       |    5.14
14.000    7.22   15.24      8.485   |     I |    O  |       |       |    5.11
14.167    8.50   15.16      8.384   |      I|    O  |       |       |    5.07
14.333   12.78   15.10      8.322   |       |  I O  |       |       |    5.05
14.500   14.07   15.08      8.299   |       |   IO  |       |       |    5.04
14.667   14.08   15.07      8.286   |       |   IO  |       |       |    5.03
14.833   13.66   15.06      8.269   |       |   IO  |       |       |    5.03
15.000   14.07   15.05      8.253   |       |   IO  |       |       |    5.02
15.167   13.33   15.03      8.234   |       |   IO  |       |       |    5.01
15.333   11.10   15.00      8.196   |       | I  O  |       |       |    5.00
15.500   10.85   14.95      8.141   |       |I   O  |       |       |    4.98
15.667   15.80   14.94      8.118   |       |    OI |       |       |    4.97
15.833   25.84   15.00      8.199   |       |    O  |      I|       |    5.00
16.000   28.64   15.14      8.367   |       |    O  |       | I     |    5.06
16.167   23.97   15.27      8.519   |       |    O  |    I  |       |    5.12
16.333   12.60   15.31      8.561   |       |  I O  |       |       |    5.13
16.500    9.63   15.26      8.503   |       I    O  |       |       |    5.11
16.667    8.05   15.18      8.415   |      I|    O  |       |       |    5.08
16.833    6.37   15.09      8.306   |    I  |    O  |       |       |    5.04
17.000    5.63   14.99      8.182   |    I  |    O  |       |       |    4.99
17.167    5.87   14.89      8.055   |    I  |    O  |       |       |    4.94
17.333    7.43   14.80      7.942   |     I |    O  |       |       |    4.90
17.500    7.85   14.73      7.844   |      I|    O  |       |       |    4.86
17.667    7.83   14.65      7.750   |      I|    O  |       |       |    4.83
17.833    7.54   14.58      7.654   |     I |    O  |       |       |    4.79
18.000    7.50   14.51      7.557   |     I |    O  |       |       |    4.75
18.167    7.31   14.43      7.460   |     I |    O  |       |       |    4.72
18.333    6.87   14.35      7.359   |     I |    O  |       |       |    4.68
18.500    6.74   14.27      7.256   |     I |    O  |       |       |    4.64
18.667    6.09   14.19      7.148   |    I  |   O   |       |       |    4.60
18.833    4.85   14.10      7.029   |   I   |   O   |       |       |    4.55
19.000    4.49   14.00      6.900   |   I   |   O   |       |       |    4.50
19.167    4.71   13.90      6.771   |   I   |   O   |       |       |    4.45
19.333    5.43   13.81      6.650   |   I   |   O   |       |       |    4.40
19.500    5.61   13.72      6.536   |    I  |   O   |       |       |    4.36
19.667    5.27   13.63      6.423   |   I   |   O   |       |       |    4.32
19.833    4.52   13.54      6.303   |   I   |   O   |       |       |    4.27
20.000    4.33   13.44      6.178   |  I    |   O   |       |       |    4.22
20.167    4.45   13.35      6.054   |   I   |   O   |       |       |    4.17
20.333    4.80   13.26      5.935   |   I   |   O   |       |       |    4.13
20.500    4.88   13.17      5.819   |   I   |   O   |       |       |    4.08
20.667    4.70   13.08      5.705   |   I   |  O    |       |       |    4.04
20.833    4.33   12.99      5.587   |  I    |  O    |       |       |    3.99
21.000    4.23   12.89      5.468   |  I    |  O    |       |       |    3.95
21.167    4.20   12.79      5.349   |  I    |  O    |       |       |    3.90
21.333    4.17   12.69      5.231   |  I    |  O    |       |       |    3.85
21.500    4.15   12.60      5.114   |  I    |  O    |       |       |    3.80
21.667    4.13   12.50      4.999   |  I    |  O    |       |       |    3.75
21.833    4.13   12.40      4.884   |  I    |  O    |       |       |    3.70
22.000    4.13   12.31      4.771   |  I    |  O    |       |       |    3.65
22.167    4.13   12.22      4.659   |  I    |  O    |       |       |    3.61
```

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22.333    4.13   12.12      4.548   |  I    |  O    |       |       |     3.56
22.500    4.13   12.03      4.439   |  I    | O     |       |       |     3.52
22.667    3.94   11.94      4.329   |  I    | O     |       |       |     3.47
22.833    3.53   11.85      4.217   |  I    | O     |       |       |     3.42
23.000    3.42   11.75      4.102   |  I    | O     |       |       |     3.38
23.167    3.37   11.66      3.988   |  I    | O     |       |       |     3.33
23.333    3.34   11.56      3.874   |  I    | O     |       |       |     3.28
23.500    3.32   11.47      3.761   |  I    | O     |       |       |     3.23
23.667    3.31   11.37      3.650   |  I    | O     |       |       |     3.19
23.833    3.31   11.28      3.539   |  I    | O     |       |       |     3.14
24.000    3.31   11.19      3.430   |  I    | O     |       |       |     3.10
24.167    2.52   11.10      3.317   | I     | O     |       |       |     3.05
24.333    0.91   10.98      3.188   I       | O     |       |       |     2.99
24.500    0.45   10.73      3.048   I       |O      |       |       |     2.91
24.667    0.24   10.48      2.907   I       |O      |       |       |     2.83
24.833    0.13   10.24      2.767   I       |O      |       |       |     2.75
25.000    0.06    9.99      2.629   I       |O      |       |       |     2.66
25.167    0.00    9.75      2.493   I       O       |       |       |     2.58
25.333    0.00    9.52      2.360   I       O       |       |       |     2.51
25.500    0.00    9.29      2.231   I       O       |       |       |     2.43
25.667    0.00    9.07      2.104   I       O       |       |       |     2.36
25.833    0.00    8.85      1.981   I       O       |       |       |     2.28
26.000    0.00    8.64      1.861   I      O|       |       |       |     2.21
26.167    0.00    8.43      1.743   I      O|       |       |       |     2.14
26.333    0.00    8.23      1.628   I      O|       |       |       |     2.08
26.500    0.00    8.03      1.516   I      O|       |       |       |     2.01
26.667    0.00    7.69      1.408   I      O|       |       |       |     1.92
26.833    0.00    7.35      1.304   I     O |       |       |       |     1.84
27.000    0.00    7.02      1.206   I     O |       |       |       |     1.75
27.167    0.00    6.70      1.111   I     O |       |       |       |     1.68
27.333    0.00    6.40      1.021   I    O  |       |       |       |     1.60
27.500    0.00    6.12      0.935   I    O  |       |       |       |     1.53
27.667    0.00    5.84      0.852   I    O  |       |       |       |     1.46
27.833    0.00    5.58      0.774   I    O  |       |       |       |     1.39
28.000    0.00    5.33      0.698   I   O   |       |       |       |     1.33
28.167    0.00    5.09      0.627   I   O   |       |       |       |     1.27
28.333    0.00    4.86      0.558   I   O   |       |       |       |     1.22
28.500    0.00    4.64      0.493   I   O   |       |       |       |     1.16
28.667    0.00    4.43      0.430   I   O   |       |       |       |     1.11
28.833    0.00    4.24      0.371   I  O    |       |       |       |     1.06
29.000    0.00    4.04      0.313   I  O    |       |       |       |     1.01
29.167    0.00    3.49      0.262   I  O    |       |       |       |     0.87
29.333    0.00    2.90      0.218   I O     |       |       |       |     0.73
29.500    0.00    2.41      0.181   I O     |       |       |       |     0.60
29.667    0.00    2.01      0.151   IO      |       |       |       |     0.50
29.833    0.00    1.67      0.125   IO      |       |       |       |     0.42
30.000    0.00    1.39      0.104   IO      |       |       |       |     0.35
30.167    0.00    1.16      0.087   IO      |       |       |       |     0.29
30.333    0.00    0.96      0.072   O       |       |       |       |     0.24
30.500    0.00    0.80      0.060   O       |       |       |       |     0.20
30.667    0.00    0.66      0.050   O       |       |       |       |     0.17
30.833    0.00    0.55      0.041   O       |       |       |       |     0.14
31.000    0.00    0.46      0.034   O       |       |       |       |     0.11
31.167    0.00    0.38      0.029   O       |       |       |       |     0.10
31.333    0.00    0.32      0.024   O       |       |       |       |     0.08
31.500    0.00    0.26      0.020   O       |       |       |       |     0.07
31.667    0.00    0.22      0.017   O       |       |       |       |     0.06
31.833    0.00    0.18      0.014   O       |       |       |       |     0.05
32.000    0.00    0.15      0.011   O       |       |       |       |     0.04
32.167    0.00    0.13      0.010   O       |       |       |       |     0.03
32.333    0.00    0.11      0.008   O       |       |       |       |     0.03
32.500    0.00    0.09      0.007   O       |       |       |       |     0.02
```

Remaining water in basin =   0.01 (Ac.Ft)

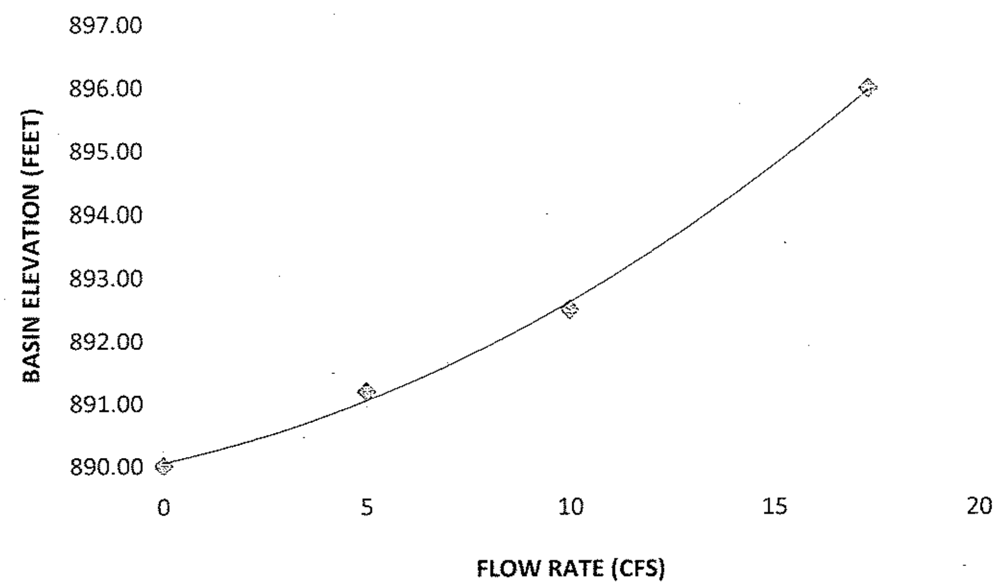
```
***************************HYDROGRAPH DATA***************************
           Number of intervals =   195
           Time interval =   10.0 (Min.)
           Maximum/Peak flow rate =        15.319 (CFS)
           Total volume =      25.329 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
*********************************************************************

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

TTM 36294-ARANTINE HILLS - BASIN "A" -10 YR.-24HR.

BASIN OUTFLOW RATING CURVE

Flow Rate (CFS)	Basin Elevation (ft)
0	890.00
5	891.19
10	892.50
17.3	896.00



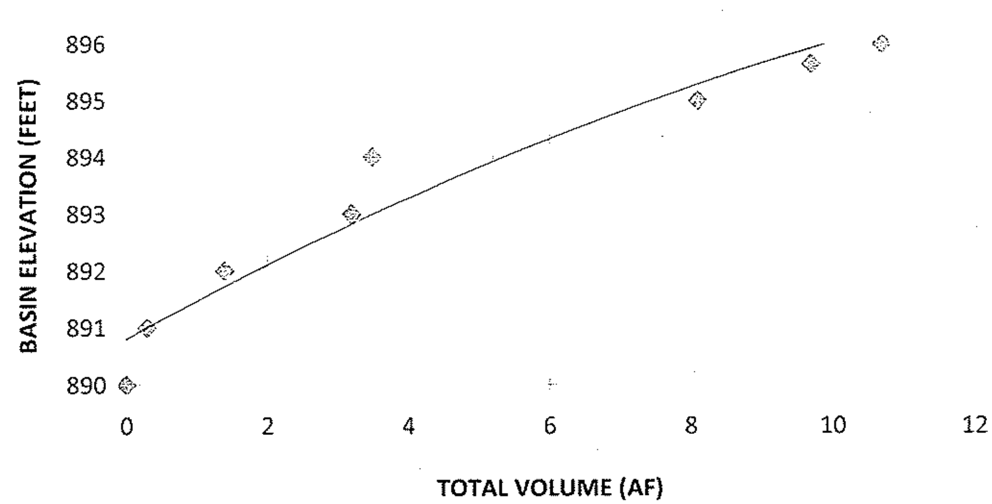
NOTES:

1. Flow Rates are numbers selected and inputted into the WSPG
2. Basin Elevation are numbers obtained directly from EGL values of the WSPG results based upon the respective flow rates
3. The chart to the right above is created to draw the curve so actual flow rates can be obtained based upon basin elevation whole numbers (i.e. 1001.00, 1002.00, 1003.00, etc)

TTM 36294-ARANTINE HILLS - BASIN "A" -10 YR.-24HR.

BASIN STORAGE VOLUME CURVE

TOTAL VOLUME (AF)	BASIN ELEVATION (FEET)
0.0	890.0
0.3	891.0
1.5	892.0
3.2	893.0
5.6	894.0
8.2	895.0
10.9	896.0
13.7	897.0
16.7	897.0
19.8	899.0
23.0	900.0



1. These were the numbers you provided the other day using the spreadsheet below.
2. The chart to the right above is created to see if your volume calculation results are accurate

TTM 36294-ARANTINE HILLS

10-YR.-24 HR. VOLUME CAPACITY CALCULATIONS FOR BASIN "A"					
ELEVATION	DEPTH	AREA (SF)	AREA (AC)	VOLUME (AC-FT)	VOLUME TOTAL (AC-FT)
890		1185.5	0.0	0.0	0.0
	1				
891		35488.4	0.8	0.3	0.3
	1				
892		64800.6	1.5	1.1	1.5
	1				
893		90225.5	2.1	1.8	3.2
	1				
894		112058.9	2.6	2.3	5.6
	1				
895		116450.4	2.7	2.6	8.2
	1				
896		120902.3	2.8	2.7	10.9
	1				
897		125638.4	2.9	2.8	13.7
	1				
898		131072.9	3.0	2.9	16.7
	1				
899		137011.7	3.1	3.1	19.8
	1				
900		143423.6	3.3	3.2	23.0

UNIT HYDROGRAPH-EXISTING CONDITION
2 YR-24 HOUR

```
U n i t   H y d r o g r a p h   A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2002, Version 6.1
      Study date  11/19/10 File: aeluh242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N   615

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (EXISTING CONDITION)
AREA "A" FOR AREAS "A1" TO "A20"
2 YEAR - 24 HOUR
FN: AE1UH242
---------------------------------------------------------------------
Drainage Area =      238.10(Ac.)  =       0.372 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      238.10(Ac.)  =      0.372 Sq.
Mi.
Length along longest watercourse =    8300.00(Ft.)
Length along longest watercourse measured to centroid =    4370.00(Ft.)
Length along longest watercourse =       1.572 Mi.
Length along longest watercourse measured to centroid =      0.828 Mi.
Difference in elevation =     323.00(Ft.)
Slope along watercourse =    205.4747 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.145 Hr.
Lag time =     8.68 Min.
25% of lag time =     2.17 Min.
40% of lag time =     3.47 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      238.10              1.55                 369.06

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      238.10              4.80                1142.88

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.550(In)
Area Averaged 100-Year Rainfall =    4.800(In)

Point rain (area averaged) =    1.550(In)
Areal adjustment factor =   99.95 %
Adjusted average point rain =    1.549(In)
```

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
238.100	55.00	0.100

Total Area Entered = 238.10(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
55.0	55.0	0.521	0.100	0.474	1.000	0.474
					Sum (F) =	0.474

Area averaged mean soil loss (F) (In/Hr) = 0.474
Minimum soil loss rate ((In/Hr)) = 0.237
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.820

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	57.612	7.682	18.434
2	0.167	115.223	32.234	77.348
3	0.250	172.835	27.325	65.569
4	0.333	230.446	10.771	25.846
5	0.417	288.058	6.239	14.972
6	0.500	345.669	4.246	10.189
7	0.583	403.281	3.076	7.382
8	0.667	460.892	2.152	5.163
9	0.750	518.504	1.742	4.181
10	0.833	576.115	1.350	3.239
11	0.917	633.727	1.032	2.476
12	1.000	691.339	0.767	1.841
13	1.083	748.950	0.585	1.405
14	1.167	806.562	0.799	1.916
			Sum = 100.000	Sum= 239.960

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.012	0.840	0.010	0.00
2	0.17	0.07	0.012	0.837	0.010	0.00
3	0.25	0.07	0.012	0.834	0.010	0.00
4	0.33	0.10	0.019	0.831	0.015	0.00
5	0.42	0.10	0.019	0.828	0.015	0.00
6	0.50	0.10	0.019	0.824	0.015	0.00
7	0.58	0.10	0.019	0.821	0.015	0.00
8	0.67	0.10	0.019	0.818	0.015	0.00
9	0.75	0.10	0.019	0.815	0.015	0.00
10	0.83	0.13	0.025	0.811	0.020	0.00
11	0.92	0.13	0.025	0.808	0.020	0.00
12	1.00	0.13	0.025	0.805	0.020	0.00
13	1.08	0.10	0.019	0.802	0.015	0.00
14	1.17	0.10	0.019	0.799	0.015	0.00
15	1.25	0.10	0.019	0.796	0.015	0.00
16	1.33	0.10	0.019	0.792	0.015	0.00
17	1.42	0.10	0.019	0.789	0.015	0.00
18	1.50	0.10	0.019	0.786	0.015	0.00
19	1.58	0.10	0.019	0.783	0.015	0.00
20	1.67	0.10	0.019	0.780	0.015	0.00
21	1.75	0.10	0.019	0.777	0.015	0.00
22	1.83	0.13	0.025	0.774	0.020	0.00
23	1.92	0.13	0.025	0.770	0.020	0.00

24	2.00	0.13	0.025	0.767	0.020	0.00
25	2.08	0.13	0.025	0.764	0.020	0.00
26	2.17	0.13	0.025	0.761	0.020	0.00
27	2.25	0.13	0.025	0.758	0.020	0.00
28	2.33	0.13	0.025	0.755	0.020	0.00
29	2.42	0.13	0.025	0.752	0.020	0.00
30	2.50	0.13	0.025	0.749	0.020	0.00
31	2.58	0.17	0.031	0.746	0.025	0.01
32	2.67	0.17	0.031	0.743	0.025	0.01
33	2.75	0.17	0.031	0.740	0.025	0.01
34	2.83	0.17	0.031	0.737	0.025	0.01
35	2.92	0.17	0.031	0.734	0.025	0.01
36	3.00	0.17	0.031	0.730	0.025	0.01
37	3.08	0.17	0.031	0.727	0.025	0.01
38	3.17	0.17	0.031	0.724	0.025	0.01
39	3.25	0.17	0.031	0.721	0.025	0.01
40	3.33	0.17	0.031	0.718	0.025	0.01
41	3.42	0.17	0.031	0.715	0.025	0.01
42	3.50	0.17	0.031	0.712	0.025	0.01
43	3.58	0.17	0.031	0.709	0.025	0.01
44	3.67	0.17	0.031	0.706	0.025	0.01
45	3.75	0.17	0.031	0.703	0.025	0.01
46	3.83	0.20	0.037	0.701	0.030	0.01
47	3.92	0.20	0.037	0.698	0.030	0.01
48	4.00	0.20	0.037	0.695	0.030	0.01
49	4.08	0.20	0.037	0.692	0.030	0.01
50	4.17	0.20	0.037	0.689	0.030	0.01
51	4.25	0.20	0.037	0.686	0.030	0.01
52	4.33	0.23	0.043	0.683	0.036	0.01
53	4.42	0.23	0.043	0.680	0.036	0.01
54	4.50	0.23	0.043	0.677	0.036	0.01
55	4.58	0.23	0.043	0.674	0.036	0.01
56	4.67	0.23	0.043	0.671	0.036	0.01
57	4.75	0.23	0.043	0.668	0.036	0.01
58	4.83	0.27	0.050	0.665	0.041	0.01
59	4.92	0.27	0.050	0.663	0.041	0.01
60	5.00	0.27	0.050	0.660	0.041	0.01
61	5.08	0.20	0.037	0.657	0.030	0.01
62	5.17	0.20	0.037	0.654	0.030	0.01
63	5.25	0.20	0.037	0.651	0.030	0.01
64	5.33	0.23	0.043	0.648	0.036	0.01
65	5.42	0.23	0.043	0.645	0.036	0.01
66	5.50	0.23	0.043	0.643	0.036	0.01
67	5.58	0.27	0.050	0.640	0.041	0.01
68	5.67	0.27	0.050	0.637	0.041	0.01
69	5.75	0.27	0.050	0.634	0.041	0.01
70	5.83	0.27	0.050	0.631	0.041	0.01
71	5.92	0.27	0.050	0.629	0.041	0.01
72	6.00	0.27	0.050	0.626	0.041	0.01
73	6.08	0.30	0.056	0.623	0.046	0.01
74	6.17	0.30	0.056	0.620	0.046	0.01
75	6.25	0.30	0.056	0.617	0.046	0.01
76	6.33	0.30	0.056	0.615	0.046	0.01
77	6.42	0.30	0.056	0.612	0.046	0.01
78	6.50	0.30	0.056	0.609	0.046	0.01
79	6.58	0.33	0.062	0.607	0.051	0.01
80	6.67	0.33	0.062	0.604	0.051	0.01
81	6.75	0.33	0.062	0.601	0.051	0.01
82	6.83	0.33	0.062	0.598	0.051	0.01
83	6.92	0.33	0.062	0.596	0.051	0.01
84	7.00	0.33	0.062	0.593	0.051	0.01
85	7.08	0.33	0.062	0.590	0.051	0.01
86	7.17	0.33	0.062	0.588	0.051	0.01
87	7.25	0.33	0.062	0.585	0.051	0.01
88	7.33	0.37	0.068	0.582	0.056	0.01
89	7.42	0.37	0.068	0.580	0.056	0.01
90	7.50	0.37	0.068	0.577	0.056	0.01

91	7.58	0.40	0.074	0.574	0.061	0.01
92	7.67	0.40	0.074	0.572	0.061	0.01
93	7.75	0.40	0.074	0.569	0.061	0.01
94	7.83	0.43	0.081	0.566	0.066	0.01
95	7.92	0.43	0.081	0.564	0.066	0.01
96	8.00	0.43	0.081	0.561	0.066	0.01
97	8.08	0.50	0.093	0.558	0.076	0.02
98	8.17	0.50	0.093	0.556	0.076	0.02
99	8.25	0.50	0.093	0.553	0.076	0.02
100	8.33	0.50	0.093	0.551	0.076	0.02
101	8.42	0.50	0.093	0.548	0.076	0.02
102	8.50	0.50	0.093	0.546	0.076	0.02
103	8.58	0.53	0.099	0.543	0.081	0.02
104	8.67	0.53	0.099	0.540	0.081	0.02
105	8.75	0.53	0.099	0.538	0.081	0.02
106	8.83	0.57	0.105	0.535	0.086	0.02
107	8.92	0.57	0.105	0.533	0.086	0.02
108	9.00	0.57	0.105	0.530	0.086	0.02
109	9.08	0.63	0.118	0.528	0.097	0.02
110	9.17	0.63	0.118	0.525	0.097	0.02
111	9.25	0.63	0.118	0.523	0.097	0.02
112	9.33	0.67	0.124	0.520	0.102	0.02
113	9.42	0.67	0.124	0.518	0.102	0.02
114	9.50	0.67	0.124	0.515	0.102	0.02
115	9.58	0.70	0.130	0.513	0.107	0.02
116	9.67	0.70	0.130	0.510	0.107	0.02
117	9.75	0.70	0.130	0.508	0.107	0.02
118	9.83	0.73	0.136	0.506	0.112	0.02
119	9.92	0.73	0.136	0.503	0.112	0.02
120	10.00	0.73	0.136	0.501	0.112	0.02
121	10.08	0.50	0.093	0.498	0.076	0.02
122	10.17	0.50	0.093	0.496	0.076	0.02
123	10.25	0.50	0.093	0.493	0.076	0.02
124	10.33	0.50	0.093	0.491	0.076	0.02
125	10.42	0.50	0.093	0.489	0.076	0.02
126	10.50	0.50	0.093	0.486	0.076	0.02
127	10.58	0.67	0.124	0.484	0.102	0.02
128	10.67	0.67	0.124	0.482	0.102	0.02
129	10.75	0.67	0.124	0.479	0.102	0.02
130	10.83	0.67	0.124	0.477	0.102	0.02
131	10.92	0.67	0.124	0.474	0.102	0.02
132	11.00	0.67	0.124	0.472	0.102	0.02
133	11.08	0.63	0.118	0.470	0.097	0.02
134	11.17	0.63	0.118	0.467	0.097	0.02
135	11.25	0.63	0.118	0.465	0.097	0.02
136	11.33	0.63	0.118	0.463	0.097	0.02
137	11.42	0.63	0.118	0.461	0.097	0.02
138	11.50	0.63	0.118	0.458	0.097	0.02
139	11.58	0.57	0.105	0.456	0.086	0.02
140	11.67	0.57	0.105	0.454	0.086	0.02
141	11.75	0.57	0.105	0.452	0.086	0.02
142	11.83	0.60	0.112	0.449	0.091	0.02
143	11.92	0.60	0.112	0.447	0.091	0.02
144	12.00	0.60	0.112	0.445	0.091	0.02
145	12.08	0.83	0.155	0.443	0.127	0.03
146	12.17	0.83	0.155	0.440	0.127	0.03
147	12.25	0.83	0.155	0.438	0.127	0.03
148	12.33	0.87	0.161	0.436	0.132	0.03
149	12.42	0.87	0.161	0.434	0.132	0.03
150	12.50	0.87	0.161	0.432	0.132	0.03
151	12.58	0.93	0.174	0.429	0.142	0.03
152	12.67	0.93	0.174	0.427	0.142	0.03
153	12.75	0.93	0.174	0.425	0.142	0.03
154	12.83	0.97	0.180	0.423	0.147	0.03
155	12.92	0.97	0.180	0.421	0.147	0.03
156	13.00	0.97	0.180	0.419	0.147	0.03
157	13.08	1.13	0.211	0.417	0.173	0.04

158	13.17	1.13	0.211	0.414	0.173	0.04
159	13.25	1.13	0.211	0.412	0.173	0.04
160	13.33	1.13	0.211	0.410	0.173	0.04
161	13.42	1.13	0.211	0.408	0.173	0.04
162	13.50	1.13	0.211	0.406	0.173	0.04
163	13.58	0.77	0.143	0.404	0.117	0.03
164	13.67	0.77	0.143	0.402	0.117	0.03
165	13.75	0.77	0.143	0.400	0.117	0.03
166	13.83	0.77	0.143	0.398	0.117	0.03
167	13.92	0.77	0.143	0.396	0.117	0.03
168	14.00	0.77	0.143	0.394	0.117	0.03
169	14.08	0.90	0.167	0.392	0.137	0.03
170	14.17	0.90	0.167	0.390	0.137	0.03
171	14.25	0.90	0.167	0.388	0.137	0.03
172	14.33	0.87	0.161	0.386	0.132	0.03
173	14.42	0.87	0.161	0.384	0.132	0.03
174	14.50	0.87	0.161	0.382	0.132	0.03
175	14.58	0.87	0.161	0.380	0.132	0.03
176	14.67	0.87	0.161	0.378	0.132	0.03
177	14.75	0.87	0.161	0.376	0.132	0.03
178	14.83	0.83	0.155	0.374	0.127	0.03
179	14.92	0.83	0.155	0.372	0.127	0.03
180	15.00	0.83	0.155	0.370	0.127	0.03
181	15.08	0.80	0.149	0.368	0.122	0.03
182	15.17	0.80	0.149	0.367	0.122	0.03
183	15.25	0.80	0.149	0.365	0.122	0.03
184	15.33	0.77	0.143	0.363	0.117	0.03
185	15.42	0.77	0.143	0.361	0.117	0.03
186	15.50	0.77	0.143	0.359	0.117	0.03
187	15.58	0.63	0.118	0.357	0.097	0.02
188	15.67	0.63	0.118	0.355	0.097	0.02
189	15.75	0.63	0.118	0.354	0.097	0.02
190	15.83	0.63	0.118	0.352	0.097	0.02
191	15.92	0.63	0.118	0.350	0.097	0.02
192	16.00	0.63	0.118	0.348	0.097	0.02
193	16.08	0.13	0.025	0.346	0.020	0.00
194	16.17	0.13	0.025	0.345	0.020	0.00
195	16.25	0.13	0.025	0.343	0.020	0.00
196	16.33	0.13	0.025	0.341	0.020	0.00
197	16.42	0.13	0.025	0.339	0.020	0.00
198	16.50	0.13	0.025	0.338	0.020	0.00
199	16.58	0.10	0.019	0.336	0.015	0.00
200	16.67	0.10	0.019	0.334	0.015	0.00
201	16.75	0.10	0.019	0.333	0.015	0.00
202	16.83	0.10	0.019	0.331	0.015	0.00
203	16.92	0.10	0.019	0.329	0.015	0.00
204	17.00	0.10	0.019	0.327	0.015	0.00
205	17.08	0.17	0.031	0.326	0.025	0.01
206	17.17	0.17	0.031	0.324	0.025	0.01
207	17.25	0.17	0.031	0.323	0.025	0.01
208	17.33	0.17	0.031	0.321	0.025	0.01
209	17.42	0.17	0.031	0.319	0.025	0.01
210	17.50	0.17	0.031	0.318	0.025	0.01
211	17.58	0.17	0.031	0.316	0.025	0.01
212	17.67	0.17	0.031	0.315	0.025	0.01
213	17.75	0.17	0.031	0.313	0.025	0.01
214	17.83	0.13	0.025	0.311	0.020	0.00
215	17.92	0.13	0.025	0.310	0.020	0.00
216	18.00	0.13	0.025	0.308	0.020	0.00
217	18.08	0.13	0.025	0.307	0.020	0.00
218	18.17	0.13	0.025	0.305	0.020	0.00
219	18.25	0.13	0.025	0.304	0.020	0.00
220	18.33	0.13	0.025	0.302	0.020	0.00
221	18.42	0.13	0.025	0.301	0.020	0.00
222	18.50	0.13	0.025	0.299	0.020	0.00
223	18.58	0.10	0.019	0.298	0.015	0.00
224	18.67	0.10	0.019	0.297	0.015	0.00

225	18.75	0.10	0.019	0.295	0.015	0.00
226	18.83	0.07	0.012	0.294	0.010	0.00
227	18.92	0.07	0.012	0.292	0.010	0.00
228	19.00	0.07	0.012	0.291	0.010	0.00
229	19.08	0.10	0.019	0.290	0.015	0.00
230	19.17	0.10	0.019	0.288	0.015	0.00
231	19.25	0.10	0.019	0.287	0.015	0.00
232	19.33	0.13	0.025	0.286	0.020	0.00
233	19.42	0.13	0.025	0.284	0.020	0.00
234	19.50	0.13	0.025	0.283	0.020	0.00
235	19.58	0.10	0.019	0.282	0.015	0.00
236	19.67	0.10	0.019	0.280	0.015	0.00
237	19.75	0.10	0.019	0.279	0.015	0.00
238	19.83	0.07	0.012	0.278	0.010	0.00
239	19.92	0.07	0.012	0.277	0.010	0.00
240	20.00	0.07	0.012	0.275	0.010	0.00
241	20.08	0.10	0.019	0.274	0.015	0.00
242	20.17	0.10	0.019	0.273	0.015	0.00
243	20.25	0.10	0.019	0.272	0.015	0.00
244	20.33	0.10	0.019	0.271	0.015	0.00
245	20.42	0.10	0.019	0.269	0.015	0.00
246	20.50	0.10	0.019	0.268	0.015	0.00
247	20.58	0.10	0.019	0.267	0.015	0.00
248	20.67	0.10	0.019	0.266	0.015	0.00
249	20.75	0.10	0.019	0.265	0.015	0.00
250	20.83	0.07	0.012	0.264	0.010	0.00
251	20.92	0.07	0.012	0.263	0.010	0.00
252	21.00	0.07	0.012	0.262	0.010	0.00
253	21.08	0.10	0.019	0.261	0.015	0.00
254	21.17	0.10	0.019	0.260	0.015	0.00
255	21.25	0.10	0.019	0.259	0.015	0.00
256	21.33	0.07	0.012	0.258	0.010	0.00
257	21.42	0.07	0.012	0.257	0.010	0.00
258	21.50	0.07	0.012	0.256	0.010	0.00
259	21.58	0.10	0.019	0.255	0.015	0.00
260	21.67	0.10	0.019	0.254	0.015	0.00
261	21.75	0.10	0.019	0.253	0.015	0.00
262	21.83	0.07	0.012	0.252	0.010	0.00
263	21.92	0.07	0.012	0.251	0.010	0.00
264	22.00	0.07	0.012	0.250	0.010	0.00
265	22.08	0.10	0.019	0.249	0.015	0.00
266	22.17	0.10	0.019	0.249	0.015	0.00
267	22.25	0.10	0.019	0.248	0.015	0.00
268	22.33	0.07	0.012	0.247	0.010	0.00
269	22.42	0.07	0.012	0.246	0.010	0.00
270	22.50	0.07	0.012	0.246	0.010	0.00
271	22.58	0.07	0.012	0.245	0.010	0.00
272	22.67	0.07	0.012	0.244	0.010	0.00
273	22.75	0.07	0.012	0.244	0.010	0.00
274	22.83	0.07	0.012	0.243	0.010	0.00
275	22.92	0.07	0.012	0.242	0.010	0.00
276	23.00	0.07	0.012	0.242	0.010	0.00
277	23.08	0.07	0.012	0.241	0.010	0.00
278	23.17	0.07	0.012	0.241	0.010	0.00
279	23.25	0.07	0.012	0.240	0.010	0.00
280	23.33	0.07	0.012	0.240	0.010	0.00
281	23.42	0.07	0.012	0.239	0.010	0.00
282	23.50	0.07	0.012	0.239	0.010	0.00
283	23.58	0.07	0.012	0.238	0.010	0.00
284	23.67	0.07	0.012	0.238	0.010	0.00
285	23.75	0.07	0.012	0.238	0.010	0.00
286	23.83	0.07	0.012	0.237	0.010	0.00
287	23.92	0.07	0.012	0.237	0.010	0.00
288	24.00	0.07	0.012	0.237	0.010	0.00
	Sum =	100.0			Sum =	3.3

Flood volume = Effective rainfall 0.28(In)
times area 238.1(Ac.)/[(In)/(Ft.)] = 5.5(Ac.Ft)

Total soil loss = 1.27(In)
Total soil loss = 25.207(Ac.Ft)
Total rainfall = 1.55(In)
Flood volume = 241028.4 Cubic Feet
Total soil loss = 1098018.3 Cubic Feet

Peak flow rate of this hydrograph = 8.932(CFS)

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24 - 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 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0003	0.04	Q	|	|	|	|
0+10	0.0018	0.21	Q	|	|	|	|
0+15	0.0042	0.36	VQ	|	|	|	|
0+20	0.0073	0.44	VQ	|	|	|	|
0+25	0.0111	0.56	V Q	|	|	|	|
0+30	0.0156	0.65	V Q	|	|	|	|
0+35	0.0204	0.70	V Q	|	|	|	|
0+40	0.0254	0.73	V Q	|	|	|	|
0+45	0.0306	0.75	V Q	|	|	|	|
0+50	0.0360	0.78	V Q	|	|	|	|
0+55	0.0421	0.88	V Q	|	|	|	|
1+ 0	0.0487	0.96	V Q	|	|	|	|
1+ 5	0.0554	0.98	V Q	|	|	|	|
1+10	0.0618	0.92	V Q	|	|	|	|
1+15	0.0677	0.86	V Q	|	|	|	|
1+20	0.0734	0.84	V Q	|	|	|	|
1+25	0.0791	0.83	V Q	|	|	|	|
1+30	0.0848	0.82	V Q	|	|	|	|
1+35	0.0904	0.82	V Q	|	|	|	|
1+40	0.0960	0.81	V Q	|	|	|	|
1+45	0.1016	0.81	V Q	|	|	|	|
1+50	0.1073	0.83	V Q	|	|	|	|
1+55	0.1137	0.92	V Q	|	|	|	|
2+ 0	0.1205	0.99	V Q	|	|	|	|
2+ 5	0.1274	1.01	V Q	|	|	|	|
2+10	0.1345	1.03	V Q	|	|	|	|
2+15	0.1417	1.04	|V Q	|	|	|	|
2+20	0.1489	1.05	|V Q	|	|	|	|
2+25	0.1562	1.05	|V Q	|	|	|	|
2+30	0.1635	1.06	|V Q	|	|	|	|
2+35	0.1709	1.08	|V Q	|	|	|	|
2+40	0.1790	1.17	|V Q	|	|	|	|
2+45	0.1876	1.25	|V Q	|	|	|	|
2+50	0.1964	1.28	|V Q	|	|	|	|
2+55	0.2053	1.30	|V Q	|	|	|	|
3+ 0	0.2143	1.31	|V Q	|	|	|	|
3+ 5	0.2234	1.32	|V Q	|	|	|	|
3+10	0.2325	1.32	|V Q	|	|	|	|
3+15	0.2417	1.33	|V Q	|	|	|	|
3+20	0.2508	1.33	|V Q	|	|	|	|
3+25	0.2600	1.33	|V Q	|	|	|	|
3+30	0.2692	1.34	|V Q	|	|	|	|
3+35	0.2784	1.34	| V Q	|	|	|	|
3+40	0.2876	1.34	| V Q	|	|	|	|
3+45	0.2968	1.34	| V Q	|	|	|	|
3+50	0.3062	1.36	| V Q	|	|	|	|
3+55	0.3162	1.45	| V Q	|	|	|	|
4+ 0	0.3266	1.52	| V Q	|	|	|	|
4+ 5	0.3373	1.55	| V Q	|	|	|	|
4+10	0.3481	1.56	| V Q	|	|	|	|

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4+15       0.3589      1.58   | V   Q   |         |         |         |
4+20       0.3700      1.60   | V   Q   |         |         |         |
4+25       0.3817      1.70   | V   Q   |         |         |         |
4+30       0.3939      1.77   | V    Q  |         |         |         |
4+35       0.4063      1.81   | V    Q  |         |         |         |
4+40       0.4189      1.83   |  V   Q  |         |         |         |
4+45       0.4316      1.84   |  V   Q  |         |         |         |
4+50       0.4445      1.87   |  V   Q  |         |         |         |
4+55       0.4580      1.96   |  V   Q  |         |         |         |
5+ 0       0.4721      2.04   |  V    Q |         |         |         |
5+ 5       0.4861      2.03   |  V    Q |         |         |         |
5+10       0.4990      1.88   |  V   Q  |         |         |         |
5+15       0.5111      1.75   |  V  Q   |         |         |         |
5+20       0.5229      1.72   |  V  Q   |         |         |         |
5+25       0.5352      1.78   |  V   Q  |         |         |         |
5+30       0.5478      1.84   |  V   Q  |         |         |         |
5+35       0.5607      1.87   |   V  Q  |         |         |         |
5+40       0.5743      1.97   |   V  Q  |         |         |         |
5+45       0.5884      2.04   |   V   Q |         |         |         |
5+50       0.6027      2.08   |   V   Q |         |         |         |
5+55       0.6171      2.10   |   V   Q |         |         |         |
6+ 0       0.6316      2.11   |   V   Q |         |         |         |
6+ 5       0.6463      2.14   |   V   Q |         |         |         |
6+10       0.6616      2.23   |   V   Q |         |         |         |
6+15       0.6775      2.31   |   V    Q|         |         |         |
6+20       0.6936      2.34   |    V   Q|         |         |         |
6+25       0.7099      2.36   |    V   Q|         |         |         |
6+30       0.7263      2.38   |    V   Q|         |         |         |
6+35       0.7429      2.41   |    V   Q|         |         |         |
6+40       0.7601      2.50   |    V    Q         |         |         |
6+45       0.7778      2.58   |    V    Q         |         |         |
6+50       0.7958      2.61   |    V    Q         |         |         |
6+55       0.8139      2.63   |    V    Q         |         |         |
7+ 0       0.8321      2.64   |     V   Q         |         |         |
7+ 5       0.8504      2.65   |     V   Q         |         |         |
7+10       0.8687      2.66   |     V   Q         |         |         |
7+15       0.8871      2.67   |     V   Q         |         |         |
7+20       0.9056      2.69   |     V   Q         |         |         |
7+25       0.9248      2.78   |     V   |Q        |         |         |
7+30       0.9444      2.85   |     V   |Q        |         |         |
7+35       0.9644      2.91   |     V   |Q        |         |         |
7+40       0.9852      3.01   |      V  | Q       |         |         |
7+45       1.0065      3.10   |      V  | Q       |         |         |
7+50       1.0282      3.15   |      V  | Q       |         |         |
7+55       1.0507      3.26   |      V  |  Q      |         |         |
8+ 0       1.0737      3.35   |      V  |  Q      |         |         |
8+ 5       1.0974      3.43   |      V  |  Q      |         |         |
8+10       1.1224      3.63   |       V |   Q     |         |         |
8+15       1.1485      3.80   |       V |    Q    |         |         |
8+20       1.1751      3.87   |       V |    Q    |         |         |
8+25       1.2021      3.91   |       V |    Q    |         |         |
8+30       1.2292      3.94   |       V |    Q    |         |         |
8+35       1.2566      3.98   |        V|    Q    |         |         |
8+40       1.2848      4.08   |        V|     Q   |         |         |
8+45       1.3135      4.17   |        V|     Q   |         |         |
8+50       1.3426      4.23   |        V|     Q   |         |         |
8+55       1.3725      4.34   |        V|      Q  |         |         |
9+ 0       1.4030      4.43   |         V      Q  |         |         |
9+ 5       1.4340      4.51   |         V       Q |         |         |
9+10       1.4664      4.71   |         V       Q |         |         |
9+15       1.5000      4.87   |         V        Q|         |         |
9+20       1.5341      4.96   |         |V       Q|         |         |
9+25       1.5692      5.09   |         |V        Q         |         |
9+30       1.6049      5.19   |         |V        Q         |         |
9+35       1.6412      5.26   |         |V        |Q        |         |
9+40       1.6782      5.38   |         | V       |Q        |         |
9+45       1.7159      5.48   |         | V       |Q        |         |
```

9+50	1.7541	5.54
9+55	1.7931	5.66
10+ 0	1.8327	5.75
10+ 5	1.8717	5.65
10+10	1.9066	5.08
10+15	1.9382	4.58
10+20	1.9685	4.40
10+25	1.9980	4.29
10+30	2.0271	4.22
10+35	2.0565	4.27
10+40	2.0886	4.66
10+45	2.1230	5.00
10+50	2.1583	5.12
10+55	2.1940	5.19
11+ 0	2.2300	5.23
11+ 5	2.2661	5.24
11+10	2.3016	5.17
11+15	2.3369	5.12
11+20	2.3720	5.10
11+25	2.4072	5.10
11+30	2.4423	5.10
11+35	2.4771	5.06
11+40	2.5108	4.89
11+45	2.5435	4.74
11+50	2.5758	4.70
11+55	2.6085	4.75
12+ 0	2.6416	4.80
12+ 5	2.6757	4.95
12+10	2.7140	5.56
12+15	2.7558	6.07
12+20	2.7992	6.30
12+25	2.8440	6.50
12+30	2.8898	6.65
12+35	2.9365	6.78
12+40	2.9848	7.01
12+45	3.0344	7.20
12+50	3.0848	7.32
12+55	3.1362	7.46
13+ 0	3.1884	7.58
13+ 5	3.2417	7.74
13+10	3.2984	8.22
13+15	3.3576	8.61
13+20	3.4180	8.77
13+25	3.4791	8.87
13+30	3.5406	8.93
13+35	3.6009	8.75
13+40	3.6549	7.84
13+45	3.7035	7.06
13+50	3.7501	6.76
13+55	3.7955	6.59
14+ 0	3.8401	6.48
14+ 5	3.8848	6.48
14+10	3.9314	6.77
14+15	3.9797	7.01
14+20	4.0284	7.07
14+25	4.0767	7.02
14+30	4.1247	6.97
14+35	4.1726	6.96
14+40	4.2204	6.94
14+45	4.2682	6.95
14+50	4.3160	6.93
14+55	4.3631	6.85
15+ 0	4.4098	6.78
15+ 5	4.4562	6.73
15+10	4.5019	6.64
15+15	4.5470	6.55
15+20	4.5917	6.49

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15+25     4.6357     6.38  |         |         |    Q    |  V      |
15+30     4.6790     6.29  |         |         |    Q    |  V      |
15+35     4.7215     6.17  |         |         |   Q     |   V     |
15+40     4.7614     5.80  |         |         |  Q      |   V     |
15+45     4.7992     5.49  |         |         |Q        |   V     |
15+50     4.8361     5.36  |         |         |Q        |   V     |
15+55     4.8724     5.28  |         |         |Q        |    V    |
16+ 0     4.9084     5.23  |         |         Q         |    V    |
16+ 5     4.9420     4.88  |         |        Q|         |    V    |
16+10     4.9665     3.56  |         |   Q     |         |    V    |
16+15     4.9833     2.44  |        Q|         |         |     V   |
16+20     4.9970     1.99  |      Q  |         |         |     V   |
16+25     5.0089     1.73  |     Q   |         |         |     V   |
16+30     5.0196     1.55  |     Q   |         |         |     V   |
16+35     5.0292     1.40  |    Q    |         |         |     V   |
16+40     5.0376     1.22  |   Q     |         |         |     V   |
16+45     5.0450     1.07  |   Q     |         |         |     V   |
16+50     5.0518     0.99  |  Q      |         |         |     V   |
16+55     5.0582     0.93  |  Q      |         |         |     V   |
17+ 0     5.0644     0.89  |  Q      |         |         |     V   |
17+ 5     5.0706     0.90  |  Q      |         |         |     V   |
17+10     5.0777     1.03  |   Q     |         |         |     V   |
17+15     5.0858     1.18  |   Q     |         |         |     V   |
17+20     5.0942     1.23  |   Q     |         |         |     V   |
17+25     5.1029     1.26  |    Q    |         |         |     V   |
17+30     5.1117     1.28  |    Q    |         |         |     V   |
17+35     5.1207     1.30  |    Q    |         |         |      V  |
17+40     5.1297     1.31  |    Q    |         |         |      V  |
17+45     5.1387     1.31  |    Q    |         |         |      V  |
17+50     5.1477     1.30  |    Q    |         |         |      V  |
17+55     5.1561     1.22  |   Q     |         |         |      V  |
18+ 0     5.1640     1.15  |   Q     |         |         |      V  |
18+ 5     5.1718     1.13  |   Q     |         |         |      V  |
18+10     5.1794     1.11  |   Q     |         |         |      V  |
18+15     5.1870     1.10  |   Q     |         |         |      V  |
18+20     5.1946     1.09  |   Q     |         |         |      V  |
18+25     5.2021     1.09  |   Q     |         |         |      V  |
18+30     5.2095     1.08  |   Q     |         |         |      V  |
18+35     5.2168     1.06  |   Q     |         |         |      V  |
18+40     5.2235     0.97  |  Q      |         |         |      V  |
18+45     5.2297     0.89  |  Q      |         |         |      V  |
18+50     5.2355     0.84  |  Q      |         |         |      V  |
18+55     5.2406     0.74  | Q       |         |         |      V  |
19+ 0     5.2451     0.65  | Q       |         |         |      V  |
19+ 5     5.2495     0.64  | Q       |         |         |      V  |
19+10     5.2543     0.70  | Q       |         |         |      V  |
19+15     5.2595     0.76  |  Q      |         |         |       V |
19+20     5.2650     0.80  |  Q      |         |         |       V |
19+25     5.2711     0.89  |  Q      |         |         |       V |
19+30     5.2778     0.97  |  Q      |         |         |       V |
19+35     5.2845     0.98  |  Q      |         |         |       V |
19+40     5.2908     0.91  |  Q      |         |         |       V |
19+45     5.2967     0.85  |  Q      |         |         |       V |
19+50     5.3023     0.81  |  Q      |         |         |       V |
19+55     5.3072     0.72  | Q       |         |         |       V |
20+ 0     5.3116     0.64  | Q       |         |         |       V |
20+ 5     5.3159     0.63  | Q       |         |         |       V |
20+10     5.3207     0.70  | Q       |         |         |       V |
20+15     5.3259     0.75  |  Q      |         |         |       V |
20+20     5.3312     0.77  |  Q      |         |         |       V |
20+25     5.3366     0.78  |  Q      |         |         |       V |
20+30     5.3421     0.79  |  Q      |         |         |       V |
20+35     5.3475     0.79  |  Q      |         |         |       V |
20+40     5.3530     0.79  |  Q      |         |         |       V |
20+45     5.3585     0.79  |  Q      |         |         |       V |
20+50     5.3638     0.78  |  Q      |         |         |       V |
20+55     5.3686     0.69  | Q       |         |         |       V |
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21+ 0	5.3728	0.62	Q				V
21+ 5	5.3771	0.61	Q				V
21+10	5.3818	0.68	Q				V
21+15	5.3869	0.75	Q				V
21+20	5.3921	0.75	Q				V
21+25	5.3967	0.67	Q				V
21+30	5.4008	0.60	Q				V
21+35	5.4050	0.60	Q				V
21+40	5.4096	0.67	Q				V
21+45	5.4147	0.74	Q				V
21+50	5.4198	0.74	Q				V
21+55	5.4244	0.67	Q				V
22+ 0	5.4285	0.60	Q				V
22+ 5	5.4326	0.60	Q				V
22+10	5.4373	0.67	Q				V
22+15	5.4424	0.74	Q				V
22+20	5.4475	0.74	Q				V
22+25	5.4520	0.67	Q				V
22+30	5.4562	0.60	Q				V
22+35	5.4602	0.58	Q				V
22+40	5.4641	0.57	Q				V
22+45	5.4679	0.56	Q				V
22+50	5.4717	0.55	Q				V
22+55	5.4755	0.55	Q				V
23+ 0	5.4792	0.54	Q				V
23+ 5	5.4830	0.54	Q				V
23+10	5.4867	0.54	Q				V
23+15	5.4904	0.54	Q				V
23+20	5.4941	0.54	Q				V
23+25	5.4978	0.54	Q				V
23+30	5.5015	0.54	Q				V
23+35	5.5052	0.54	Q				V
23+40	5.5089	0.54	Q				V
23+45	5.5126	0.54	Q				V
23+50	5.5162	0.54	Q				V
23+55	5.5199	0.54	Q				V
24+ 0	5.5236	0.54	Q				V
24+ 5	5.5270	0.49	Q				V
24+10	5.5292	0.32	Q				V
24+15	5.5304	0.18	Q				V
24+20	5.5313	0.12	Q				V
24+25	5.5318	0.08	Q				V
24+30	5.5323	0.06	Q				V
24+35	5.5326	0.05	Q				V
24+40	5.5328	0.03	Q				V
24+45	5.5330	0.02	Q				V
24+50	5.5331	0.02	Q				V
24+55	5.5332	0.01	Q				V
25+ 0	5.5332	0.01	Q				V
25+ 5	5.5333	0.00	Q				V

UNIT HYDROGRAPH-EXISTING CONDITION
10 YR-24 HOUR

```
      U n i t   H y d r o g r a p h   A n a l y s i s

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            Study date  11/19/10 File: ae1uh2410.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N   615

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (EXISTING CONDITION)
AREA "A" FOR AREAS "A1" TO "A20"
10 YEAR - 24 HOUR
FN: AE1UH2410
---------------------------------------------------------------------
Drainage Area =      238.10(Ac.)   =       0.372 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      238.10(Ac.)   =       0.372 Sq.
Mi.
Length along longest watercourse =     8300.00(Ft.)
Length along longest watercourse measured to centroid =     4370.00(Ft.)
Length along longest watercourse =        1.572 Mi.
Length along longest watercourse measured to centroid =       0.828 Mi.
Difference in elevation =      323.00(Ft.)
Slope along watercourse =     205.4747 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =     0.145 Hr.
Lag time =      8.68 Min.
25% of lag time =      2.17 Min.
40% of lag time =      3.47 Min.
Unit time =      5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =      0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]       Weighting[1*2]
      238.10                1.55                  369.06

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]       Weighting[1*2]
      238.10                4.80                 1142.88

STORM EVENT (YEAR) =    10.00
Area Averaged 2-Year Rainfall =      1.550(In)
Area Averaged 100-Year Rainfall =      4.800(In)

Point rain (area averaged) =      2.887(In)
Areal adjustment factor =    99.95 %
Adjusted average point rain =     2.886(In)
```

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
238.100	55.00	0.100

Total Area Entered = 238.10(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
55.0	55.0	0.521	0.100	0.474	1.000	0.474
					Sum (F) =	0.474

Area averaged mean soil loss (F) (In/Hr) = 0.474
Minimum soil loss rate ((In/Hr)) = 0.237
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.820

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period	(hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	57.612	7.682	18.434
2	0.167	115.223	32.234	77.348
3	0.250	172.835	27.325	65.569
4	0.333	230.446	10.771	25.846
5	0.417	288.058	6.239	14.972
6	0.500	345.669	4.246	10.189
7	0.583	403.281	3.076	7.382
8	0.667	460.892	2.152	5.163
9	0.750	518.504	1.742	4.181
10	0.833	576.115	1.350	3.239
11	0.917	633.727	1.032	2.476
12	1.000	691.339	0.767	1.841
13	1.083	748.950	0.585	1.405
14	1.167	806.562	0.799	1.916
			Sum = 100.000	Sum= 239.960

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.023	0.840	0.019	0.00
2	0.17	0.07	0.023	0.837	0.019	0.00
3	0.25	0.07	0.023	0.834	0.019	0.00
4	0.33	0.10	0.035	0.831	0.028	0.01
5	0.42	0.10	0.035	0.828	0.028	0.01
6	0.50	0.10	0.035	0.824	0.028	0.01
7	0.58	0.10	0.035	0.821	0.028	0.01
8	0.67	0.10	0.035	0.818	0.028	0.01
9	0.75	0.10	0.035	0.815	0.028	0.01
10	0.83	0.13	0.046	0.811	0.038	0.01
11	0.92	0.13	0.046	0.808	0.038	0.01
12	1.00	0.13	0.046	0.805	0.038	0.01
13	1.08	0.10	0.035	0.802	0.028	0.01
14	1.17	0.10	0.035	0.799	0.028	0.01
15	1.25	0.10	0.035	0.796	0.028	0.01
16	1.33	0.10	0.035	0.792	0.028	0.01
17	1.42	0.10	0.035	0.789	0.028	0.01
18	1.50	0.10	0.035	0.786	0.028	0.01
19	1.58	0.10	0.035	0.783	0.028	0.01
20	1.67	0.10	0.035	0.780	0.028	0.01
21	1.75	0.10	0.035	0.777	0.028	0.01
22	1.83	0.13	0.046	0.774	0.038	0.01
23	1.92	0.13	0.046	0.770	0.038	0.01

24	2.00	0.13	0.046	0.767	0.038	0.01
25	2.08	0.13	0.046	0.764	0.038	0.01
26	2.17	0.13	0.046	0.761	0.038	0.01
27	2.25	0.13	0.046	0.758	0.038	0.01
28	2.33	0.13	0.046	0.755	0.038	0.01
29	2.42	0.13	0.046	0.752	0.038	0.01
30	2.50	0.13	0.046	0.749	0.038	0.01
31	2.58	0.17	0.058	0.746	0.047	0.01
32	2.67	0.17	0.058	0.743	0.047	0.01
33	2.75	0.17	0.058	0.740	0.047	0.01
34	2.83	0.17	0.058	0.737	0.047	0.01
35	2.92	0.17	0.058	0.734	0.047	0.01
36	3.00	0.17	0.058	0.730	0.047	0.01
37	3.08	0.17	0.058	0.727	0.047	0.01
38	3.17	0.17	0.058	0.724	0.047	0.01
39	3.25	0.17	0.058	0.721	0.047	0.01
40	3.33	0.17	0.058	0.718	0.047	0.01
41	3.42	0.17	0.058	0.715	0.047	0.01
42	3.50	0.17	0.058	0.712	0.047	0.01
43	3.58	0.17	0.058	0.709	0.047	0.01
44	3.67	0.17	0.058	0.706	0.047	0.01
45	3.75	0.17	0.058	0.703	0.047	0.01
46	3.83	0.20	0.069	0.701	0.057	0.01
47	3.92	0.20	0.069	0.698	0.057	0.01
48	4.00	0.20	0.069	0.695	0.057	0.01
49	4.08	0.20	0.069	0.692	0.057	0.01
50	4.17	0.20	0.069	0.689	0.057	0.01
51	4.25	0.20	0.069	0.686	0.057	0.01
52	4.33	0.23	0.081	0.683	0.066	0.01
53	4.42	0.23	0.081	0.680	0.066	0.01
54	4.50	0.23	0.081	0.677	0.066	0.01
55	4.58	0.23	0.081	0.674	0.066	0.01
56	4.67	0.23	0.081	0.671	0.066	0.01
57	4.75	0.23	0.081	0.668	0.066	0.01
58	4.83	0.27	0.092	0.665	0.076	0.02
59	4.92	0.27	0.092	0.663	0.076	0.02
60	5.00	0.27	0.092	0.660	0.076	0.02
61	5.08	0.20	0.069	0.657	0.057	0.01
62	5.17	0.20	0.069	0.654	0.057	0.01
63	5.25	0.20	0.069	0.651	0.057	0.01
64	5.33	0.23	0.081	0.648	0.066	0.01
65	5.42	0.23	0.081	0.645	0.066	0.01
66	5.50	0.23	0.081	0.643	0.066	0.01
67	5.58	0.27	0.092	0.640	0.076	0.02
68	5.67	0.27	0.092	0.637	0.076	0.02
69	5.75	0.27	0.092	0.634	0.076	0.02
70	5.83	0.27	0.092	0.631	0.076	0.02
71	5.92	0.27	0.092	0.629	0.076	0.02
72	6.00	0.27	0.092	0.626	0.076	0.02
73	6.08	0.30	0.104	0.623	0.085	0.02
74	6.17	0.30	0.104	0.620	0.085	0.02
75	6.25	0.30	0.104	0.617	0.085	0.02
76	6.33	0.30	0.104	0.615	0.085	0.02
77	6.42	0.30	0.104	0.612	0.085	0.02
78	6.50	0.30	0.104	0.609	0.085	0.02
79	6.58	0.33	0.115	0.607	0.095	0.02
80	6.67	0.33	0.115	0.604	0.095	0.02
81	6.75	0.33	0.115	0.601	0.095	0.02
82	6.83	0.33	0.115	0.598	0.095	0.02
83	6.92	0.33	0.115	0.596	0.095	0.02
84	7.00	0.33	0.115	0.593	0.095	0.02
85	7.08	0.33	0.115	0.590	0.095	0.02
86	7.17	0.33	0.115	0.588	0.095	0.02
87	7.25	0.33	0.115	0.585	0.095	0.02
88	7.33	0.37	0.127	0.582	0.104	0.02
89	7.42	0.37	0.127	0.580	0.104	0.02
90	7.50	0.37	0.127	0.577	0.104	0.02

91	7.58	0.40	0.139	0.574	0.114	0.02
92	7.67	0.40	0.139	0.572	0.114	0.02
93	7.75	0.40	0.139	0.569	0.114	0.02
94	7.83	0.43	0.150	0.566	0.123	0.03
95	7.92	0.43	0.150	0.564	0.123	0.03
96	8.00	0.43	0.150	0.561	0.123	0.03
97	8.08	0.50	0.173	0.558	0.142	0.03
98	8.17	0.50	0.173	0.556	0.142	0.03
99	8.25	0.50	0.173	0.553	0.142	0.03
100	8.33	0.50	0.173	0.551	0.142	0.03
101	8.42	0.50	0.173	0.548	0.142	0.03
102	8.50	0.50	0.173	0.546	0.142	0.03
103	8.58	0.53	0.185	0.543	0.151	0.03
104	8.67	0.53	0.185	0.540	0.151	0.03
105	8.75	0.53	0.185	0.538	0.151	0.03
106	8.83	0.57	0.196	0.535	0.161	0.04
107	8.92	0.57	0.196	0.533	0.161	0.04
108	9.00	0.57	0.196	0.530	0.161	0.04
109	9.08	0.63	0.219	0.528	0.180	0.04
110	9.17	0.63	0.219	0.525	0.180	0.04
111	9.25	0.63	0.219	0.523	0.180	0.04
112	9.33	0.67	0.231	0.520	0.189	0.04
113	9.42	0.67	0.231	0.518	0.189	0.04
114	9.50	0.67	0.231	0.515	0.189	0.04
115	9.58	0.70	0.242	0.513	0.199	0.04
116	9.67	0.70	0.242	0.510	0.199	0.04
117	9.75	0.70	0.242	0.508	0.199	0.04
118	9.83	0.73	0.254	0.506	0.208	0.05
119	9.92	0.73	0.254	0.503	0.208	0.05
120	10.00	0.73	0.254	0.501	0.208	0.05
121	10.08	0.50	0.173	0.498	0.142	0.03
122	10.17	0.50	0.173	0.496	0.142	0.03
123	10.25	0.50	0.173	0.493	0.142	0.03
124	10.33	0.50	0.173	0.491	0.142	0.03
125	10.42	0.50	0.173	0.489	0.142	0.03
126	10.50	0.50	0.173	0.486	0.142	0.03
127	10.58	0.67	0.231	0.484	0.189	0.04
128	10.67	0.67	0.231	0.482	0.189	0.04
129	10.75	0.67	0.231	0.479	0.189	0.04
130	10.83	0.67	0.231	0.477	0.189	0.04
131	10.92	0.67	0.231	0.474	0.189	0.04
132	11.00	0.67	0.231	0.472	0.189	0.04
133	11.08	0.63	0.219	0.470	0.180	0.04
134	11.17	0.63	0.219	0.467	0.180	0.04
135	11.25	0.63	0.219	0.465	0.180	0.04
136	11.33	0.63	0.219	0.463	0.180	0.04
137	11.42	0.63	0.219	0.461	0.180	0.04
138	11.50	0.63	0.219	0.458	0.180	0.04
139	11.58	0.57	0.196	0.456	0.161	0.04
140	11.67	0.57	0.196	0.454	0.161	0.04
141	11.75	0.57	0.196	0.452	0.161	0.04
142	11.83	0.60	0.208	0.449	0.170	0.04
143	11.92	0.60	0.208	0.447	0.170	0.04
144	12.00	0.60	0.208	0.445	0.170	0.04
145	12.08	0.83	0.289	0.443	0.237	0.05
146	12.17	0.83	0.289	0.440	0.237	0.05
147	12.25	0.83	0.289	0.438	0.237	0.05
148	12.33	0.87	0.300	0.436	0.246	0.05
149	12.42	0.87	0.300	0.434	0.246	0.05
150	12.50	0.87	0.300	0.432	0.246	0.05
151	12.58	0.93	0.323	0.429	0.265	0.06
152	12.67	0.93	0.323	0.427	0.265	0.06
153	12.75	0.93	0.323	0.425	0.265	0.06
154	12.83	0.97	0.335	0.423	0.274	0.06
155	12.92	0.97	0.335	0.421	0.274	0.06
156	13.00	0.97	0.335	0.419	0.274	0.06
157	13.08	1.13	0.392	0.417	0.322	0.07

158	13.17	1.13	0.392	0.414	0.322	0.07
159	13.25	1.13	0.392	0.412	0.322	0.07
160	13.33	1.13	0.392	0.410	0.322	0.07
161	13.42	1.13	0.392	0.408	0.322	0.07
162	13.50	1.13	0.392	0.406	0.322	0.07
163	13.58	0.77	0.265	0.404	0.218	0.05
164	13.67	0.77	0.265	0.402	0.218	0.05
165	13.75	0.77	0.265	0.400	0.218	0.05
166	13.83	0.77	0.265	0.398	0.218	0.05
167	13.92	0.77	0.265	0.396	0.218	0.05
168	14.00	0.77	0.265	0.394	0.218	0.05
169	14.08	0.90	0.312	0.392	0.256	0.06
170	14.17	0.90	0.312	0.390	0.256	0.06
171	14.25	0.90	0.312	0.388	0.256	0.06
172	14.33	0.87	0.300	0.386	0.246	0.05
173	14.42	0.87	0.300	0.384	0.246	0.05
174	14.50	0.87	0.300	0.382	0.246	0.05
175	14.58	0.87	0.300	0.380	0.246	0.05
176	14.67	0.87	0.300	0.378	0.246	0.05
177	14.75	0.87	0.300	0.376	0.246	0.05
178	14.83	0.83	0.289	0.374	0.237	0.05
179	14.92	0.83	0.289	0.372	0.237	0.05
180	15.00	0.83	0.289	0.370	0.237	0.05
181	15.08	0.80	0.277	0.368	0.227	0.05
182	15.17	0.80	0.277	0.367	0.227	0.05
183	15.25	0.80	0.277	0.365	0.227	0.05
184	15.33	0.77	0.265	0.363	0.218	0.05
185	15.42	0.77	0.265	0.361	0.218	0.05
186	15.50	0.77	0.265	0.359	0.218	0.05
187	15.58	0.63	0.219	0.357	0.180	0.04
188	15.67	0.63	0.219	0.355	0.180	0.04
189	15.75	0.63	0.219	0.354	0.180	0.04
190	15.83	0.63	0.219	0.352	0.180	0.04
191	15.92	0.63	0.219	0.350	0.180	0.04
192	16.00	0.63	0.219	0.348	0.180	0.04
193	16.08	0.13	0.046	0.346	0.038	0.01
194	16.17	0.13	0.046	0.345	0.038	0.01
195	16.25	0.13	0.046	0.343	0.038	0.01
196	16.33	0.13	0.046	0.341	0.038	0.01
197	16.42	0.13	0.046	0.339	0.038	0.01
198	16.50	0.13	0.046	0.338	0.038	0.01
199	16.58	0.10	0.035	0.336	0.028	0.01
200	16.67	0.10	0.035	0.334	0.028	0.01
201	16.75	0.10	0.035	0.333	0.028	0.01
202	16.83	0.10	0.035	0.331	0.028	0.01
203	16.92	0.10	0.035	0.329	0.028	0.01
204	17.00	0.10	0.035	0.327	0.028	0.01
205	17.08	0.17	0.058	0.326	0.047	0.01
206	17.17	0.17	0.058	0.324	0.047	0.01
207	17.25	0.17	0.058	0.323	0.047	0.01
208	17.33	0.17	0.058	0.321	0.047	0.01
209	17.42	0.17	0.058	0.319	0.047	0.01
210	17.50	0.17	0.058	0.318	0.047	0.01
211	17.58	0.17	0.058	0.316	0.047	0.01
212	17.67	0.17	0.058	0.315	0.047	0.01
213	17.75	0.17	0.058	0.313	0.047	0.01
214	17.83	0.13	0.046	0.311	0.038	0.01
215	17.92	0.13	0.046	0.310	0.038	0.01
216	18.00	0.13	0.046	0.308	0.038	0.01
217	18.08	0.13	0.046	0.307	0.038	0.01
218	18.17	0.13	0.046	0.305	0.038	0.01
219	18.25	0.13	0.046	0.304	0.038	0.01
220	18.33	0.13	0.046	0.302	0.038	0.01
221	18.42	0.13	0.046	0.301	0.038	0.01
222	18.50	0.13	0.046	0.299	0.038	0.01
223	18.58	0.10	0.035	0.298	0.028	0.01
224	18.67	0.10	0.035	0.297	0.028	0.01

225	18.75	0.10	0.035	0.295	0.028	0.01
226	18.83	0.07	0.023	0.294	0.019	0.00
227	18.92	0.07	0.023	0.292	0.019	0.00
228	19.00	0.07	0.023	0.291	0.019	0.00
229	19.08	0.10	0.035	0.290	0.028	0.01
230	19.17	0.10	0.035	0.288	0.028	0.01
231	19.25	0.10	0.035	0.287	0.028	0.01
232	19.33	0.13	0.046	0.286	0.038	0.01
233	19.42	0.13	0.046	0.284	0.038	0.01
234	19.50	0.13	0.046	0.283	0.038	0.01
235	19.58	0.10	0.035	0.282	0.028	0.01
236	19.67	0.10	0.035	0.280	0.028	0.01
237	19.75	0.10	0.035	0.279	0.028	0.01
238	19.83	0.07	0.023	0.278	0.019	0.00
239	19.92	0.07	0.023	0.277	0.019	0.00
240	20.00	0.07	0.023	0.275	0.019	0.00
241	20.08	0.10	0.035	0.274	0.028	0.01
242	20.17	0.10	0.035	0.273	0.028	0.01
243	20.25	0.10	0.035	0.272	0.028	0.01
244	20.33	0.10	0.035	0.271	0.028	0.01
245	20.42	0.10	0.035	0.269	0.028	0.01
246	20.50	0.10	0.035	0.268	0.028	0.01
247	20.58	0.10	0.035	0.267	0.028	0.01
248	20.67	0.10	0.035	0.266	0.028	0.01
249	20.75	0.10	0.035	0.265	0.028	0.01
250	20.83	0.07	0.023	0.264	0.019	0.00
251	20.92	0.07	0.023	0.263	0.019	0.00
252	21.00	0.07	0.023	0.262	0.019	0.00
253	21.08	0.10	0.035	0.261	0.028	0.01
254	21.17	0.10	0.035	0.260	0.028	0.01
255	21.25	0.10	0.035	0.259	0.028	0.01
256	21.33	0.07	0.023	0.258	0.019	0.00
257	21.42	0.07	0.023	0.257	0.019	0.00
258	21.50	0.07	0.023	0.256	0.019	0.00
259	21.58	0.10	0.035	0.255	0.028	0.01
260	21.67	0.10	0.035	0.254	0.028	0.01
261	21.75	0.10	0.035	0.253	0.028	0.01
262	21.83	0.07	0.023	0.252	0.019	0.00
263	21.92	0.07	0.023	0.251	0.019	0.00
264	22.00	0.07	0.023	0.250	0.019	0.00
265	22.08	0.10	0.035	0.249	0.028	0.01
266	22.17	0.10	0.035	0.249	0.028	0.01
267	22.25	0.10	0.035	0.248	0.028	0.01
268	22.33	0.07	0.023	0.247	0.019	0.00
269	22.42	0.07	0.023	0.246	0.019	0.00
270	22.50	0.07	0.023	0.246	0.019	0.00
271	22.58	0.07	0.023	0.245	0.019	0.00
272	22.67	0.07	0.023	0.244	0.019	0.00
273	22.75	0.07	0.023	0.244	0.019	0.00
274	22.83	0.07	0.023	0.243	0.019	0.00
275	22.92	0.07	0.023	0.242	0.019	0.00
276	23.00	0.07	0.023	0.242	0.019	0.00
277	23.08	0.07	0.023	0.241	0.019	0.00
278	23.17	0.07	0.023	0.241	0.019	0.00
279	23.25	0.07	0.023	0.240	0.019	0.00
280	23.33	0.07	0.023	0.240	0.019	0.00
281	23.42	0.07	0.023	0.239	0.019	0.00
282	23.50	0.07	0.023	0.239	0.019	0.00
283	23.58	0.07	0.023	0.238	0.019	0.00
284	23.67	0.07	0.023	0.238	0.019	0.00
285	23.75	0.07	0.023	0.238	0.019	0.00
286	23.83	0.07	0.023	0.237	0.019	0.00
287	23.92	0.07	0.023	0.237	0.019	0.00
288	24.00	0.07	0.023	0.237	0.019	0.00
	Sum =	100.0			Sum =	6.2

Flood volume = Effective rainfall 0.52(In)
times area 238.1(Ac.)/[(In)/(Ft.)] = 10.3(Ac.Ft)

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    Total soil loss =      2.37(In)
    Total soil loss =    46.951(Ac.Ft)
    Total rainfall =      2.89(In)
    Flood volume =      448946.7 Cubic Feet
    Total soil loss =     2045201.6 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =      16.637(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - 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   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0       10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0005      0.08  Q         |         |         |         |
  0+10       0.0033      0.40  Q         |         |         |         |
  0+15       0.0079      0.67  VQ        |         |         |         |
  0+20       0.0135      0.82  VQ        |         |         |         |
  0+25       0.0207      1.04  V Q       |         |         |         |
  0+30       0.0291      1.22  V Q       |         |         |         |
  0+35       0.0380      1.30  V Q       |         |         |         |
  0+40       0.0474      1.36  V Q       |         |         |         |
  0+45       0.0570      1.39  V Q       |         |         |         |
  0+50       0.0670      1.46  V Q       |         |         |         |
  0+55       0.0783      1.64  V  Q      |         |         |         |
  1+ 0       0.0907      1.80  V  Q      |         |         |         |
  1+ 5       0.1033      1.82  V  Q      |         |         |         |
  1+10       0.1150      1.71  V  Q      |         |         |         |
  1+15       0.1260      1.60  V  Q      |         |         |         |
  1+20       0.1368      1.56  V  Q      |         |         |         |
  1+25       0.1474      1.54  V  Q      |         |         |         |
  1+30       0.1579      1.53  V  Q      |         |         |         |
  1+35       0.1684      1.52  V  Q      |         |         |         |
  1+40       0.1789      1.52  V  Q      |         |         |         |
  1+45       0.1893      1.51  V  Q      |         |         |         |
  1+50       0.1999      1.55  V  Q      |         |         |         |
  1+55       0.2117      1.71  V  Q      |         |         |         |
  2+ 0       0.2244      1.84  V  Q      |         |         |         |
  2+ 5       0.2374      1.89  V  Q      |         |         |         |
  2+10       0.2506      1.92  V  Q      |         |         |         |
  2+15       0.2639      1.94  |V Q      |         |         |         |
  2+20       0.2774      1.95  |V Q      |         |         |         |
  2+25       0.2909      1.96  |V Q      |         |         |         |
  2+30       0.3045      1.97  |V Q      |         |         |         |
  2+35       0.3184      2.02  |V  Q     |         |         |         |
  2+40       0.3334      2.18  |V  Q     |         |         |         |
  2+45       0.3494      2.32  |V  Q     |         |         |         |
  2+50       0.3658      2.38  |V  Q     |         |         |         |
  2+55       0.3825      2.42  |V  Q     |         |         |         |
  3+ 0       0.3992      2.44  |V  Q     |         |         |         |
  3+ 5       0.4161      2.45  |V  Q     |         |         |         |
  3+10       0.4331      2.46  |V  Q     |         |         |         |
  3+15       0.4501      2.47  |V  Q     |         |         |         |
  3+20       0.4672      2.48  |V  Q     |         |         |         |
  3+25       0.4843      2.48  |V  Q     |         |         |         |
  3+30       0.5014      2.49  |V  Q     |         |         |         |
  3+35       0.5186      2.49  | V Q     |         |         |         |
  3+40       0.5357      2.49  | V Q     |         |         |         |
  3+45       0.5529      2.49  | V Q     |         |         |         |
  3+50       0.5704      2.53  | V  Q    |         |         |         |
  3+55       0.5889      2.69  | V  Q    |         |         |         |
  4+ 0       0.6084      2.83  | V  Q    |         |         |         |
  4+ 5       0.6282      2.88  | V  Q    |         |         |         |
  4+10       0.6483      2.91  | V  Q    |         |         |         |
```

```
4+15      0.6685     2.94  | V  Q    |         |         |         |
4+20      0.6891     2.99  | V  Q    |         |         |         |
4+25      0.7109     3.16  | V   Q   |         |         |         |
4+30      0.7337     3.31  | V   Q   |         |         |         |
4+35      0.7568     3.37  | V   Q   |         |         |         |
4+40      0.7803     3.40  |  V  Q   |         |         |         |
4+45      0.8039     3.43  |  V  Q   |         |         |         |
4+50      0.8279     3.48  |  V  Q   |         |         |         |
4+55      0.8531     3.66  |  V   Q  |         |         |         |
5+ 0      0.8793     3.80  |  V   Q  |         |         |         |
5+ 5      0.9054     3.79  |  V   Q  |         |         |         |
5+10      0.9295     3.50  |  V   Q  |         |         |         |
5+15      0.9519     3.26  |  V  Q   |         |         |         |
5+20      0.9740     3.20  |  V  Q   |         |         |         |
5+25      0.9968     3.32  |  V  Q   |         |         |         |
5+30      1.0204     3.42  |  V  Q   |         |         |         |
5+35      1.0444     3.49  |   V Q   |         |         |         |
5+40      1.0697     3.66  |   V  Q  |         |         |         |
5+45      1.0959     3.81  |   V  Q  |         |         |         |
5+50      1.1225     3.87  |   V  Q  |         |         |         |
5+55      1.1494     3.90  |   V  Q  |         |         |         |
6+ 0      1.1764     3.92  |   V  Q  |         |         |         |
6+ 5      1.2038     3.98  |   V  Q  |         |         |         |
6+10      1.2324     4.15  |   V   Q |         |         |         |
6+15      1.2620     4.30  |   V   Q |         |         |         |
6+20      1.2920     4.36  |    V  Q |         |         |         |
6+25      1.3223     4.40  |    V  Q |         |         |         |
6+30      1.3528     4.43  |    V  Q |         |         |         |
6+35      1.3837     4.48  |    V  Q |         |         |         |
6+40      1.4157     4.66  |    V   Q|         |         |         |
6+45      1.4488     4.80  |    V   Q|         |         |         |
6+50      1.4823     4.86  |    V   Q|         |         |         |
6+55      1.5160     4.90  |    V   Q|         |         |         |
7+ 0      1.5499     4.92  |     V  Q|         |         |         |
7+ 5      1.5840     4.94  |     V  Q|         |         |         |
7+10      1.6181     4.96  |     V  Q|         |         |         |
7+15      1.6523     4.97  |     V  Q|         |         |         |
7+20      1.6868     5.01  |     V   Q         |         |         |
7+25      1.7225     5.18  |     V   Q         |         |         |
7+30      1.7591     5.32  |     V   Q         |         |         |
7+35      1.7964     5.41  |     V   Q         |         |         |
7+40      1.8350     5.61  |      V  |Q        |         |         |
7+45      1.8747     5.77  |      V  |Q        |         |         |
7+50      1.9151     5.87  |      V  |Q        |         |         |
7+55      1.9570     6.08  |      V  | Q       |         |         |
8+ 0      2.0000     6.24  |      V  | Q       |         |         |
8+ 5      2.0440     6.39  |      V  | Q       |         |         |
8+10      2.0906     6.76  |       V |  Q      |         |         |
8+15      2.1393     7.07  |       V |   Q     |         |         |
8+20      2.1889     7.20  |       V |   Q     |         |         |
8+25      2.2390     7.28  |       V |   Q     |         |         |
8+30      2.2895     7.34  |       V |   Q     |         |         |
8+35      2.3406     7.42  |        V|   Q     |         |         |
8+40      2.3930     7.61  |        V|    Q    |         |         |
8+45      2.4465     7.77  |        V|    Q    |         |         |
8+50      2.5007     7.87  |        V|    Q    |         |         |
8+55      2.5564     8.08  |        V|     Q   |         |         |
9+ 0      2.6132     8.25  |         V     Q   |         |         |
9+ 5      2.6710     8.40  |         V     Q   |         |         |
9+10      2.7314     8.77  |         V      Q  |         |         |
9+15      2.7939     9.07  |         V       Q |         |         |
9+20      2.8575     9.24  |         |V      Q |         |         |
9+25      2.9228     9.48  |         |V      Q |         |         |
9+30      2.9894     9.67  |         |V       Q|         |         |
9+35      3.0569     9.80  |         |V       Q|         |         |
9+40      3.1259    10.02  |         | V       Q         |         |
9+45      3.1962    10.20  |         | V       Q         |         |
```

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 9+50       3.2673     10.33  |         | V       Q         |         |
 9+55       3.3399     10.54  |         | V       |Q        |         |
10+ 0       3.4137     10.72  |         |  V      |Q        |         |
10+ 5       3.4862     10.53  |         |  V      |Q        |         |
10+10       3.5514      9.46  |         |  V    Q |         |         |
10+15       3.6102      8.54  |         |   V  Q  |         |         |
10+20       3.6666      8.19  |         |   V Q   |         |         |
10+25       3.7216      7.99  |         |   VQ    |         |         |
10+30       3.7757      7.85  |         |   VQ    |         |         |
10+35       3.8304      7.95  |         |   VQ    |         |         |
10+40       3.8903      8.69  |         |    V Q  |         |         |
10+45       3.9544      9.31  |         |    V  Q |         |         |
10+50       4.0201      9.54  |         |    V   Q|         |         |
10+55       4.0866      9.66  |         |    V   Q|         |         |
11+ 0       4.1537      9.74  |         |     V  Q|         |         |
11+ 5       4.2208      9.76  |         |     V  Q|         |         |
11+10       4.2871      9.62  |         |     V  Q|         |         |
11+15       4.3527      9.53  |         |     V  Q|         |         |
11+20       4.4182      9.51  |         |      V Q|         |         |
11+25       4.4837      9.50  |         |      V Q|         |         |
11+30       4.5491      9.50  |         |      V Q|         |         |
11+35       4.6140      9.42  |         |      VQ |         |         |
11+40       4.6767      9.11  |         |       Q |         |         |
11+45       4.7375      8.83  |         |      QV |         |         |
11+50       4.7978      8.75  |         |      QV |         |         |
11+55       4.8588      8.85  |         |      QV |         |         |
12+ 0       4.9203      8.94  |         |      Q V|         |         |
12+ 5       4.9838      9.23  |         |       QV|         |         |
12+10       5.0552     10.36  |         |        VQ         |         |
12+15       5.1331     11.31  |         |        V| Q       |         |
12+20       5.2139     11.73  |         |         V  Q      |         |
12+25       5.2973     12.11  |         |         V   Q     |         |
12+30       5.3827     12.40  |         |         V   Q     |         |
12+35       5.4697     12.63  |         |         |V   Q    |         |
12+40       5.5596     13.06  |         |         |V    Q   |         |
12+45       5.6520     13.42  |         |         |V    Q   |         |
12+50       5.7459     13.63  |         |         | V    Q  |         |
12+55       5.8416     13.90  |         |         | V    Q  |         |
13+ 0       5.9389     14.12  |         |         |  V    Q |         |
13+ 5       6.0382     14.42  |         |         |  V    Q |         |
13+10       6.1436     15.31  |         |         |  V      Q         |
13+15       6.2540     16.03  |         |         |   V     | Q       |
13+20       6.3665     16.33  |         |         |   V     | Q       |
13+25       6.4803     16.51  |         |         |    V    |  Q      |
13+30       6.5948     16.64  |         |         |    V    |  Q      |
13+35       6.7071     16.30  |         |         |     V   | Q       |
13+40       6.8077     14.60  |         |         |     V  Q|         |
13+45       6.8983     13.15  |         |         |     Q   |         |
13+50       6.9850     12.60  |         |         |    Q V  |         |
13+55       7.0696     12.28  |         |         |   Q  V  |         |
14+ 0       7.1527     12.07  |         |         |   Q  V  |         |
14+ 5       7.2359     12.07  |         |         |   Q   V |         |
14+10       7.3227     12.61  |         |         |    Q  V |         |
14+15       7.4127     13.06  |         |         |     Q V |         |
14+20       7.5034     13.17  |         |         |     Q  V|         |
14+25       7.5934     13.07  |         |         |     Q  V|         |
14+30       7.6828     12.98  |         |         |    Q   V|         |
14+35       7.7720     12.95  |         |         |    Q    V         |
14+40       7.8610     12.92  |         |         |    Q    V         |
14+45       7.9501     12.94  |         |         |    Q    V         |
14+50       8.0390     12.91  |         |         |    Q    |V        |
14+55       8.1269     12.76  |         |         |    Q    |V        |
15+ 0       8.2139     12.63  |         |         |    Q    |V        |
15+ 5       8.3003     12.54  |         |         |    Q    | V       |
15+10       8.3854     12.36  |         |         |   Q     | V       |
15+15       8.4694     12.20  |         |         |   Q     | V       |
15+20       8.5527     12.09  |         |         |   Q     |  V      |
```

```
15+25       8.6345     11.88   |         |         |  Q      |  V      |
15+30       8.7152     11.72   |         |         |  Q      |  V      |
15+35       8.7943     11.49   |         |         | Q       |   V     |
15+40       8.8687     10.80   |         |         |Q        |   V     |
15+45       8.9390     10.22   |         |         Q         |   V     |
15+50       9.0078      9.98   |         |        Q|         |   V     |
15+55       9.0755      9.83   |         |        Q|         |    V    |
16+ 0       9.1426      9.74   |         |        Q|         |    V    |
16+ 5       9.2052      9.09   |         |       Q |         |    V    |
16+10       9.2508      6.63   |         |  Q      |         |    V    |
16+15       9.2821      4.54   |        Q|         |         |     V   |
16+20       9.3076      3.71   |      Q  |         |         |     V   |
16+25       9.3298      3.22   |     Q   |         |         |     V   |
16+30       9.3497      2.88   |    Q    |         |         |     V   |
16+35       9.3676      2.60   |    Q    |         |         |     V   |
16+40       9.3832      2.27   |   Q     |         |         |     V   |
16+45       9.3970      2.00   |  Q      |         |         |     V   |
16+50       9.4097      1.84   |  Q      |         |         |     V   |
16+55       9.4216      1.74   |  Q      |         |         |     V   |
17+ 0       9.4330      1.66   |  Q      |         |         |     V   |
17+ 5       9.4446      1.67   |  Q      |         |         |     V   |
17+10       9.4578      1.93   |  Q      |         |         |     V   |
17+15       9.4729      2.19   |   Q     |         |         |     V   |
17+20       9.4887      2.29   |   Q     |         |         |     V   |
17+25       9.5049      2.35   |   Q     |         |         |     V   |
17+30       9.5213      2.39   |   Q     |         |         |     V   |
17+35       9.5379      2.41   |   Q     |         |         |      V  |
17+40       9.5547      2.43   |   Q     |         |         |      V  |
17+45       9.5715      2.45   |   Q     |         |         |      V  |
17+50       9.5882      2.42   |   Q     |         |         |      V  |
17+55       9.6039      2.27   |   Q     |         |         |      V  |
18+ 0       9.6187      2.14   |   Q     |         |         |      V  |
18+ 5       9.6331      2.10   |   Q     |         |         |      V  |
18+10       9.6474      2.07   |   Q     |         |         |      V  |
18+15       9.6615      2.05   |   Q     |         |         |      V  |
18+20       9.6755      2.04   |   Q     |         |         |      V  |
18+25       9.6895      2.03   |   Q     |         |         |      V  |
18+30       9.7034      2.02   |   Q     |         |         |      V  |
18+35       9.7170      1.97   |  Q      |         |         |      V  |
18+40       9.7294      1.81   |  Q      |         |         |      V  |
18+45       9.7409      1.67   |  Q      |         |         |      V  |
18+50       9.7517      1.57   |  Q      |         |         |      V  |
18+55       9.7612      1.38   | Q       |         |         |      V  |
19+ 0       9.7696      1.22   | Q       |         |         |      V  |
19+ 5       9.7778      1.19   | Q       |         |         |      V  |
19+10       9.7868      1.31   | Q       |         |         |      V  |
19+15       9.7965      1.41   | Q       |         |         |       V |
19+20       9.8067      1.48   | Q       |         |         |       V |
19+25       9.8182      1.66   |  Q      |         |         |       V |
19+30       9.8306      1.80   |  Q      |         |         |       V |
19+35       9.8431      1.83   |  Q      |         |         |       V |
19+40       9.8548      1.70   |  Q      |         |         |       V |
19+45       9.8658      1.59   |  Q      |         |         |       V |
19+50       9.8762      1.51   |  Q      |         |         |       V |
19+55       9.8854      1.33   | Q       |         |         |       V |
20+ 0       9.8936      1.19   | Q       |         |         |       V |
20+ 5       9.9016      1.17   | Q       |         |         |       V |
20+10       9.9105      1.30   | Q       |         |         |       V |
20+15       9.9202      1.41   | Q       |         |         |       V |
20+20       9.9301      1.44   | Q       |         |         |       V |
20+25       9.9402      1.46   | Q       |         |         |       V |
20+30       9.9503      1.47   | Q       |         |         |       V |
20+35       9.9605      1.47   | Q       |         |         |       V |
20+40       9.9706      1.48   | Q       |         |         |       V |
20+45       9.9808      1.48   | Q       |         |         |       V |
20+50       9.9908      1.45   | Q       |         |         |       V |
20+55       9.9996      1.29   | Q       |         |         |       V |
```

21+ 0	10.0076	1.15	Q				V
21+ 5	10.0155	1.14	Q				V
21+10	10.0242	1.28	Q				V
21+15	10.0338	1.39	Q				V
21+20	10.0434	1.39	Q				V
21+25	10.0520	1.25	Q				V
21+30	10.0598	1.13	Q				V
21+35	10.0675	1.12	Q				V
21+40	10.0761	1.25	Q				V
21+45	10.0856	1.37	Q				V
21+50	10.0951	1.38	Q				V
21+55	10.1036	1.24	Q				V
22+ 0	10.1113	1.12	Q				V
22+ 5	10.1190	1.12	Q				V
22+10	10.1276	1.25	Q				V
22+15	10.1371	1.37	Q				V
22+20	10.1466	1.38	Q				V
22+25	10.1551	1.24	Q				V
22+30	10.1629	1.12	Q				V
22+35	10.1703	1.08	Q				V
22+40	10.1775	1.06	Q				V
22+45	10.1847	1.04	Q				V
22+50	10.1918	1.03	Q				V
22+55	10.1988	1.02	Q				V
23+ 0	10.2058	1.01	Q				V
23+ 5	10.2127	1.01	Q				V
23+10	10.2197	1.01	Q				V
23+15	10.2266	1.00	Q				V
23+20	10.2335	1.00	Q				V
23+25	10.2404	1.00	Q				V
23+30	10.2472	1.00	Q				V
23+35	10.2541	1.00	Q				V
23+40	10.2610	1.00	Q				V
23+45	10.2678	1.00	Q				V
23+50	10.2747	1.00	Q				V
23+55	10.2816	1.00	Q				V
24+ 0	10.2885	1.00	Q				V
24+ 5	10.2948	0.92	Q				V
24+10	10.2989	0.60	Q				V
24+15	10.3012	0.33	Q				V
24+20	10.3027	0.22	Q				V
24+25	10.3038	0.16	Q				V
24+30	10.3046	0.11	Q				V
24+35	10.3051	0.08	Q				V
24+40	10.3056	0.06	Q				V
24+45	10.3059	0.05	Q				V
24+50	10.3061	0.03	Q				V
24+55	10.3062	0.02	Q				V
25+ 0	10.3063	0.01	Q				V
25+ 5	10.3064	0.01	Q				V

UNIT HYDROGRAPH-PROPOSED CONDITION
2 YR-24 HOUR

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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               Study date  11/17/10 File: A1UHMDP242.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N   615

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (PROPOSED CONDITION)
AREA "A" FOR AREAS "A1" TO "A20"
2 YEAR - 24 HOUR
FN: AUHMDP242
--------------------------------------------------------------------
Drainage Area =      238.10(Ac.)  =       0.372 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      238.10(Ac.)  =       0.372 Sq. Mi.
Length along longest watercourse =      8300.00(Ft.)
Length along longest watercourse measured to centroid =     4370.00(Ft.)
Length along longest watercourse =       1.572 Mi.
Length along longest watercourse measured to centroid =       0.828 Mi.
Difference in elevation =      323.00(Ft.)
Slope along watercourse =    205.4747 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =     0.145 Hr.
Lag time =     8.68 Min.
25% of lag time =     2.17 Min.
40% of lag time =     3.47 Min.
Unit time =    10.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =      0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
      238.10              1.55                 369.06

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
      238.10              4.80                1142.88

STORM EVENT (YEAR) =     2.00
Area Averaged 2-Year Rainfall =     1.550(In)
Area Averaged 100-Year Rainfall =     4.800(In)

Point rain (area averaged) =     1.550(In)
Areal adjustment factor =    99.95 %
Adjusted average point rain =     1.549(In)

Sub-Area Data:
Area(Ac.)          Runoff Index   Impervious %
    47.500            32.00          0.500
    11.600            41.10          0.500
    38.800            38.70          0.500
    13.900            53.60          0.500
    27.500            32.00          0.650
    11.500            48.80          0.650
    16.600            51.20          0.650
     8.900            44.00          0.020
    12.500            32.00          0.900
    31.500            34.40          0.900
    17.800            46.40          0.900
 Total Area Entered =     238.10(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%      F
AMC2 AMC-2   (In/Hr)    (Dec.%)      (In/Hr)        (Dec.)    (In/Hr)
32.0  32.0    0.742     0.500         0.408          0.199     0.081
```

41.1	41.1	0.659	0.500	0.363	0.049	0.018
38.7	38.7	0.682	0.500	0.375	0.163	0.061
53.6	53.6	0.535	0.500	0.294	0.058	0.017
32.0	32.0	0.742	0.650	0.308	0.115	0.036
48.8	48.8	0.584	0.650	0.242	0.048	0.012
51.2	51.2	0.560	0.650	0.232	0.070	0.016
44.0	44.0	0.631	0.020	0.619	0.037	0.023
32.0	32.0	0.742	0.900	0.141	0.052	0.007
34.4	34.4	0.720	0.900	0.137	0.132	0.018
46.4	46.4	0.607	0.900	0.115	0.075	0.009
					Sum (F) =	0.298

Area averaged mean soil loss (F) (In/Hr) = 0.298
Minimum soil loss rate ((In/Hr)) = 0.149
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.403

Unit Hydrograph
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.167	115.223	23.799	57.108
2	0.333	230.446	48.827	117.166
3	0.500	345.669	13.748	32.989
4	0.667	460.892	6.275	15.058
5	0.833	576.115	3.493	8.382
6	1.000	691.339	2.090	5.016
7	1.167	806.562	1.767	4.241
			Sum = 100.000	Sum= 239.960

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.17	0.17	0.015	0.527	0.006	0.01
2	0.33	0.17	0.015	0.523	0.006	0.01
3	0.50	0.17	0.015	0.519	0.006	0.01
4	0.67	0.23	0.022	0.515	0.009	0.01
5	0.83	0.23	0.022	0.511	0.009	0.01
6	1.00	0.23	0.022	0.507	0.009	0.01
7	1.17	0.20	0.019	0.503	0.007	0.01
8	1.33	0.20	0.019	0.499	0.007	0.01
9	1.50	0.20	0.019	0.495	0.007	0.01
10	1.67	0.23	0.022	0.491	0.009	0.01
11	1.83	0.23	0.022	0.487	0.009	0.01
12	2.00	0.23	0.022	0.483	0.009	0.01
13	2.17	0.27	0.025	0.480	0.010	0.01
14	2.33	0.27	0.025	0.476	0.010	0.01
15	2.50	0.27	0.025	0.472	0.010	0.01
16	2.67	0.33	0.031	0.468	0.012	0.02
17	2.83	0.33	0.031	0.464	0.012	0.02
18	3.00	0.33	0.031	0.460	0.012	0.02
19	3.17	0.33	0.031	0.456	0.012	0.02
20	3.33	0.33	0.031	0.453	0.012	0.02
21	3.50	0.33	0.031	0.449	0.012	0.02
22	3.67	0.37	0.034	0.445	0.014	0.02
23	3.83	0.37	0.034	0.441	0.014	0.02
24	4.00	0.37	0.034	0.438	0.014	0.02
25	4.17	0.43	0.040	0.434	0.016	0.02
26	4.33	0.43	0.040	0.430	0.016	0.02
27	4.50	0.43	0.040	0.427	0.016	0.02
28	4.67	0.50	0.046	0.423	0.019	0.03
29	4.83	0.50	0.046	0.419	0.019	0.03
30	5.00	0.50	0.046	0.416	0.019	0.03
31	5.17	0.43	0.040	0.412	0.016	0.02
32	5.33	0.43	0.040	0.409	0.016	0.02
33	5.50	0.43	0.040	0.405	0.016	0.02
34	5.67	0.53	0.050	0.401	0.020	0.03
35	5.83	0.53	0.050	0.398	0.020	0.03
36	6.00	0.53	0.050	0.394	0.020	0.03
37	6.17	0.60	0.056	0.391	0.022	0.03
38	6.33	0.60	0.056	0.387	0.022	0.03
39	6.50	0.60	0.056	0.384	0.022	0.03
40	6.67	0.67	0.062	0.381	0.025	0.04
41	6.83	0.67	0.062	0.377	0.025	0.04
42	7.00	0.67	0.062	0.374	0.025	0.04
43	7.17	0.70	0.065	0.370	0.026	0.04
44	7.33	0.70	0.065	0.367	0.026	0.04
45	7.50	0.70	0.065	0.364	0.026	0.04
6	7.67	0.83	0.077	0.360	0.031	0.05
7	7.83	0.83	0.077	0.357	0.031	0.05

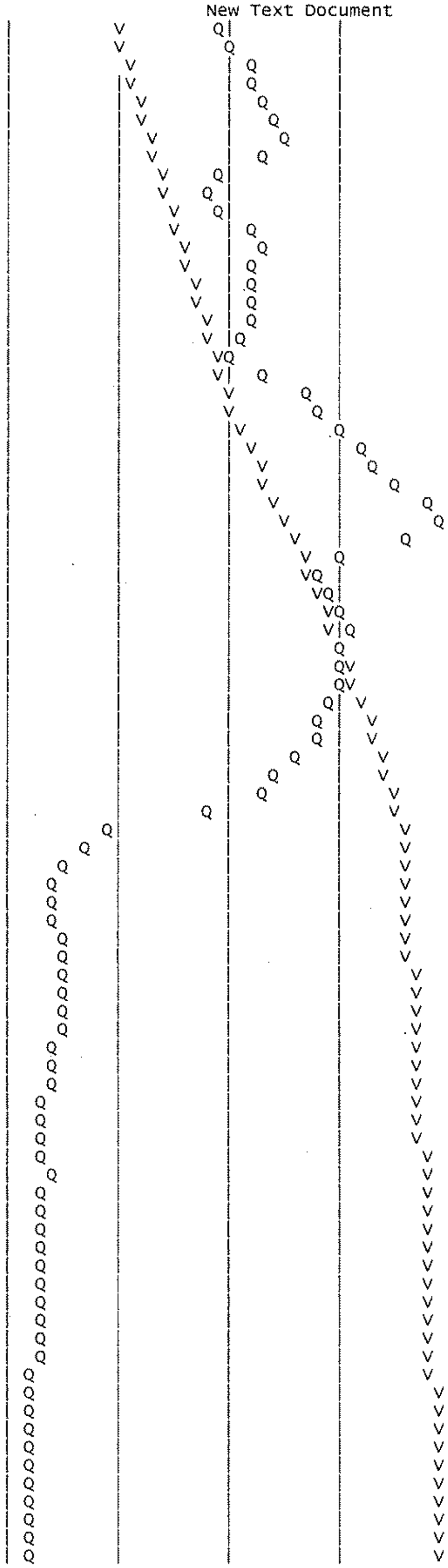
48	8.00	0.83	0.077	0.354	0.031	0.05
49	8.17	1.00	0.093	0.350	0.037	0.06
50	8.33	1.00	0.093	0.347	0.037	0.06
51	8.50	1.00	0.093	0.344	0.037	0.06
52	8.67	1.10	0.102	0.341	0.041	0.06
53	8.83	1.10	0.102	0.337	0.041	0.06
54	9.00	1.10	0.102	0.334	0.041	0.06
55	9.17	1.30	0.121	0.331	0.049	0.07
56	9.33	1.30	0.121	0.328	0.049	0.07
57	9.50	1.30	0.121	0.325	0.049	0.07
58	9.67	1.43	0.133	0.322	0.054	0.08
59	9.83	1.43	0.133	0.319	0.054	0.08
60	10.00	1.43	0.133	0.316	0.054	0.08
61	10.17	1.00	0.093	0.313	0.037	0.06
62	10.33	1.00	0.093	0.310	0.037	0.06
63	10.50	1.00	0.093	0.306	0.037	0.06
64	10.67	1.33	0.124	0.304	0.050	0.07
65	10.83	1.33	0.124	0.301	0.050	0.07
66	11.00	1.33	0.124	0.298	0.050	0.07
67	11.17	1.27	0.118	0.295	0.047	0.07
68	11.33	1.27	0.118	0.292	0.047	0.07
69	11.50	1.27	0.118	0.289	0.047	0.07
70	11.67	1.17	0.108	0.286	0.044	0.06
71	11.83	1.17	0.108	0.283	0.044	0.06
72	12.00	1.17	0.108	0.280	0.044	0.06
73	12.17	1.70	0.158	0.278	0.064	0.09
74	12.33	1.70	0.158	0.275	0.064	0.09
75	12.50	1.70	0.158	0.272	0.064	0.09
76	12.67	1.90	0.177	0.269	0.071	0.11
77	12.83	1.90	0.177	0.267	0.071	0.11
78	13.00	1.90	0.177	0.264	0.071	0.11
79	13.17	2.27	0.211	0.261	0.085	0.13
80	13.33	2.27	0.211	0.259	0.085	0.13
81	13.50	2.27	0.211	0.256	0.085	0.13
82	13.67	1.53	0.143	0.253	0.057	0.09
83	13.83	1.53	0.143	0.251	0.057	0.09
84	14.00	1.53	0.143	0.248	0.057	0.09
85	14.17	1.77	0.164	0.246	0.066	0.10
86	14.33	1.77	0.164	0.243	0.066	0.10
87	14.50	1.77	0.164	0.241	0.066	0.10
88	14.67	1.70	0.158	0.238	0.064	0.09
89	14.83	1.70	0.158	0.236	0.064	0.09
90	15.00	1.70	0.158	0.233	0.064	0.09
91	15.17	1.57	0.146	0.231	0.059	0.09
92	15.33	1.57	0.146	0.229	0.059	0.09
93	15.50	1.57	0.146	0.226	0.059	0.09
94	15.67	1.27	0.118	0.224	0.047	0.07
95	15.83	1.27	0.118	0.222	0.047	0.07
96	16.00	1.27	0.118	0.219	0.047	0.07
97	16.17	0.27	0.025	0.217	0.010	0.01
98	16.33	0.27	0.025	0.215	0.010	0.01
99	16.50	0.27	0.025	0.213	0.010	0.01
100	16.67	0.20	0.019	0.211	0.007	0.01
101	16.83	0.20	0.019	0.209	0.007	0.01
102	17.00	0.20	0.019	0.206	0.007	0.01
103	17.17	0.33	0.031	0.204	0.012	0.02
104	17.33	0.33	0.031	0.202	0.012	0.02
105	17.50	0.33	0.031	0.200	0.012	0.02
106	17.67	0.30	0.028	0.198	0.011	0.02
107	17.83	0.30	0.028	0.196	0.011	0.02
108	18.00	0.30	0.028	0.194	0.011	0.02
109	18.17	0.27	0.025	0.192	0.010	0.01
110	18.33	0.27	0.025	0.191	0.010	0.01
111	18.50	0.27	0.025	0.189	0.010	0.01
112	18.67	0.17	0.015	0.187	0.006	0.01
113	18.83	0.17	0.015	0.185	0.006	0.01
114	19.00	0.17	0.015	0.183	0.006	0.01
115	19.17	0.23	0.022	0.182	0.009	0.01
116	19.33	0.23	0.022	0.180	0.009	0.01
117	19.50	0.23	0.022	0.178	0.009	0.01
118	19.67	0.17	0.015	0.177	0.006	0.01
119	19.83	0.17	0.015	0.175	0.006	0.01
120	20.00	0.17	0.015	0.173	0.006	0.01
121	20.17	0.20	0.019	0.172	0.007	0.01
122	20.33	0.20	0.019	0.170	0.007	0.01
123	20.50	0.20	0.019	0.169	0.007	0.01
124	20.67	0.17	0.015	0.168	0.006	0.01
125	20.83	0.17	0.015	0.166	0.006	0.01
126	21.00	0.17	0.015	0.165	0.006	0.01
127	21.17	0.17	0.015	0.164	0.006	0.01
128	21.33	0.17	0.015	0.162	0.006	0.01
129	21.50	0.17	0.015	0.161	0.006	0.01
130	21.67	0.17	0.015	0.160	0.006	0.01
1	21.83	0.17	0.015	0.159	0.006	0.01
2	22.00	0.17	0.015	0.158	0.006	0.01

133	22.17	0.17	0.015	0.157	0.006	0.01
134	22.33	0.17	0.015	0.156	0.006	0.01
135	22.50	0.17	0.015	0.155	0.006	0.01
136	22.67	0.13	0.012	0.154	0.005	0.01
137	22.83	0.13	0.012	0.153	0.005	0.01
138	23.00	0.13	0.012	0.152	0.005	0.01
139	23.17	0.13	0.012	0.151	0.005	0.01
140	23.33	0.13	0.012	0.151	0.005	0.01
141	23.50	0.13	0.012	0.150	0.005	0.01
142	23.67	0.13	0.012	0.150	0.005	0.01
143	23.83	0.13	0.012	0.149	0.005	0.01
144	24.00	0.13	0.012	0.149	0.005	0.01
Sum =		100.0			Sum =	5.5

```
     Flood volume = Effective rainfall      0.92(In)
      times area     238.1(Ac.)/[(In)/(Ft.)] =      18.3(Ac.Ft)
     Total soil loss =        0.62(In)
     Total soil loss =     12.394(Ac.Ft)
     Total rainfall =        1.55(In)
     Flood volume =        799143.0 Cubic Feet
     Total soil loss =        539903.6 Cubic Feet
     ---------------------------------------------------------------------
      Peak flow rate of this hydrograph =      29.477(CFS)
     ---------------------------------------------------------------------
     +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - 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  10   Minute intervals ((CFS))

     ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft    Q(CFS)  0        7.5       15.0      22.5      30.0
-----------------------------------------------------------------------------
  0+10        0.0073      0.53  Q         |         |         |         |
  0+20        0.0295      1.61  V Q       |         |         |         |
  0+30        0.0559      1.92  V Q       |         |         |         |
  0+40        0.0871      2.27  V  Q      |         |         |         |
  0+50        0.1254      2.78  V  Q      |         |         |         |
  1+ 0        0.1660      2.95  V  Q      |         |         |         |
  1+10        0.2065      2.94  V  Q      |         |         |         |
  1+20        0.2444      2.75  V  Q      |         |         |         |
  1+30        0.2817      2.71  V  Q      |         |         |         |
  1+40        0.3203      2.80  V  Q      |         |         |         |
  1+50        0.3616      3.00  V   Q     |         |         |         |
  2+ 0        0.4037      3.06  V   Q     |         |         |         |
  2+10        0.4475      3.18  V   Q     |         |         |         |
  2+20        0.4945      3.41  |V  Q     |         |         |         |
  2+30        0.5425      3.48  |V  Q     |         |         |         |
  2+40        0.5939      3.73  |V  Q     |         |         |         |
  2+50        0.6515      4.18  |V   Q    |         |         |         |
  3+ 0        0.7108      4.31  |V   Q    |         |         |         |
  3+10        0.7711      4.37  |V   Q    |         |         |         |
  3+20        0.8318      4.41  |V   Q    |         |         |         |
  3+30        0.8927      4.42  |V   Q    |         |         |         |
  3+40        0.9553      4.55  | V   Q   |         |         |         |
  3+50        1.0209      4.76  | V   Q   |         |         |         |
  4+ 0        1.0874      4.82  | V   Q   |         |         |         |
  4+10        1.1571      5.06  | V   Q   |         |         |         |
  4+20        1.2330      5.51  | V    Q  |         |         |         |
  4+30        1.3107      5.64  | V    Q  |         |         |         |
  4+40        1.3922      5.92  |  V   Q  |         |         |         |
  4+50        1.4801      6.38  |  V    Q |         |         |         |
  5+ 0        1.5700      6.52  |  V    Q |         |         |         |
  5+10        1.6579      6.38  |  V    Q |         |         |         |
  5+20        1.7403      5.98  |  V   Q  |         |         |         |
  5+30        1.8212      5.88  |  V   Q  |         |         |         |
  5+40        1.9060      6.15  |   V   Q |         |         |         |
  5+50        1.9993      6.77  |   V    Q|         |         |         |
  6+ 0        2.0949      6.94  |   V    Q|         |         |         |
  6+10        2.1943      7.22  |   V    Q|         |         |         |
  6+20        2.3003      7.70  |    V    Q         |         |         |
  6+30        2.4084      7.85  |    V    Q         |         |         |
  6+40        2.5204      8.14  |    V    Q         |         |         |
  6+50        2.6389      8.60  |    V    |Q        |         |         |
  7+ 0        2.7594      8.74  |     V   |Q        |         |         |
  7+10        2.8822      8.92  |     V   |Q        |         |         |
  7+20        3.0085      9.17  |     V   | Q       |         |         |
  7+30        3.1359      9.25  |     V   | Q       |         |         |
  7+40        3.2697      9.71  |      V  | Q       |         |         |
  7+50        3.4156     10.60  |      V  |   Q     |         |         |
  8+ 0        3.5650     10.85  |      V  |   Q     |         |         |
  8+10        3.7234     11.50  |       V |    Q    |         |         |
  8+20        3.8976     12.64  |       V |     Q   |         |         |
  8+30        4.0764     12.99  |       V |      Q  |         |         |
  8+40        4.2620     13.47  |        V|      Q  |         |         |
  8+50        4.4576     14.20  |        V|       Q |         |         |
```

9+ 0	4.6564	14.43
9+10	4.8655	15.19
9+20	5.0933	16.53
9+30	5.3265	16.93
9+40	5.5681	17.54
9+50	5.8229	18.50
10+ 0	6.0819	18.80
10+10	6.3241	17.59
10+20	6.5284	14.83
10+30	6.7223	14.07
10+40	6.9261	14.80
10+50	7.1571	16.77
11+ 0	7.3947	17.26
11+10	7.6319	17.22
11+20	7.8653	16.94
11+30	8.0983	16.91
11+40	8.3272	16.62
11+50	8.5467	15.94
12+ 0	8.7635	15.74
12+10	9.0021	17.33
12+20	9.2879	20.75
12+30	9.5868	21.70
12+40	9.9002	22.75
12+50	10.2350	24.30
13+ 0	10.5768	24.82
13+10	10.9387	26.27
13+20	11.3347	28.75
13+30	11.7407	29.48
13+40	12.1196	27.51
13+50	12.4352	22.91
14+ 0	12.7336	21.67
14+10	13.0350	21.88
14+20	13.3526	23.06
14+30	13.6732	23.28
14+40	13.9913	23.09
14+50	14.3048	22.77
15+ 0	14.6176	22.71
15+10	14.9246	22.29
15+20	15.2192	21.39
15+30	15.5101	21.12
15+40	15.7863	20.05
15+50	16.0346	18.03
16+ 0	16.2750	17.45
16+10	16.4677	13.99
16+20	16.5690	7.35
16+30	16.6439	5.44
16+40	16.7034	4.32
16+50	16.7505	3.42
17+ 0	16.7921	3.02
17+10	16.8355	3.15
17+20	16.8904	3.99
17+30	16.9485	4.21
17+40	17.0064	4.20
17+50	17.0621	4.05
18+ 0	17.1176	4.02
18+10	17.1716	3.92
18+20	17.2224	3.69
18+30	17.2723	3.62
18+40	17.3173	3.27
18+50	17.3531	2.60
19+ 0	17.3863	2.41
19+10	17.4212	2.53
19+20	17.4613	2.92
19+30	17.5028	3.01
19+40	17.5418	2.83
19+50	17.5752	2.43
20+ 0	17.6073	2.33
20+10	17.6402	2.39
20+20	17.6757	2.58
20+30	17.7118	2.62
20+40	17.7466	2.53
20+50	17.7786	2.32
21+ 0	17.8099	2.27
21+10	17.8409	2.25
21+20	17.8717	2.24
21+30	17.9024	2.23
21+40	17.9330	2.22
21+50	17.9635	2.22
22+ 0	17.9941	2.22
22+10	18.0247	2.22
22+20	18.0553	2.22
22+30	18.0858	2.22
22+40	18.1150	2.11
22+50	18.1411	1.90
23+ 0	18.1664	1.84



23+10	18.1913	1.81	Q				V
23+20	18.2160	1.79	Q				V
23+30	18.2406	1.78	Q				V
23+40	18.2650	1.78	Q				V
23+50	18.2895	1.78	Q				V
24+ 0	18.3140	1.78	Q				V
24+10	18.3326	1.35	Q				V
24+20	18.3393	0.49	Q				V
24+30	18.3426	0.24	Q				V
24+40	18.3444	0.13	Q				V
24+50	18.3454	0.07	Q				V
25+ 0	18.3458	0.03	Q				V

UNIT HYDROGRAPH-PROPOSED CONDITION
10 YR-24 HOUR

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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                Study date  11/17/10 File: A1UHMDP2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N   615

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format


---------------------------------------------------------------------
TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (PROPOSED CONDITION)
AREA "A" FOR AREAS "A1" TO "A20"
10 YEAR - 24 HOUR
FN: AUHMDP2410
--------------------------------------------------------------------
Drainage Area =     238.10(Ac.)  =      0.372 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =    238.10(Ac.)  =      0.372 Sq. Mi.
Length along longest watercourse =    8300.00(Ft.)
Length along longest watercourse measured to centroid =    4370.00(Ft.)
Length along longest watercourse =      1.572 Mi.
Length along longest watercourse measured to centroid =      0.828 Mi.
Difference in elevation =     323.00(Ft.)
Slope along watercourse =    205.4747 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.145 Hr.
Lag time =     8.68 Min.
25% of lag time =     2.17 Min.
40% of lag time =     3.47 Min.
Unit time =    10.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
      238.10             1.55                 369.06

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
      238.10             4.80                1142.88

STORM EVENT (YEAR) =   10.00
Area Averaged 2-Year Rainfall =    1.550(In)
Area Averaged 100-Year Rainfall =    4.800(In)

Point rain (area averaged) =    2.887(In)
Areal adjustment factor =   99.95 %
Adjusted average point rain =    2.886(In)

Sub-Area Data:
Area(Ac.)          Runoff Index   Impervious %
    47.500             32.00         0.500
    11.600             41.10         0.500
    38.800             38.70         0.500
    13.900             53.60         0.500
    27.500             32.00         0.650
    11.500             48.80         0.650
    16.600             51.20         0.650
     8.900             44.00         0.020
    12.500             32.00         0.900
    31.500             34.40         0.900
    17.800             46.40         0.900
 Total Area Entered =    238.10(Ac.)


RI    RI    Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2    (In/Hr)    (Dec.%)     (In/Hr)       (Dec.)    (In/Hr)
32.0  32.0     0.742      0.500       0.408         0.199     0.081
```

41.1	41.1	0.659	0.500	0.363	0.049	0.018
38.7	38.7	0.682	0.500	0.375	0.163	0.061
53.6	53.6	0.535	0.500	0.294	0.058	0.017
32.0	32.0	0.742	0.650	0.308	0.115	0.036
48.8	48.8	0.584	0.650	0.242	0.048	0.012
51.2	51.2	0.560	0.650	0.232	0.070	0.016
44.0	44.0	0.631	0.020	0.619	0.037	0.023
32.0	32.0	0.742	0.900	0.141	0.052	0.007
34.4	34.4	0.720	0.900	0.137	0.132	0.018
46.4	46.4	0.607	0.900	0.115	0.075	0.009
					Sum (F) =	0.298

Area averaged mean soil loss (F) (In/Hr) = 0.298
Minimum soil loss rate ((In/Hr)) = 0.149
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.403

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.167	115.223	23.799	57.108
2	0.333	230.446	48.827	117.166
3	0.500	345.669	13.748	32.989
4	0.667	460.892	6.275	15.058
5	0.833	576.115	3.493	8.382
6	1.000	691.339	2.090	5.016
7	1.167	806.562	1.767	4.241
			Sum = 100.000	Sum= 239.960

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.17	0.17	0.029	0.527	0.012	0.02
2	0.33	0.17	0.029	0.523	0.012	0.02
3	0.50	0.17	0.029	0.519	0.012	0.02
4	0.67	0.23	0.040	0.515	0.016	0.02
5	0.83	0.23	0.040	0.511	0.016	0.02
6	1.00	0.23	0.040	0.507	0.016	0.02
7	1.17	0.20	0.035	0.503	0.014	0.02
8	1.33	0.20	0.035	0.499	0.014	0.02
9	1.50	0.20	0.035	0.495	0.014	0.02
10	1.67	0.23	0.040	0.491	0.016	0.02
11	1.83	0.23	0.040	0.487	0.016	0.02
12	2.00	0.23	0.040	0.483	0.016	0.02
13	2.17	0.27	0.046	0.480	0.019	0.03
14	2.33	0.27	0.046	0.476	0.019	0.03
15	2.50	0.27	0.046	0.472	0.019	0.03
16	2.67	0.33	0.058	0.468	0.023	0.03
17	2.83	0.33	0.058	0.464	0.023	0.03
18	3.00	0.33	0.058	0.460	0.023	0.03
19	3.17	0.33	0.058	0.456	0.023	0.03
20	3.33	0.33	0.058	0.453	0.023	0.03
21	3.50	0.33	0.058	0.449	0.023	0.03
22	3.67	0.37	0.063	0.445	0.026	0.04
23	3.83	0.37	0.063	0.441	0.026	0.04
24	4.00	0.37	0.063	0.438	0.026	0.04
25	4.17	0.43	0.075	0.434	0.030	0.04
26	4.33	0.43	0.075	0.430	0.030	0.04
27	4.50	0.43	0.075	0.427	0.030	0.04
28	4.67	0.50	0.087	0.423	0.035	0.05
29	4.83	0.50	0.087	0.419	0.035	0.05
30	5.00	0.50	0.087	0.416	0.035	0.05
31	5.17	0.43	0.075	0.412	0.030	0.04
32	5.33	0.43	0.075	0.409	0.030	0.04
33	5.50	0.43	0.075	0.405	0.030	0.04
34	5.67	0.53	0.092	0.401	0.037	0.06
35	5.83	0.53	0.092	0.398	0.037	0.06
36	6.00	0.53	0.092	0.394	0.037	0.06
37	6.17	0.60	0.104	0.391	0.042	0.06
38	6.33	0.60	0.104	0.387	0.042	0.06
39	6.50	0.60	0.104	0.384	0.042	0.06
40	6.67	0.67	0.115	0.381	0.047	0.07
41	6.83	0.67	0.115	0.377	0.047	0.07
42	7.00	0.67	0.115	0.374	0.047	0.07
43	7.17	0.70	0.121	0.370	0.049	0.07
44	7.33	0.70	0.121	0.367	0.049	0.07
45	7.50	0.70	0.121	0.364	0.049	0.07
6	7.67	0.83	0.144	0.360	0.058	0.09
7	7.83	0.83	0.144	0.357	0.058	0.09

48	8.00	0.83	0.144	0.354	0.058	0.09
49	8.17	1.00	0.173	0.350	0.070	0.10
0	8.33	1.00	0.173	0.347	0.070	0.10
1	8.50	1.00	0.173	0.344	0.070	0.10
52	8.67	1.10	0.190	0.341	0.077	0.11
53	8.83	1.10	0.190	0.337	0.077	0.11
54	9.00	1.10	0.190	0.334	0.077	0.11
55	9.17	1.30	0.225	0.331	0.091	0.13
56	9.33	1.30	0.225	0.328	0.091	0.13
57	9.50	1.30	0.225	0.325	0.091	0.13
58	9.67	1.43	0.248	0.322	0.100	0.15
59	9.83	1.43	0.248	0.319	0.100	0.15
60	10.00	1.43	0.248	0.316	0.100	0.15
61	10.17	1.00	0.173	0.313	0.070	0.10
62	10.33	1.00	0.173	0.310	0.070	0.10
63	10.50	1.00	0.173	0.306	0.070	0.10
64	10.67	1.33	0.231	0.304	0.093	0.14
65	10.83	1.33	0.231	0.301	0.093	0.14
66	11.00	1.33	0.231	0.298	0.093	0.14
67	11.17	1.27	0.219	0.295	0.088	0.13
68	11.33	1.27	0.219	0.292	0.088	0.13
69	11.50	1.27	0.219	0.289	0.088	0.13
70	11.67	1.17	0.202	0.286	0.081	0.12
71	11.83	1.17	0.202	0.283	0.081	0.12
72	12.00	1.17	0.202	0.280	0.081	0.12
73	12.17	1.70	0.294	0.278	---	0.02
74	12.33	1.70	0.294	0.275	---	0.02
75	12.50	1.70	0.294	0.272	---	0.02
76	12.67	1.90	0.329	0.269	---	0.06
77	12.83	1.90	0.329	0.267	---	0.06
78	13.00	1.90	0.329	0.264	---	0.07
79	13.17	2.27	0.392	0.261	---	0.13
80	13.33	2.27	0.392	0.259	---	0.13
81	13.50	2.27	0.392	0.256	---	0.14
82	13.67	1.53	0.265	0.253	---	0.01
83	13.83	1.53	0.265	0.251	---	0.01
84	14.00	1.53	0.265	0.248	---	0.02
85	14.17	1.77	0.306	0.246	---	0.06
86	14.33	1.77	0.306	0.243	---	0.06
87	14.50	1.77	0.306	0.241	---	0.07
88	14.67	1.70	0.294	0.238	---	0.06
89	14.83	1.70	0.294	0.236	---	0.06
90	15.00	1.70	0.294	0.233	---	0.06
1	15.17	1.57	0.271	0.231	---	0.04
2	15.33	1.57	0.271	0.229	---	0.04
93	15.50	1.57	0.271	0.226	---	0.04
94	15.67	1.27	0.219	0.224	0.088	0.13
95	15.83	1.27	0.219	0.222	0.088	0.13
96	16.00	1.27	0.219	0.219	0.088	0.13
97	16.17	0.27	0.046	0.217	0.019	0.03
98	16.33	0.27	0.046	0.215	0.019	0.03
99	16.50	0.27	0.046	0.213	0.019	0.03
100	16.67	0.20	0.035	0.211	0.014	0.02
101	16.83	0.20	0.035	0.209	0.014	0.02
102	17.00	0.20	0.035	0.206	0.014	0.02
103	17.17	0.33	0.058	0.204	0.023	0.03
104	17.33	0.33	0.058	0.202	0.023	0.03
105	17.50	0.33	0.058	0.200	0.023	0.03
106	17.67	0.30	0.052	0.198	0.021	0.03
107	17.83	0.30	0.052	0.196	0.021	0.03
108	18.00	0.30	0.052	0.194	0.021	0.03
109	18.17	0.27	0.046	0.192	0.019	0.03
110	18.33	0.27	0.046	0.191	0.019	0.03
111	18.50	0.27	0.046	0.189	0.019	0.03
112	18.67	0.17	0.029	0.187	0.012	0.02
113	18.83	0.17	0.029	0.185	0.012	0.02
114	19.00	0.17	0.029	0.183	0.012	0.02
115	19.17	0.23	0.040	0.182	0.016	0.02
116	19.33	0.23	0.040	0.180	0.016	0.02
117	19.50	0.23	0.040	0.178	0.016	0.02
118	19.67	0.17	0.029	0.177	0.012	0.02
119	19.83	0.17	0.029	0.175	0.012	0.02
120	20.00	0.17	0.029	0.173	0.012	0.02
121	20.17	0.20	0.035	0.172	0.014	0.02
122	20.33	0.20	0.035	0.170	0.014	0.02
123	20.50	0.20	0.035	0.169	0.014	0.02
124	20.67	0.17	0.029	0.168	0.012	0.02
125	20.83	0.17	0.029	0.166	0.012	0.02
126	21.00	0.17	0.029	0.165	0.012	0.02
127	21.17	0.17	0.029	0.164	0.012	0.02
128	21.33	0.17	0.029	0.162	0.012	0.02
129	21.50	0.17	0.029	0.161	0.012	0.02
130	21.67	0.17	0.029	0.160	0.012	0.02
1	21.83	0.17	0.029	0.159	0.012	0.02
2	22.00	0.17	0.029	0.158	0.012	0.02

```
133  22.17      0.17       0.029            0.157     0.012          0.02
134  22.33      0.17       0.029            0.156     0.012          0.02
135  22.50      0.17       0.029            0.155     0.012          0.02
136  22.67      0.13       0.023            0.154     0.009          0.01
137  22.83      0.13       0.023            0.153     0.009          0.01
138  23.00      0.13       0.023            0.152     0.009          0.01
139  23.17      0.13       0.023            0.151     0.009          0.01
140  23.33      0.13       0.023            0.151     0.009          0.01
141  23.50      0.13       0.023            0.150     0.009          0.01
142  23.67      0.13       0.023            0.150     0.009          0.01
143  23.83      0.13       0.023            0.149     0.009          0.01
144  24.00      0.13       0.023            0.149     0.009          0.01
    Sum =     100.0                                       Sum =      7.7
       Flood volume = Effective rainfall       1.28(In)
        times area     238.1(Ac.)/[(In)/(Ft.)] =       25.3(Ac.Ft)
       Total soil loss =       1.61(In)
       Total soil loss =    31.923(Ac.Ft)
       Total rainfall =       2.89(In)
       Flood volume =     1103596.0 Cubic Feet
       Total soil loss =     1390552.3 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =       35.020(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - 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  10   Minute intervals ((CFS))

       --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0         10.0       20.0       30.0       40.0
-------------------------------------------------------------------------------
  0+10       0.0136      0.98  Q         |         |         |         |
  0+20       0.0549      3.00  V  Q      |         |         |         |
  0+30       0.1041      3.57  V  Q      |         |         |         |
  0+40       0.1623      4.22  V   Q     |         |         |         |
  0+50       0.2336      5.18  V    Q    |         |         |         |
  1+ 0       0.3092      5.49  V    Q    |         |         |         |
  1+10       0.3846      5.47  V    Q    |         |         |         |
  1+20       0.4551      5.12  V    Q    |         |         |         |
  1+30       0.5246      5.05  V    Q    |         |         |         |
  1+40       0.5965      5.22  V    Q    |         |         |         |
  1+50       0.6736      5.59  |V   Q    |         |         |         |
  2+ 0       0.7520      5.69  |V   Q    |         |         |         |
  2+10       0.8336      5.92  |V   Q    |         |         |         |
  2+20       0.9211      6.36  |V    Q   |         |         |         |
  2+30       1.0105      6.49  |V    Q   |         |         |         |
  2+40       1.1062      6.95  |V    Q   |         |         |         |
  2+50       1.2135      7.78  |V     Q  |         |         |         |
  3+ 0       1.3240      8.03  | V     Q |         |         |         |
  3+10       1.4363      8.15  | V     Q |         |         |         |
  3+20       1.5493      8.21  | V     Q |         |         |         |
  3+30       1.6628      8.24  | V     Q |         |         |         |
  3+40       1.7794      8.47  | V     Q |         |         |         |
  3+50       1.9016      8.87  |  V    Q |         |         |         |
  4+ 0       2.0253      8.98  |  V    Q |         |         |         |
  4+10       2.1552      9.43  |  V     Q|         |         |         |
  4+20       2.2966     10.27  |  V      Q         |         |         |
  4+30       2.4414     10.51  |  V      Q         |         |         |
  4+40       2.5932     11.02  |   V     |Q        |         |         |
  4+50       2.7570     11.89  |   V     |Q        |         |         |
  5+ 0       2.9243     12.15  |   V     | Q       |         |         |
  5+10       3.0881     11.89  |   V     |Q        |         |         |
  5+20       3.2415     11.14  |    V    |Q        |         |         |
  5+30       3.3923     10.95  |    V    Q         |         |         |
  5+40       3.5502     11.46  |    V    |Q        |         |         |
  5+50       3.7239     12.62  |    V    | Q       |         |         |
  6+ 0       3.9019     12.92  |     V   | Q       |         |         |
  6+10       4.0871     13.44  |     V   |  Q      |         |         |
  6+20       4.2846     14.34  |     V   |   Q     |         |         |
  6+30       4.4859     14.62  |      V  |   Q     |         |         |
  6+40       4.6947     15.16  |      V  |    Q    |         |         |
  6+50       4.9154     16.02  |      V  |     Q   |         |         |
  7+ 0       5.1397     16.28  |       V |     Q   |         |         |
  7+10       5.3685     16.61  |       V |     Q   |         |         |
  7+20       5.6037     17.08  |       V |      Q  |         |         |
  7+30       5.8410     17.22  |        V|      Q  |         |         |
  7+40       6.0902     18.09  |        V|       Q |         |         |
  7+50       6.3620     19.74  |         V        Q|         |         |
  8+ 0       6.6404     20.21  |         V         Q         |         |
  8+10       6.9353     21.41  |         V         |Q        |         |
  8+20       7.2597     23.55  |         |V        |  Q      |         |
  8+30       7.5928     24.19  |         |V        |   Q     |         |
  8+40       7.9385     25.09  |         | V       |    Q    |         |
  8+50       8.3028     26.45  |         |  V      |     Q   |         |
```

9+ 0	8.6731	26.88
9+10	9.0627	28.29
9+20	9.4869	30.80
9+30	9.9212	31.53
9+40	10.3713	32.67
9+50	10.8459	34.46
10+ 0	11.3283	35.02
10+10	11.7795	32.76
10+20	12.1600	27.62
10+30	12.5211	26.21
10+40	12.9008	27.57
10+50	13.3310	31.23
11+ 0	13.7737	32.14
11+10	14.2155	32.08
11+20	14.6502	31.56
11+30	15.0841	31.50
11+40	15.5105	30.96
11+50	15.9194	29.69
12+ 0	16.3231	29.31
12+10	16.6426	23.19
12+20	16.7955	11.10
12+30	16.9071	8.10
12+40	17.0317	9.05
12+50	17.2086	12.84
13+ 0	17.4027	14.09
13+10	17.6566	18.43
13+20	18.0259	26.81
13+30	18.4352	29.71
13+40	18.7684	24.19
13+50	18.9126	10.47
14+ 0	19.0120	7.22
14+10	19.1290	8.50
14+20	19.3050	12.78
14+30	19.4989	14.07
14+40	19.6928	14.08
14+50	19.8810	13.66
15+ 0	20.0748	14.07
15+10	20.2584	13.33
15+20	20.4113	11.10
15+30	20.5607	10.85
15+40	20.7783	15.80
15+50	21.1342	25.84
16+ 0	21.5286	28.64
16+10	21.8588	23.97
16+20	22.0324	12.60
16+30	22.1650	9.63
16+40	22.2758	8.05
16+50	22.3636	6.37
17+ 0	22.4411	5.63
17+10	22.5220	5.87
17+20	22.6243	7.43
17+30	22.7324	7.85
17+40	22.8402	7.83
17+50	22.9441	7.54
18+ 0	23.0473	7.50
18+10	23.1480	7.31
18+20	23.2427	6.87
18+30	23.3355	6.74
18+40	23.4194	6.09
18+50	23.4861	4.85
19+ 0	23.5479	4.49
19+10	23.6128	4.71
19+20	23.6876	5.43
19+30	23.7649	5.61
19+40	23.8375	5.27
19+50	23.8998	4.52
20+ 0	23.9595	4.33
20+10	24.0208	4.45
20+20	24.0869	4.80
20+30	24.1541	4.88
20+40	24.2189	4.70
20+50	24.2785	4.33
21+ 0	24.3368	4.23
21+10	24.3946	4.20
21+20	24.4520	4.17
21+30	24.5092	4.15
21+40	24.5661	4.13
21+50	24.6231	4.13
22+ 0	24.6800	4.13
22+10	24.7370	4.13
22+20	24.7939	4.13
22+30	24.8509	4.13
22+40	24.9051	3.94
22+50	24.9538	3.53
23+ 0	25.0009	3.42

```
 23+10      25.0473      3.37   |  Q       |         |         |         V|
 23+20      25.0933      3.34   |  Q       |         |         |         V|
 23+30      25.1391      3.32   |  Q       |         |         |         V|
 23+40      25.1846      3.31   |  Q       |         |         |         V|
 23+50      25.2302      3.31   |  Q       |         |         |         V|
 24+ 0      25.2758      3.31   |  Q       |         |         |         V|
 24+10      25.3105      2.52   | Q        |         |         |         V|
 24+20      25.3230      0.91   Q          |         |         |         V|
 24+30      25.3292      0.45   Q          |         |         |         V|
 24+40      25.3325      0.24   Q          |         |         |         V|
 24+50      25.3343      0.13   Q          |         |         |         V|
 25+ 0      25.3351      0.06   Q          |         |         |         V|
-----------------------------------------------------------------------
```

BASIN B ROUTING
2 YR-24 HOUR

```
                  FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2001
                       Study date: 11/17/10

----------------------------------------------------------------------

ARANTINE HILLS-TRACT MAP 36294
FLOOD HYDROGRAPH ROUTING FOR BASIN B
FOR 2 YR.-24 HR.
FN:BASINB24
----------------------------------------------------------------------
TRI-8 Builders - S/N   615
----------------------------------------------------------------------
******************** HYDROGRAPH INFORMATION ********************

                From study/file name: BUHMDP242.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   292
                Time interval =     5.0 (Min.)
                Maximum/Peak flow rate =         2.473 (CFS)
                Total volume =       1.583 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000      0.000      0.000      0.000      0.000
        Vol (Ac.Ft)      0.000      0.000      0.000      0.000      0.000
***********************************************************************


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** RETARDING BASIN ROUTING ****
_______________________________________________________________________

User entry of depth-outflow-storage data
----------------------------------------------------------------------
Total number of inflow hydrograph intervals = 292
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
----------------------------------------------------------------------
----------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
----------------------------------------------------------------------
----------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)      (Ac.Ft)
----------------------------------------------------------------------
   0.000       0.000      0.000      0.000        0.000
   1.000       0.100      0.330      0.099        0.101
   2.000       0.400      0.550      0.398        0.402
   3.300       0.900      0.840      0.897        0.903
----------------------------------------------------------------------
                Hydrograph Detention Basin Routing
----------------------------------------------------------------------

Graph values: 'I'= unit inflow; 'O'=outflow at time shown
----------------------------------------------------------------------
 Time    Inflow  Outflow     Storage                                  Depth
(Hours)  (CFS)   (CFS)      (Ac.Ft) .0        0.6     1.24     1.85     2.47 (Ft.)
 0.083    0.07    0.00       0.000  O          |        |        |        |    0.00
 0.167    0.15    0.00       0.001  OI         |        |        |        |    0.01
 0.250    0.17    0.01       0.002  O I        |        |        |        |    0.02
 0.333    0.21    0.01       0.003  O I        |        |        |        |    0.03
 0.417    0.25    0.02       0.005  O   I      |        |        |        |    0.05
 0.500    0.26    0.02       0.006  O   I      |        |        |        |    0.06
 0.583    0.26    0.03       0.008  O   I      |        |        |        |    0.08
 0.667    0.27    0.03       0.010  O   I      |        |        |        |    0.10
 0.750    0.27    0.04       0.011  O   I      |        |        |        |    0.11
 0.833    0.30    0.04       0.013  O   I      |        |        |        |    0.13
 0.917    0.34    0.05       0.015  O    I     |        |        |        |    0.15
 1.000    0.35    0.06       0.017  O    I     |        |        |        |    0.17
 1.083    0.32    0.06       0.019  O    I     |        |        |        |    0.19
 1.167    0.28    0.07       0.020  O   I      |        |        |        |    0.20
 1.250    0.27    0.07       0.022  O   I      |        |        |        |    0.22
 1.333    0.27    0.08       0.023  O   I      |        |        |        |    0.23
 1.417    0.27    0.08       0.024 |O   I      |        |        |        |    0.24
 1.500    0.27    0.08       0.026 |O   I      |        |        |        |    0.26
  .583    0.27    0.09       0.027 |O   I      |        |        |        |    0.27
  .667    0.27    0.09       0.028 |O   I      |        |        |        |    0.28
```

```
1.750   0.27   0.10   0.029   |O I    |       |       |       |   0.29
1.833   0.30   0.10   0.031   |O I    |       |       |       |   0.31
 .917   0.34   0.11   0.032   |O  I   |       |       |       |   0.32
 .000   0.35   0.11   0.034   |O  I   |       |       |       |   0.34
2.083   0.35   0.12   0.035   |O  I   |       |       |       |   0.35
2.167   0.36   0.12   0.037   |O  I   |       |       |       |   0.37
2.250   0.36   0.13   0.038   |O  I   |       |       |       |   0.38
2.333   0.36   0.13   0.040   |O  I   |       |       |       |   0.40
2.417   0.36   0.14   0.042   |O  I   |       |       |       |   0.42
2.500   0.36   0.14   0.043   |O  I   |       |       |       |   0.43
2.583   0.39   0.15   0.045   |O   I  |       |       |       |   0.45
2.667   0.43   0.15   0.046   |O   I  |       |       |       |   0.46
2.750   0.44   0.16   0.048   | O  I  |       |       |       |   0.48
2.833   0.44   0.17   0.050   | O  I  |       |       |       |   0.50
2.917   0.44   0.17   0.052   | O  I  |       |       |       |   0.52
3.000   0.44   0.18   0.054   | O  I  |       |       |       |   0.54
3.083   0.44   0.18   0.056   | O  I  |       |       |       |   0.56
3.167   0.44   0.19   0.058   | O  I  |       |       |       |   0.58
3.250   0.44   0.20   0.059   | O  I  |       |       |       |   0.59
3.333   0.44   0.20   0.061   | O  I  |       |       |       |   0.61
3.417   0.44   0.21   0.063   | O  I  |       |       |       |   0.63
3.500   0.44   0.21   0.064   | O  I  |       |       |       |   0.64
3.583   0.44   0.22   0.066   | O  I  |       |       |       |   0.66
3.667   0.44   0.22   0.067   | O  I  |       |       |       |   0.67
3.750   0.44   0.23   0.069   | O  I  |       |       |       |   0.69
3.833   0.48   0.23   0.070   |  O  I |       |       |       |   0.70
3.917   0.52   0.24   0.072   |  O  I |       |       |       |   0.72
4.000   0.53   0.24   0.074   |  O  I |       |       |       |   0.74
4.083   0.53   0.25   0.076   |  O  I |       |       |       |   0.76
4.167   0.53   0.26   0.078   |  O  I |       |       |       |   0.78
4.250   0.53   0.26   0.080   |  O  I |       |       |       |   0.80
4.333   0.57   0.27   0.082   |  O   I|       |       |       |   0.82
4.417   0.61   0.28   0.084   |  O   I|       |       |       |   0.84
4.500   0.62   0.28   0.086   |  O   I|       |       |       |   0.86
4.583   0.62   0.29   0.088   |  O    I       |       |       |   0.88
4.667   0.62   0.30   0.091   |  O    I       |       |       |   0.91
4.750   0.62   0.31   0.093   |  O    I       |       |       |   0.93
4.833   0.65   0.31   0.095   |   O   I       |       |       |   0.95
4.917   0.69   0.32   0.098   |   O   I       |       |       |   0.98
5.000   0.70   0.33   0.100   |   O   |I      |       |       |   1.00
5.083   0.64   0.33   0.103   |   O   I       |       |       |   1.01
5.167   0.56   0.33   0.104   |   O  I|       |       |       |   1.01
 .250   0.55   0.33   0.106   |   O  I|       |       |       |   1.02
 .333   0.57   0.34   0.107   |   O  I|       |       |       |   1.02
 .417   0.61   0.34   0.109   |   O  I|       |       |       |   1.03
5.500   0.62   0.34   0.111   |   O  I|       |       |       |   1.04
5.583   0.65   0.34   0.113   |   O   I       |       |       |   1.04
5.667   0.69   0.34   0.115   |   O   I       |       |       |   1.05
5.750   0.70   0.34   0.118   |   O   |I      |       |       |   1.06
5.833   0.71   0.34   0.120   |   O   |I      |       |       |   1.07
5.917   0.71   0.35   0.123   |   O   |I      |       |       |   1.08
6.000   0.71   0.35   0.125   |   O   |I      |       |       |   1.08
6.083   0.74   0.35   0.128   |   O   |I      |       |       |   1.09
6.167   0.78   0.35   0.131   |   O   | I     |       |       |   1.10
6.250   0.79   0.35   0.134   |   O   | I     |       |       |   1.11
6.333   0.80   0.36   0.137   |   O   | I     |       |       |   1.12
6.417   0.80   0.36   0.140   |   O   | I     |       |       |   1.13
6.500   0.80   0.36   0.143   |   O   | I     |       |       |   1.14
6.583   0.83   0.36   0.146   |   O   | I     |       |       |   1.15
6.667   0.87   0.37   0.149   |   O   |  I    |       |       |   1.16
6.750   0.88   0.37   0.153   |   O   |  I    |       |       |   1.18
6.833   0.89   0.37   0.156   |   O   |  I    |       |       |   1.19
6.917   0.89   0.37   0.160   |   O   |  I    |       |       |   1.20
7.000   0.89   0.38   0.163   |   O   |  I    |       |       |   1.21
7.083   0.89   0.38   0.167   |   O   |  I    |       |       |   1.22
7.167   0.89   0.38   0.170   |   O   |  I    |       |       |   1.23
7.250   0.89   0.38   0.174   |   O   |  I    |       |       |   1.25
7.333   0.92   0.39   0.177   |    O  |  I    |       |       |   1.26
7.417   0.96   0.39   0.181   |    O  |   I   |       |       |   1.27
7.500   0.97   0.39   0.185   |    O  |   I   |       |       |   1.28
7.583   1.01   0.40   0.189   |    O  |    I  |       |       |   1.30
7.667   1.05   0.40   0.194   |    O  |    I  |       |       |   1.31
7.750   1.06   0.40   0.198   |    O  |    I  |       |       |   1.33
7.833   1.10   0.41   0.203   |    O  |     I |       |       |   1.34
7.917   1.14   0.41   0.208   |    O  |     I |       |       |   1.36
8.000   1.15   0.41   0.213   |    O  |     I |       |       |   1.38
8.083   1.22   0.42   0.218   |    O  |      I|       |       |   1.39
8.167   1.30   0.42   0.224   |    O  |       I       |       |   1.41
8.250   1.32   0.43   0.230   |    O  |       |I      |       |   1.43
8.333   1.33   0.43   0.236   |    O  |       |I      |       |   1.45
8.417   1.33   0.43   0.242   |    O  |       |I      |       |   1.47
8.500   1.33   0.44   0.248   |    O  |       |I      |       |   1.49
8.583   1.36   0.44   0.255   |    O  |       |I      |       |   1.52
 .667   1.40   0.45   0.261   |    O  |       | I     |       |   1.54
 .750   1.41   0.45   0.268   |    O  |       | I     |       |   1.56
```

8.833	1.45	0.46	0.274	1.58
8.917	1.49	0.46	0.281	1.60
9.000	1.50	0.47	0.289	1.63
9.083	1.57	0.47	0.296	1.65
9.167	1.66	0.48	0.304	1.68
9.250	1.67	0.49	0.312	1.71
9.333	1.71	0.49	0.320	1.73
9.417	1.76	0.50	0.329	1.76
9.500	1.77	0.50	0.337	1.79
9.583	1.81	0.51	0.346	1.82
9.667	1.85	0.52	0.355	1.85
9.750	1.86	0.52	0.364	1.88
9.833	1.89	0.53	0.374	1.91
9.917	1.94	0.54	0.383	1.94
10.000	1.95	0.54	0.393	1.98
10.083	1.72	0.55	0.402	2.00
10.167	1.44	0.56	0.409	2.02
10.250	1.38	0.56	0.415	2.04
10.333	1.35	0.56	0.420	2.05
10.417	1.33	0.56	0.426	2.07
10.500	1.33	0.57	0.431	2.08
10.583	1.49	0.57	0.437	2.10
10.667	1.70	0.58	0.444	2.11
10.750	1.74	0.58	0.452	2.13
10.833	1.76	0.58	0.460	2.15
10.917	1.78	0.59	0.468	2.18
11.000	1.78	0.59	0.476	2.20
11.083	1.74	0.60	0.484	2.22
11.167	1.70	0.60	0.492	2.24
11.250	1.69	0.61	0.499	2.26
11.333	1.69	0.61	0.507	2.28
11.417	1.69	0.62	0.514	2.30
11.500	1.69	0.62	0.521	2.32
11.583	1.62	0.62	0.528	2.33
11.667	1.54	0.63	0.535	2.35
11.750	1.52	0.63	0.541	2.37
11.833	1.55	0.64	0.547	2.38
11.917	1.58	0.64	0.554	2.40
12.000	1.59	0.64	0.560	2.42
12.083	1.82	0.65	0.568	2.44
12.167	2.11	0.65	0.577	2.46
12.250	2.18	0.66	0.587	2.49
2.333	2.24	0.66	0.598	2.51
.417	2.29	0.67	0.609	2.54
2.500	2.30	0.68	0.620	2.57
12.583	2.37	0.68	0.631	2.60
12.667	2.45	0.69	0.643	2.63
12.750	2.47	0.70	0.655	2.66
12.833	1.58	0.70	0.664	2.69
12.917	0.48	0.70	0.667	2.69
13.000	0.24	0.70	0.664	2.69
13.083	0.42	0.70	0.662	2.68
13.167	0.70	0.70	0.661	2.68
13.250	0.80	0.70	0.661	2.68
13.333	0.85	0.70	0.662	2.68
13.417	0.89	0.70	0.663	2.68
13.500	0.91	0.70	0.664	2.69
13.583	1.33	0.70	0.667	2.69
13.667	1.85	0.71	0.673	2.71
13.750	1.96	0.71	0.681	2.73
13.833	2.01	0.72	0.690	2.75
13.917	2.04	0.72	0.699	2.78
14.000	2.04	0.73	0.708	2.80
14.083	1.31	0.73	0.715	2.82
14.167	0.41	0.73	0.716	2.82
14.250	0.22	0.73	0.713	2.81
14.333	0.96	0.73	0.712	2.81
14.417	1.92	0.73	0.717	2.82
14.500	1.31	0.74	0.723	2.84
14.583	0.36	0.74	0.723	2.84
14.667	0.20	0.74	0.720	2.83
14.750	0.12	0.73	0.716	2.82
14.833	0.86	0.73	0.715	2.82
14.917	1.84	0.73	0.719	2.83
15.000	2.07	0.74	0.727	2.85
15.083	2.13	0.75	0.737	2.88
15.167	2.15	0.75	0.746	2.90
15.250	2.14	0.76	0.756	2.92
15.333	2.10	0.76	0.765	2.95
15.417	2.06	0.77	0.774	2.97
15.500	2.05	0.77	0.783	3.00
15.583	1.91	0.78	0.791	3.02
15.667	1.75	0.78	0.799	3.04
.750	1.71	0.78	0.805	3.05
.833	1.70	0.79	0.811	3.07

```
15.917    1.69    0.79      0.818   |       | O     |    I  |       |     3.09
16.000    1.69    0.80      0.824   |       | O     |    I  |       |     3.10
16.083    1.20    0.80      0.828   |       | O    I|       |       |     3.11
16.167    0.59    0.80      0.829   |      I| O     |       |       |     3.11
16.250    0.45    0.80      0.827   |    I  | O     |       |       |     3.11
16.333    0.39    0.80      0.824   |    I  | O     |       |       |     3.10
16.417    0.36    0.79      0.821   |   I   | O     |       |       |     3.10
16.500    0.36    0.79      0.818   |   I   | O     |       |       |     3.09
16.583    0.32    0.79      0.815   |   I   | O     |       |       |     3.08
16.667    0.28    0.79      0.812   |  I    | O     |       |       |     3.07
16.750    0.27    0.79      0.808   |  I    | O     |       |       |     3.06
16.833    0.27    0.78      0.805   |  I    | O     |       |       |     3.05
16.917    0.27    0.78      0.801   |  I    | O     |       |       |     3.04
17.000    0.27    0.78      0.798   |  I    | O     |       |       |     3.03
17.083    0.33    0.78      0.794   |   I   | O     |       |       |     3.03
17.167    0.41    0.78      0.792   |    I  | O     |       |       |     3.02
17.250    0.43    0.78      0.789   |    I  | O     |       |       |     3.01
17.333    0.44    0.77      0.787   |    I  | O     |       |       |     3.01
17.417    0.44    0.77      0.785   |    I  | O     |       |       |     3.00
17.500    0.44    0.77      0.782   |    I  |O      |       |       |     2.99
17.583    0.44    0.77      0.780   |    I  |O      |       |       |     2.99
17.667    0.44    0.77      0.778   |    I  |O      |       |       |     2.98
17.750    0.44    0.77      0.776   |    I  |O      |       |       |     2.98
17.833    0.41    0.77      0.773   |    I  |O      |       |       |     2.97
17.917    0.37    0.76      0.771   |   I   |O      |       |       |     2.96
18.000    0.36    0.76      0.768   |   I   |O      |       |       |     2.96
18.083    0.36    0.76      0.765   |   I   |O      |       |       |     2.95
18.167    0.36    0.76      0.762   |   I   |O      |       |       |     2.94
18.250    0.36    0.76      0.760   |   I   |O      |       |       |     2.93
18.333    0.36    0.76      0.757   |   I   |O      |       |       |     2.93
18.417    0.36    0.76      0.754   |   I   |O      |       |       |     2.92
18.500    0.36    0.75      0.751   |   I   |O      |       |       |     2.91
18.583    0.32    0.75      0.748   |   I   |O      |       |       |     2.91
18.667    0.28    0.75      0.745   |  I    |O      |       |       |     2.90
18.750    0.27    0.75      0.742   |  I    |O      |       |       |     2.89
18.833    0.24    0.75      0.739   |  I    |O      |       |       |     2.88
18.917    0.19    0.74      0.735   | I     |O      |       |       |     2.87
19.000    0.18    0.74      0.731   | I     |O      |       |       |     2.86
19.083    0.21    0.74      0.727   | I     |O      |       |       |     2.85
19.167    0.25    0.74      0.724   |  I    |O      |       |       |     2.84
19.250    0.26    0.74      0.721   |  I    |O      |       |       |     2.83
19.333    0.30    0.73      0.717   |  I    |O      |       |       |     2.83
19.417    0.34    0.73      0.715   |   I   |O      |       |       |     2.82
19.500    0.35    0.73      0.712   |   I   |O      |       |       |     2.81
19.583    0.32    0.73      0.709   |   I   |O      |       |       |     2.80
19.667    0.28    0.73      0.706   |  I    |O      |       |       |     2.80
19.750    0.27    0.73      0.703   |  I    |O      |       |       |     2.79
19.833    0.24    0.72      0.700   |  I    |O      |       |       |     2.78
19.917    0.19    0.72      0.696   | I     |O      |       |       |     2.77
20.000    0.18    0.72      0.693   | I     |O      |       |       |     2.76
20.083    0.21    0.72      0.689   | I     |O      |       |       |     2.75
20.167    0.25    0.72      0.686   |  I    |O      |       |       |     2.74
20.250    0.26    0.71      0.683   |  I    |O      |       |       |     2.73
20.333    0.26    0.71      0.680   |  I    |O      |       |       |     2.73
20.417    0.27    0.71      0.676   |  I    |O      |       |       |     2.72
20.500    0.27    0.71      0.673   |  I    |O      |       |       |     2.71
20.583    0.27    0.71      0.670   |  I    |O      |       |       |     2.70
20.667    0.27    0.71      0.667   |  I    |O      |       |       |     2.70
20.750    0.27    0.70      0.664   |  I    |O      |       |       |     2.69
20.833    0.23    0.70      0.661   |  I    |O      |       |       |     2.68
20.917    0.19    0.70      0.658   | I     |O      |       |       |     2.67
21.000    0.18    0.70      0.654   | I     |O      |       |       |     2.66
21.083    0.21    0.70      0.651   | I     |O      |       |       |     2.65
21.167    0.25    0.69      0.648   |  I    O       |       |       |     2.64
21.250    0.26    0.69      0.645   |  I    O       |       |       |     2.64
21.333    0.23    0.69      0.642   | I     O       |       |       |     2.63
21.417    0.19    0.69      0.638   | I     O       |       |       |     2.62
21.500    0.18    0.69      0.635   | I     O       |       |       |     2.61
21.583    0.21    0.68      0.632   | I     O       |       |       |     2.60
21.667    0.25    0.68      0.628   |  I    O       |       |       |     2.59
21.750    0.26    0.68      0.626   |  I    O       |       |       |     2.59
21.833    0.23    0.68      0.623   | I     O       |       |       |     2.58
21.917    0.19    0.68      0.619   | I     O       |       |       |     2.57
22.000    0.18    0.68      0.616   | I     O       |       |       |     2.56
22.083    0.21    0.67      0.613   | I     O       |       |       |     2.55
22.167    0.25    0.67      0.610   |  I    O       |       |       |     2.55
22.250    0.26    0.67      0.607   |  I    O       |       |       |     2.54
22.333    0.23    0.67      0.604   | I     O       |       |       |     2.53
22.417    0.19    0.67      0.601   | I     O       |       |       |     2.52
22.500    0.18    0.66      0.597   | I     O       |       |       |     2.51
22.583    0.18    0.66      0.594   | I     O       |       |       |     2.50
22.667    0.18    0.66      0.591   | I     O       |       |       |     2.50
22.750    0.18    0.66      0.588   | I     O       |       |       |     2.49
  .833    0.18    0.66      0.584   | I     O       |       |       |     2.48
  .917    0.18    0.65      0.581   | I     O       |       |       |     2.47
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23.000   0.18   0.65   0.578  | I      O       |    |    |      2.46
23.083   0.18   0.65   0.574  | I      O       |    |    |      2.45
23.167   0.18   0.65   0.571  | I      O       |    |    |      2.44
23.250   0.18   0.65   0.568  | I      O       |    |    |      2.44
23.333   0.18   0.65   0.565  | I      O       |    |    |      2.43
23.417   0.18   0.64   0.561  | I      O       |    |    |      2.42
23.500   0.18   0.64   0.558  | I      O       |    |    |      2.41
23.583   0.18   0.64   0.555  | I      O       |    |    |      2.40
23.667   0.18   0.64   0.552  | I      O       |    |    |      2.39
23.750   0.18   0.64   0.549  | I      O       |    |    |      2.39
23.833   0.18   0.63   0.546  | I      O       |    |    |      2.38
23.917   0.18   0.63   0.542  | I      O       |    |    |      2.37
24.000   0.18   0.63   0.539  | I      O       |    |    |      2.36
24.083   0.11   0.63   0.536  |I       O       |    |    |      2.35
24.167   0.03   0.63   0.532  I        O       |    |    |      2.34
24.250   0.01   0.62   0.528  I        O       |    |    |      2.33
24.333   0.00   0.62   0.524  I        O       |    |    |      2.32
24.417   0.00   0.62   0.519  I        O       |    |    |      2.31
24.500   0.00   0.62   0.515  I       O|       |    |    |      2.30
24.583   0.00   0.61   0.511  I       O|       |    |    |      2.29
24.667   0.00   0.61   0.507  I       O|       |    |    |      2.28
24.750   0.00   0.61   0.503  I       O|       |    |    |      2.27
24.833   0.00   0.61   0.498  I       O|       |    |    |      2.26
24.917   0.00   0.60   0.494  I       O|       |    |    |      2.24
25.000   0.00   0.60   0.490  I       O|       |    |    |      2.23
25.083   0.00   0.60   0.486  I       O|       |    |    |      2.22
25.167   0.00   0.60   0.482  I       O|       |    |    |      2.21
25.250   0.00   0.60   0.478  I       O|       |    |    |      2.20
25.333   0.00   0.59   0.474  I       O|       |    |    |      2.19
25.417   0.00   0.59   0.469  I       O|       |    |    |      2.18
25.500   0.00   0.59   0.465  I       O|       |    |    |      2.17
25.583   0.00   0.59   0.461  I       O|       |    |    |      2.16
25.667   0.00   0.58   0.457  I       O|       |    |    |      2.15
25.750   0.00   0.58   0.453  I       O|       |    |    |      2.14
25.833   0.00   0.58   0.449  I       O|       |    |    |      2.13
25.917   0.00   0.58   0.445  I       O|       |    |    |      2.12
26.000   0.00   0.57   0.441  I       O|       |    |    |      2.11
26.083   0.00   0.57   0.437  I       O|       |    |    |      2.10
26.167   0.00   0.57   0.434  I       O|       |    |    |      2.09
26.250   0.00   0.57   0.430  I       O|       |    |    |      2.08
26.333   0.00   0.56   0.426  I       O|       |    |    |      2.07
26.417   0.00   0.56   0.422  I       O|       |    |    |      2.06
26.500   0.00   0.56   0.418  I       O|       |    |    |      2.05
26.583   0.00   0.56   0.414  I       O|       |    |    |      2.04
26.667   0.00   0.56   0.410  I       O|       |    |    |      2.03
26.750   0.00   0.55   0.406  I       O|       |    |    |      2.02
26.833   0.00   0.55   0.403  I       O|       |    |    |      2.01
26.917   0.00   0.55   0.399  I       O|       |    |    |      2.00
27.000   0.00   0.55   0.395  I       O|       |    |    |      1.98
27.083   0.00   0.54   0.391  I       O|       |    |    |      1.97
27.167   0.00   0.54   0.388  I      O |       |    |    |      1.96
27.250   0.00   0.54   0.384  I      O |       |    |    |      1.95
27.333   0.00   0.54   0.380  I      O |       |    |    |      1.93
27.417   0.00   0.53   0.377  I      O |       |    |    |      1.92
27.500   0.00   0.53   0.373  I      O |       |    |    |      1.91
27.583   0.00   0.53   0.369  I      O |       |    |    |      1.90
27.667   0.00   0.52   0.366  I      O |       |    |    |      1.89
27.750   0.00   0.52   0.362  I      O |       |    |    |      1.87
27.833   0.00   0.52   0.358  I      O |       |    |    |      1.86
27.917   0.00   0.52   0.355  I      O |       |    |    |      1.85
28.000   0.00   0.51   0.351  I      O |       |    |    |      1.84
28.083   0.00   0.51   0.348  I      O |       |    |    |      1.83
28.167   0.00   0.51   0.344  I      O |       |    |    |      1.81
28.250   0.00   0.51   0.341  I      O |       |    |    |      1.80
28.333   0.00   0.50   0.337  I      O |       |    |    |      1.79
28.417   0.00   0.50   0.334  I      O |       |    |    |      1.78
28.500   0.00   0.50   0.330  I      O |       |    |    |      1.77
28.583   0.00   0.50   0.327  I      O |       |    |    |      1.76
28.667   0.00   0.49   0.323  I      O |       |    |    |      1.74
28.750   0.00   0.49   0.320  I      O |       |    |    |      1.73
28.833   0.00   0.49   0.317  I      O |       |    |    |      1.72
28.917   0.00   0.49   0.313  I      O |       |    |    |      1.71
29.000   0.00   0.48   0.310  I      O |       |    |    |      1.70
29.083   0.00   0.48   0.307  I      O |       |    |    |      1.69
29.167   0.00   0.48   0.303  I      O |       |    |    |      1.68
29.250   0.00   0.48   0.300  I      O |       |    |    |      1.67
29.333   0.00   0.47   0.297  I      O |       |    |    |      1.66
29.417   0.00   0.47   0.294  I      O |       |    |    |      1.65
29.500   0.00   0.47   0.290  I      O |       |    |    |      1.63
29.583   0.00   0.47   0.287  I      O |       |    |    |      1.62
29.667   0.00   0.46   0.284  I      O |       |    |    |      1.61
29.750   0.00   0.46   0.281  I     O  |       |    |    |      1.60
29.833   0.00   0.46   0.278  I     O  |       |    |    |      1.59
29.917   0.00   0.46   0.274  I     O  |       |    |    |      1.58
30.000   0.00   0.46   0.271  I     O  |       |    |    |      1.57
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30.083	0.00	0.45	0.268	I O	1.56
30.167	0.00	0.45	0.265	I O	1.55
0.250	0.00	0.45	0.262	I O	1.54
0.333	0.00	0.45	0.259	I O	1.53
30.417	0.00	0.44	0.256	I O	1.52
30.500	0.00	0.44	0.253	I O	1.51
30.583	0.00	0.44	0.250	I O	1.50
30.667	0.00	0.44	0.247	I O	1.49
30.750	0.00	0.44	0.244	I O	1.48
30.833	0.00	0.43	0.241	I O	1.47
30.917	0.00	0.43	0.238	I O	1.46
31.000	0.00	0.43	0.235	I O	1.45
31.083	0.00	0.43	0.232	I O	1.44
31.167	0.00	0.42	0.229	I O	1.43
31.250	0.00	0.42	0.226	I O	1.42
31.333	0.00	0.42	0.223	I O	1.41
31.417	0.00	0.42	0.220	I O	1.40
31.500	0.00	0.42	0.217	I O	1.39
31.583	0.00	0.41	0.214	I O	1.38
31.667	0.00	0.41	0.212	I O	1.37
31.750	0.00	0.41	0.209	I O	1.36
31.833	0.00	0.41	0.206	I O	1.35
31.917	0.00	0.41	0.203	I O	1.34
32.000	0.00	0.40	0.200	I O	1.33
32.083	0.00	0.40	0.198	I O	1.33
32.167	0.00	0.40	0.195	I O	1.32
32.250	0.00	0.40	0.192	I O	1.31
32.333	0.00	0.40	0.189	I O	1.30
32.417	0.00	0.39	0.187	I O	1.29
32.500	0.00	0.39	0.184	I O	1.28
32.583	0.00	0.39	0.181	I O	1.27
32.667	0.00	0.39	0.179	I O	1.26
32.750	0.00	0.39	0.176	I O	1.25
32.833	0.00	0.38	0.173	I O	1.24
32.917	0.00	0.38	0.171	I O	1.24
33.000	0.00	0.38	0.168	I O	1.23
33.083	0.00	0.38	0.165	I O	1.22
33.167	0.00	0.38	0.163	I O	1.21
33.250	0.00	0.37	0.160	I O	1.20
33.333	0.00	0.37	0.158	I O	1.19
33.417	0.00	0.37	0.155	I O	1.18
33.500	0.00	0.37	0.152	I O	1.17
33.583	0.00	0.37	0.150	I O	1.17
.667	0.00	0.36	0.147	I O	1.16
3.750	0.00	0.36	0.145	I O	1.15
33.833	0.00	0.36	0.142	I O	1.14
33.917	0.00	0.36	0.140	I O	1.13
34.000	0.00	0.36	0.137	I O	1.12
34.083	0.00	0.36	0.135	I O	1.12
34.167	0.00	0.35	0.133	I O	1.11
34.250	0.00	0.35	0.130	I O	1.10
34.333	0.00	0.35	0.128	I O	1.09
34.417	0.00	0.35	0.125	I O	1.08
34.500	0.00	0.35	0.123	I O	1.08
34.583	0.00	0.35	0.121	I O	1.07
34.667	0.00	0.34	0.118	I O	1.06
34.750	0.00	0.34	0.116	I O	1.05
34.833	0.00	0.34	0.113	I O	1.04
34.917	0.00	0.34	0.111	I O	1.04
35.000	0.00	0.34	0.109	I O	1.03
35.083	0.00	0.33	0.107	I O	1.02
35.167	0.00	0.33	0.104	I O	1.01
35.250	0.00	0.33	0.102	I O	1.01
35.333	0.00	0.33	0.100	I O	1.00
35.417	0.00	0.32	0.097	I O	0.97
35.500	0.00	0.31	0.095	I O	0.95
35.583	0.00	0.31	0.093	I O	0.93
35.667	0.00	0.30	0.091	I O	0.91
35.750	0.00	0.29	0.089	I O	0.89
35.833	0.00	0.29	0.087	I O	0.87
35.917	0.00	0.28	0.085	I O	0.85
36.000	0.00	0.27	0.083	I O	0.83
36.083	0.00	0.27	0.081	I O	0.81
36.167	0.00	0.26	0.079	I O	0.79
36.250	0.00	0.26	0.078	I O	0.78
36.333	0.00	0.25	0.076	I O	0.76
36.417	0.00	0.24	0.074	I O	0.74
36.500	0.00	0.24	0.072	I O	0.72
36.583	0.00	0.23	0.071	I O	0.71
36.667	0.00	0.23	0.069	I O	0.69
36.750	0.00	0.22	0.068	I O	0.68
36.833	0.00	0.22	0.066	I O	0.66
36.917	0.00	0.21	0.065	I O	0.65
.000	0.00	0.21	0.063	I O	0.63
.083	0.00	0.20	0.062	I O	0.62

37.167	0.00	0.20	0.060	I O	0.60
37.250	0.00	0.19	0.059	I O	0.59
7.333	0.00	0.19	0.058	I O	0.58
.417	0.00	0.19	0.056	I O	0.56
37.500	0.00	0.18	0.055	I O	0.55
37.583	0.00	0.18	0.054	I O	0.54
37.667	0.00	0.17	0.053	I O	0.53
37.750	0.00	0.17	0.052	I O	0.52
37.833	0.00	0.17	0.050	I O	0.50
37.917	0.00	0.16	0.049	I O	0.49
38.000	0.00	0.16	0.048	I O	0.48
38.083	0.00	0.16	0.047	I O	0.47
38.167	0.00	0.15	0.046	IO	0.46
38.250	0.00	0.15	0.045	IO	0.45
38.333	0.00	0.15	0.044	IO	0.44
38.417	0.00	0.14	0.043	IO	0.43
38.500	0.00	0.14	0.042	IO	0.42
38.583	0.00	0.14	0.041	IO	0.41
38.667	0.00	0.13	0.040	IO	0.40
38.750	0.00	0.13	0.039	IO	0.39
38.833	0.00	0.13	0.038	IO	0.38
38.917	0.00	0.12	0.037	IO	0.37
39.000	0.00	0.12	0.037	IO	0.37
39.083	0.00	0.12	0.036	IO	0.36
39.167	0.00	0.12	0.035	IO	0.35
39.250	0.00	0.11	0.034	IO	0.34
39.333	0.00	0.11	0.033	IO	0.33
39.417	0.00	0.11	0.033	IO	0.33
39.500	0.00	0.11	0.032	IO	0.32
39.583	0.00	0.10	0.031	IO	0.31
39.667	0.00	0.10	0.031	IO	0.31
39.750	0.00	0.10	0.030	IO	0.30

Remaining water in basin = 0.03 (Ac.Ft)

```
****************************HYDROGRAPH DATA****************************
                Number of intervals =   477
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       0.799 (CFS)
                Total volume =        1.554 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************
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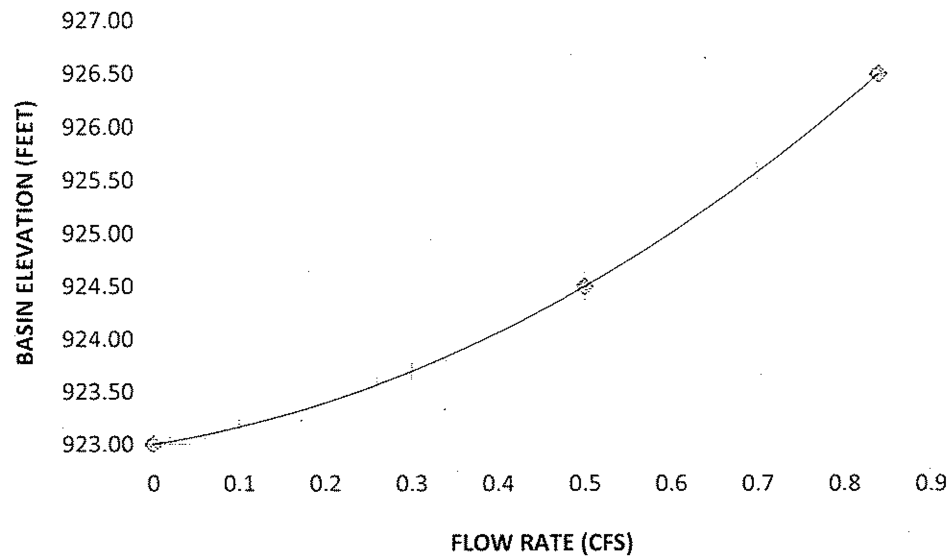
TTM 36294-ARANTINE HILLS - BASIN "B" -2 YR.-24HR.

BASIN OUTFLOW RATING CURVE

Flow Rate (CFS)	Basin Elevation (ft)
0	923.00
0.5	924.50
0.84	926.50



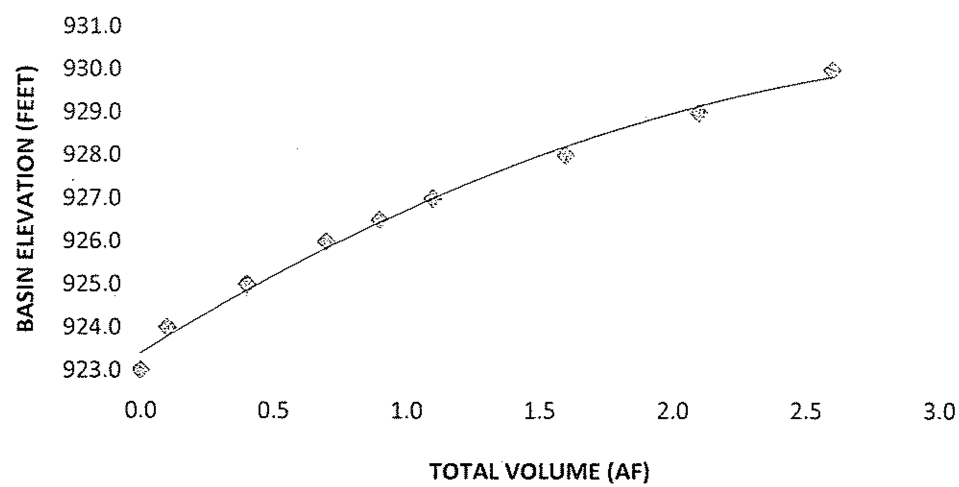
NOTES:

1. Flow Rates are numbers selected and inputted into the WSPG
2. Basin Elevation are numbers obtained directly from EGL values of the WSPG results based upon the respective flow rates
3. The chart to the right above is created to draw the curve so actual flow rates can be obtained based upon basin elevation whole numbers (i.e. 1001.00, 1002.00, 1003.00, etc)

TTM 36294-ARANTINE HILLS - BASIN "B" -2 YR.-24HR.

BASIN STORAGE VOLUME CURVE

TOTAL VOLUME (AF)	BASIN ELEVATION (FEET)
0.0	923.0
0.1	924.0
0.4	925.0
0.7	926.0
0.9	926.5
1.1	927.0
1.6	928.0
2.1	929.0
2.6	930.0



NOTES:

1. These were the numbers you provided the other day using the spreadsheet below.
2. The chart to the right above is created to see if your volume calculation results are accurate

TTM 36294-ARANTINE HILLS

2-YR. VOLUME CAPACITY CALCULATIONS FOR BASIN "B"					
ELEVATION	DEPTH	AREA (SF)	AREA (AC)	VOLUME (AC-FT)	VOLUME TOTAL (AC-FT)
923		3022.4	0.1	0.0	0.0
	1				
924		8424.2	0.2	0.1	0.1
	1				
925		14694.8	0.3	0.3	0.4
	1				
926		16698.7	0.4	0.4	0.7
	0.5				
926.5		15647.3	0.4	0.2	0.9
	0.5				
927		18759.0	0.4	0.2	1.1
	1				
928		20876.1	0.5	0.5	1.6
	1				
929		23048.2	0.5	0.5	2.1
	1				
930		25277.8	0.6	0.6	2.6

BASIN B ROUTING
10 YR-24 HOUR

FLOOD HYDROGRAPH ROUTING PROGRAM

Study date: 11/19/10

ARANTINE HILLS-TRACT MAP 36294
FLOOD HYDROGRAPH ROUTING FOR BASIN B
FOR 10YR.-24 HR.
FN:BASINB24

TRI-8 Builders - S/N 615

******************** HYDROGRAPH INFORMATION ********************

From study/file name: BUHMDP2410.rte

**************************HYDROGRAPH DATA**************************

Number of intervals = 292
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 5.106 (CFS)
Total volume = 2.516 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 292
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.100	2.200	0.092	0.108
2.000	0.400	6.200	0.379	0.421

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	1.3	2.55	3.83	5.11	Depth (Ft.)
0.083	0.12	0.01	0.000	O	|	|	|	|	0.00
0.167	0.27	0.04	0.002	OI	|	|	|	|	0.02
0.250	0.31	0.07	0.003	OI	|	|	|	|	0.03

0.333	0.38	0.11	0.005	O I	0.05
0.417	0.47	0.15	0.007	O I	0.07
0.500	0.48	0.20	0.009	O I	0.09
0.583	0.49	0.24	0.011	O I	0.11
0.667	0.50	0.28	0.013	O I	0.13
0.750	0.50	0.31	0.014	O I	0.14
0.833	0.56	0.34	0.015	OI	0.15
0.917	0.63	0.37	0.017	OI	0.17
1.000	0.65	0.41	0.019	O I	0.19
1.083	0.60	0.44	0.020	OI	0.20
1.167	0.52	0.46	0.021	OI	0.21
1.250	0.51	0.47	0.021	OI	0.21
1.333	0.50	0.47	0.021	OI	0.21
1.417	0.50	0.48	0.022	OI	0.22
1.500	0.50	0.48	0.022	OI	0.22
1.583	0.50	0.48	0.022	O	0.22
1.667	0.50	0.48	0.022	O	0.22
1.750	0.50	0.48	0.022	O	0.22
1.833	0.56	0.49	0.022	O	0.22
1.917	0.63	0.51	0.023	O	0.23
2.000	0.65	0.52	0.024	OI	0.24
2.083	0.66	0.54	0.025	OI	0.25
2.167	0.66	0.56	0.025	OI	0.25
2.250	0.66	0.57	0.026	OI	0.26
2.333	0.66	0.59	0.027	OI	0.27
2.417	0.66	0.60	0.027	OI	0.27
2.500	0.66	0.61	0.028	OI	0.28
2.583	0.72	0.62	0.028	OI	0.28
2.667	0.80	0.64	0.029	O I	0.29
2.750	0.81	0.66	0.030	OI	0.30
2.833	0.82	0.68	0.031	OI	0.31
2.917	0.83	0.70	0.032	OI	0.32
3.000	0.83	0.72	0.033	OI	0.33
3.083	0.83	0.74	0.033	OI	0.33
3.167	0.83	0.75	0.034	OI	0.34
3.250	0.83	0.76	0.035	OI	0.35
3.333	0.83	0.77	0.035	OI	0.35
3.417	0.83	0.78	0.035	OI	0.35
3.500	0.83	0.78	0.036	OI	0.36
3.583	0.83	0.79	0.036	OI	0.36
3.667	0.83	0.80	0.036	OI	0.36
3.750	0.83	0.80	0.036	O	0.36
3.833	0.89	0.81	0.037	O	0.37
3.917	0.96	0.82	0.037	OI	0.37
4.000	0.98	0.85	0.038	OI	0.38
4.083	0.99	0.86	0.039	OI	0.39
4.167	0.99	0.88	0.040	OI	0.40
4.250	0.99	0.90	0.041	OI	0.41
4.333	1.05	0.92	0.042	OI	0.42
4.417	1.13	0.94	0.043	O I	0.43
4.500	1.15	0.97	0.044	OI	0.44
4.583	1.15	0.99	0.045	OI	0.45
4.667	1.16	1.02	0.046	OI	0.46
4.750	1.16	1.04	0.047	OI	0.47
4.833	1.22	1.06	0.048	OI	0.48
4.917	1.29	1.09	0.049	O I	0.49
5.000	1.31	1.12	0.051	O I	0.51
5.083	1.20	1.14	0.052	O	0.52
5.167	1.05	1.13	0.052	IO	0.52
5.250	1.02	1.12	0.051	IO	0.51
5.333	1.06	1.11	0.050	O	0.50
5.417	1.13	1.11	0.050	OI	0.50
5.500	1.15	1.11	0.050	OI	0.50
5.583	1.21	1.12	0.051	O	0.51
5.667	1.29	1.14	0.052	OI	0.52
5.750	1.31	1.16	0.053	OI	0.53
5.833	1.32	1.18	0.054	OI	0.54

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 5.917    1.32    1.20      0.055   |      OI       |       |       |     0.55
 6.000    1.32    1.22      0.055   |      OI       |       |       |     0.55
 6.083    1.38    1.24      0.056   |      OI       |       |       |     0.56
 6.167    1.46    1.26      0.057   |      O|I      |       |       |     0.57
 6.250    1.48    1.29      0.059   |       OI      |       |       |     0.59
 6.333    1.48    1.32      0.060   |       OI      |       |       |     0.60
 6.417    1.49    1.34      0.061   |       OI      |       |       |     0.61
 6.500    1.49    1.36      0.062   |       OI      |       |       |     0.62
 6.583    1.55    1.38      0.063   |       OI      |       |       |     0.63
 6.667    1.62    1.41      0.064   |       O I     |       |       |     0.64
 6.750    1.64    1.44      0.066   |       |OI     |       |       |     0.66
 6.833    1.65    1.47      0.067   |       |OI     |       |       |     0.67
 6.917    1.65    1.50      0.068   |       |OI     |       |       |     0.68
 7.000    1.65    1.52      0.069   |       |OI     |       |       |     0.69
 7.083    1.65    1.54      0.070   |       |OI     |       |       |     0.70
 7.167    1.65    1.55      0.071   |       |OI     |       |       |     0.71
 7.250    1.65    1.57      0.071   |       |OI     |       |       |     0.71
 7.333    1.71    1.58      0.072   |       |OI     |       |       |     0.72
 7.417    1.79    1.61      0.073   |       | OI    |       |       |     0.73
 7.500    1.81    1.64      0.074   |       | OI    |       |       |     0.74
 7.583    1.87    1.66      0.076   |       | OI    |       |       |     0.76
 7.667    1.96    1.70      0.077   |       | O I   |       |       |     0.77
 7.750    1.97    1.74      0.079   |       | O I   |       |       |     0.79
 7.833    2.04    1.77      0.081   |       |  OI   |       |       |     0.81
 7.917    2.12    1.82      0.083   |       |  O I  |       |       |     0.83
 8.000    2.14    1.86      0.085   |       |  O I  |       |       |     0.85
 8.083    2.27    1.91      0.087   |       |  O  I |       |       |     0.87
 8.167    2.42    1.97      0.090   |       |   O  I|       |       |     0.90
 8.250    2.46    2.04      0.093   |       |   O  I|       |       |     0.93
 8.333    2.47    2.10      0.095   |       |    O I|       |       |     0.95
 8.417    2.48    2.15      0.098   |       |    O I|       |       |     0.98
 8.500    2.48    2.20      0.100   |       |    O I|       |       |     1.00
 8.583    2.54    2.23      0.102   |       |    O I|       |       |     1.01
 8.667    2.62    2.26      0.104   |       |     O I       |       |     1.01
 8.750    2.63    2.29      0.107   |       |     O I       |       |     1.02
 8.833    2.70    2.32      0.109   |       |     O I       |       |     1.03
 8.917    2.78    2.36      0.112   |       |     O |I      |       |     1.04
 9.000    2.80    2.40      0.115   |       |      O|I      |       |     1.05
 9.083    2.93    2.44      0.118   |       |      O| I     |       |     1.06
 9.167    3.08    2.49      0.122   |       |      O|  I    |       |     1.07
 9.250    3.12    2.54      0.126   |       |      O|  I    |       |     1.09
 9.333    2.08    2.55      0.126   |       |    I O|       |       |     1.09
 9.417    0.79    2.45      0.119   |   I   |      O|       |       |     1.06
 9.500    0.51    2.29      0.107   |  I    |     O |       |       |     1.02
 9.583    0.51    2.09      0.095   |  I    |    O  |       |       |     0.95
 9.667    0.58    1.88      0.085   |  I    |  O    |       |       |     0.85
 9.750    0.63    1.70      0.077   |  I    | O     |       |       |     0.77
 9.833    0.76    1.56      0.071   |   I   |O      |       |       |     0.71
 9.917    0.91    1.45      0.066   |    I  |O      |       |       |     0.66
10.000    0.97    1.38      0.063   |     I O       |       |       |     0.63
10.083    1.53    1.36      0.062   |       OI      |       |       |     0.62
10.167    2.22    1.44      0.065   |       |O   I  |       |       |     0.65
10.250    2.38    1.56      0.071   |       |O    I |       |       |     0.71
10.333    2.44    1.68      0.076   |       | O    I|       |       |     0.76
10.417    2.48    1.79      0.081   |       |  O   I|       |       |     0.81
10.500    2.48    1.89      0.086   |       |  O   I|       |       |     0.86
10.583    1.80    1.92      0.087   |       |  IO   |       |       |     0.87
10.667    0.96    1.85      0.084   |     I |  O    |       |       |     0.84
10.750    0.79    1.71      0.078   |   I   | O     |       |       |     0.78
10.833    0.73    1.58      0.072   |   I   |O      |       |       |     0.72
10.917    0.71    1.46      0.066   |   I   |O      |       |       |     0.66
11.000    0.73    1.35      0.061   |   I   O       |       |       |     0.61
11.083    0.65    1.26      0.057   |   I  O|       |       |       |     0.57
11.167    0.55    1.17      0.053   |  I   O|       |       |       |     0.53
11.250    0.55    1.08      0.049   |  I  O |       |       |       |     0.49
11.333    0.56    1.01      0.046   |  I  O |       |       |       |     0.46
11.417    0.57    0.94      0.043   |  I O  |       |       |       |     0.43
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11.500   0.60   0.89   0.041   |  I O  |       |       |       |   0.41
11.583   0.42   0.84   0.038   | I  O  |       |       |       |   0.38
11.667   0.20   0.77   0.035   |I  O   |       |       |       |   0.35
11.750   0.17   0.68   0.031   |I  O   |       |       |       |   0.31
11.833   0.26   0.62   0.028   |I O    |       |       |       |   0.28
11.917   0.39   0.58   0.026   | IO    |       |       |       |   0.26
12.000   0.44   0.55   0.025   | IO    |       |       |       |   0.25
12.083   1.16   0.59   0.027   |  O   I|       |       |       |   0.27
12.167   2.05   0.73   0.033   |   O   |   I   |       |       |   0.33
12.250   2.26   0.93   0.042   |    O  |     I |       |       |   0.42
12.333   2.46   1.13   0.052   |      O|      I|       |       |   0.52
12.417   2.66   1.34   0.061   |       O       I       |       |   0.61
12.500   2.71   1.52   0.069   |       |O      I       |       |   0.69
12.583   2.93   1.71   0.078   |       | O     | I     |       |   0.78
12.667   3.21   1.90   0.086   |       |  O    |   I   |       |   0.86
12.750   3.28   2.09   0.095   |       |    O  |   I   |       |   0.95
12.833   3.43   2.24   0.103   |       |     O |    I  |       |   1.01
12.917   3.58   2.35   0.111   |       |     O |     I |       |   1.04
13.000   3.63   2.46   0.120   |       |      O|     I |       |   1.07
13.083   4.15   2.59   0.129   |       |       O       | I     |   1.10
13.167   4.79   2.75   0.142   |       |       |O      |     I |   1.14
13.250   4.95   2.94   0.155   |       |       | O     |      I|   1.18
13.333   5.03   3.12   0.169   |       |       |  O    |      I|   1.23
13.417   5.09   3.29   0.182   |       |       |   O   |      I|   1.27
13.500   5.11   3.45   0.194   |       |       |    O  |      I|   1.31
13.583   4.05   3.55   0.201   |       |       |     O |I      |   1.34
13.667   2.72   3.53   0.200   |       |       |I    O |       |   1.33
13.750   2.44   3.45   0.194   |       |      I|    O  |       |   1.31
13.833   2.33   3.36   0.187   |       |     I |    O  |       |   1.29
13.917   2.27   3.26   0.180   |       |     I |   O   |       |   1.27
14.000   2.29   3.18   0.173   |       |     I |  O    |       |   1.24
14.083   2.70   3.12   0.169   |       |       I  O    |       |   1.23
14.167   3.21   3.10   0.168   |       |       |  OI   |       |   1.23
14.250   3.34   3.12   0.169   |       |       |  OI   |       |   1.23
14.333   3.31   3.14   0.170   |       |       |  OI   |       |   1.23
14.417   3.24   3.15   0.171   |       |       |  OI   |       |   1.24
14.500   3.23   3.16   0.172   |       |       |  OI   |       |   1.24
14.583   3.23   3.16   0.172   |       |       |  OI   |       |   1.24
14.667   3.25   3.17   0.173   |       |       |  OI   |       |   1.24
14.750   3.27   3.18   0.173   |       |       |  OI   |       |   1.24
14.833   3.19   3.18   0.174   |       |       |  O    |       |   1.25
14.917   3.08   3.18   0.173   |       |       |  O    |       |   1.24
15.000   3.07   3.17   0.173   |       |       |  O    |       |   1.24
15.083   2.98   3.16   0.172   |       |       | IO    |       |   1.24
15.167   2.87   3.14   0.170   |       |       |I O    |       |   1.23
15.250   2.86   3.11   0.168   |       |       |I O    |       |   1.23
15.333   2.77   3.09   0.166   |       |       |I O    |       |   1.22
15.417   2.66   3.05   0.164   |       |       I  O    |       |   1.21
15.500   2.65   3.02   0.161   |       |       I O     |       |   1.20
15.583   2.26   2.97   0.158   |       |     I | O     |       |   1.19
15.667   1.79   2.89   0.151   |       |  I    | O     |       |   1.17
15.750   1.69   2.79   0.144   |       | I     |O      |       |   1.15
15.833   1.66   2.69   0.137   |       | I     O       |       |   1.12
15.917   1.65   2.60   0.130   |       | I     O       |       |   1.10
16.000   1.67   2.52   0.124   |       | I    O|       |       |   1.08
16.083   1.30   2.43   0.117   |       I      O|       |       |   1.06
16.167   0.84   2.31   0.108   |    I  |     O |       |       |   1.03
16.250   0.73   2.16   0.098   |   I   |    O  |       |       |   0.98
16.333   0.69   1.95   0.089   |   I   |   O   |       |       |   0.89
16.417   0.66   1.77   0.081   |   I   |  O    |       |       |   0.81
16.500   0.66   1.62   0.073   |   I   | O     |       |       |   0.73
16.583   0.60   1.48   0.067   |  I    |O      |       |       |   0.67
16.667   0.52   1.35   0.061   |  I    O       |       |       |   0.61
16.750   0.51   1.23   0.056   |  I   O|       |       |       |   0.56
16.833   0.50   1.13   0.051   |  I   O|       |       |       |   0.51
16.917   0.50   1.04   0.047   |  I  O |       |       |       |   0.47
17.000   0.50   0.96   0.044   |  I  O |       |       |       |   0.44
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17.083	0.62	0.91	0.041	I O				0.41
17.167	0.77	0.88	0.040	IO				0.40
17.250	0.80	0.86	0.039	O				0.39
17.333	0.82	0.86	0.039	O				0.39
17.417	0.83	0.85	0.039	O				0.39
17.500	0.83	0.85	0.039	O				0.39
17.583	0.83	0.84	0.038	O				0.38
17.667	0.83	0.84	0.038	O				0.38
17.750	0.83	0.84	0.038	O				0.38
17.833	0.77	0.83	0.038	IO				0.38
17.917	0.69	0.82	0.037	IO				0.37
18.000	0.67	0.80	0.036	IO				0.36
18.083	0.67	0.78	0.036	O				0.36
18.167	0.66	0.76	0.035	O				0.35
18.250	0.66	0.75	0.034	O				0.34
18.333	0.66	0.74	0.034	O				0.34
18.417	0.66	0.73	0.033	O				0.33
18.500	0.66	0.72	0.033	O				0.33
18.583	0.60	0.71	0.032	IO				0.32
18.667	0.52	0.69	0.031	IO				0.31
18.750	0.51	0.66	0.030	IO				0.30
18.833	0.44	0.64	0.029	IO				0.29
18.917	0.36	0.60	0.027	IO				0.27
19.000	0.34	0.57	0.026	IO				0.26
19.083	0.40	0.54	0.024	IO				0.24
19.167	0.47	0.52	0.024	IO				0.24
19.250	0.48	0.52	0.023	O				0.23
19.333	0.55	0.52	0.024	O				0.24
19.417	0.63	0.53	0.024	O				0.24
19.500	0.65	0.54	0.025	OI				0.25
19.583	0.60	0.55	0.025	O				0.25
19.667	0.52	0.56	0.025	O				0.25
19.750	0.51	0.55	0.025	O				0.25
19.833	0.44	0.54	0.025	IO				0.25
19.917	0.36	0.52	0.024	IO				0.24
20.000	0.34	0.50	0.023	IO				0.23
20.083	0.40	0.48	0.022	O				0.22
20.167	0.47	0.47	0.021	O				0.21
20.250	0.48	0.47	0.021	OI				0.21
20.333	0.49	0.47	0.022	OI				0.22
20.417	0.50	0.48	0.022	OI				0.22
20.500	0.50	0.48	0.022	O				0.22
20.583	0.50	0.48	0.022	O				0.22
20.667	0.50	0.48	0.022	O				0.22
20.750	0.50	0.49	0.022	O				0.22
20.833	0.44	0.48	0.022	IO				0.22
20.917	0.36	0.47	0.021	O				0.21
21.000	0.34	0.45	0.021	O				0.21
21.083	0.40	0.44	0.020	O				0.20
21.167	0.47	0.44	0.020	O				0.20
21.250	0.48	0.45	0.020	OI				0.20
21.333	0.43	0.45	0.020	O				0.20
21.417	0.36	0.44	0.020	O				0.20
21.500	0.34	0.43	0.019	O				0.19
21.583	0.40	0.42	0.019	O				0.19
21.667	0.47	0.42	0.019	O				0.19
21.750	0.48	0.43	0.019	OI				0.19
21.833	0.43	0.43	0.020	O				0.20
21.917	0.36	0.43	0.019	O				0.19
22.000	0.34	0.42	0.019	O				0.19
22.083	0.40	0.41	0.019	O				0.19
22.167	0.47	0.41	0.019	O				0.19
22.250	0.48	0.42	0.019	OI				0.19
22.333	0.43	0.43	0.019	O				0.19
22.417	0.36	0.42	0.019	O				0.19
22.500	0.34	0.41	0.019	O				0.19
22.583	0.34	0.40	0.018	O				0.18

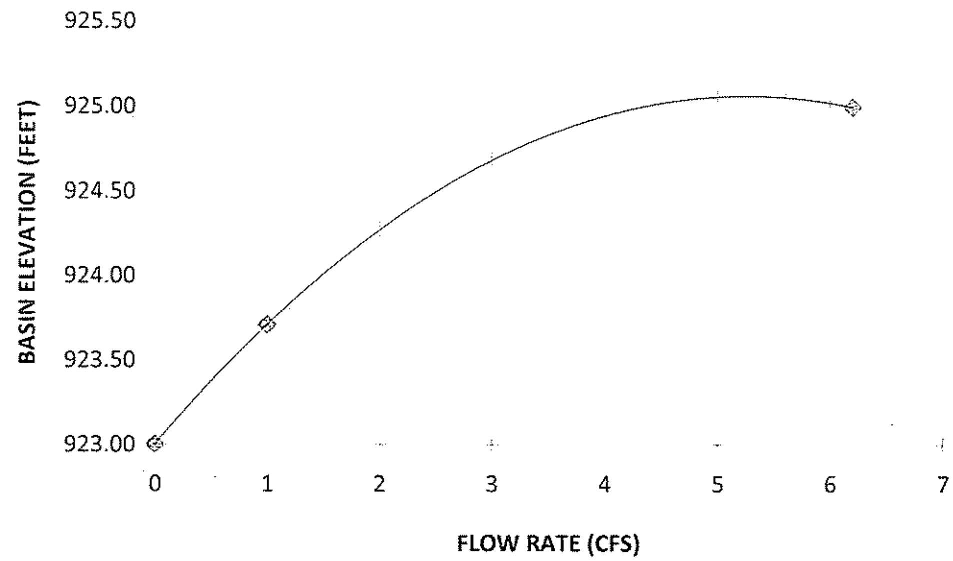
22.667	0.33	0.39	0.018	O	0.18
22.750	0.33	0.38	0.017	O	0.17
22.833	0.33	0.38	0.017	O	0.17
22.917	0.33	0.37	0.017	O	0.17
23.000	0.33	0.36	0.017	O	0.17
23.083	0.33	0.36	0.016	O	0.16
23.167	0.33	0.36	0.016	O	0.16
23.250	0.33	0.35	0.016	O	0.16
23.333	0.33	0.35	0.016	O	0.16
23.417	0.33	0.35	0.016	O	0.16
23.500	0.33	0.34	0.016	O	0.16
23.583	0.33	0.34	0.016	O	0.16
23.667	0.33	0.34	0.015	O	0.15
23.750	0.33	0.34	0.015	O	0.15
23.833	0.33	0.34	0.015	O	0.15
23.917	0.33	0.34	0.015	O	0.15
24.000	0.33	0.34	0.015	O	0.15
24.083	0.21	0.33	0.015	IO	0.15
24.167	0.06	0.30	0.014	IO	0.14
24.250	0.02	0.26	0.012	IO	0.12
24.333	0.01	0.23	0.010	IO	0.10
24.417	0.00	0.20	0.009	IO	0.09
24.500	0.00	0.17	0.008	IO	0.08
24.583	0.00	0.15	0.007	O	0.07
24.667	0.00	0.12	0.006	O	0.06
24.750	0.00	0.11	0.005	O	0.05
24.833	0.00	0.09	0.004	O	0.04

Remaining water in basin = 0.00 (Ac.Ft)

```
****************************HYDROGRAPH DATA****************************
            Number of intervals =    298
            Time interval =     5.0 (Min.)
            Maximum/Peak flow rate =          3.547 (CFS)
            Total volume =       2.512 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************
```

BASIN OUTFLOW RATING CURVE

Flow Rate (CFS)	Basin Elevation (ft)
0	923.00
1	923.71
6.2	925.00



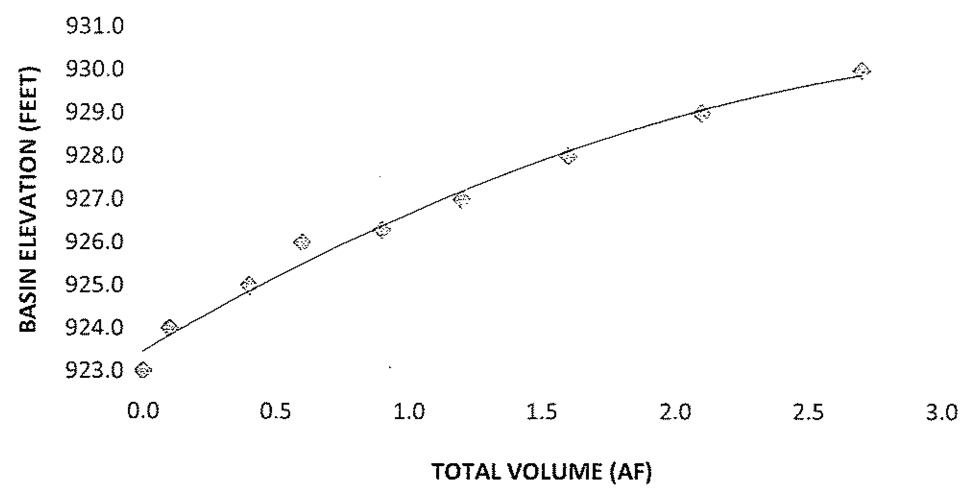
NOTES:

1. Flow Rates are numbers selected and inputted into the WSPG
2. Basin Elevation are numbers obtained directly from EGL values of the WSPG results based upon the respective flow rates
3. The chart to the right above is created to draw the curve so actual flow rates can be obtained based upon basin elevation whole numbers (i.e. 1001.00, 1002.00, 1003.00, etc)

TTM 36294-ARANTINE HILLS - BASIN "B" -10 YR.-24HR.

BASIN STORAGE VOLUME CURVE

TOTAL VOLUME (AF)	BASIN ELEVATION (FEET)
0.0	923.0
0.1	924.0
0.4	925.0
0.6	926.0
0.9	926.3
1.2	927.0
1.6	928.0
2.1	929.0
2.7	930.0



NOTES:

1. These were the numbers you provided the other day using the spreadsheet below.
2. The chart to the right above is created to see if your volume calculation results are accurate

TTM 36294-ARANTINE HILLS

10-YR. VOLUME CAPACITY CALCULATIONS FOR BASIN "B"					
ELEVATION	DEPTH	AREA (SF)	AREA (AC)	VOLUME (AC-FT)	VOLUME TOTAL (AC-FT)
923		3022.4	0.1	0.0	0.0
	1				
924		8424.2	0.2	0.1	0.1
	1				
925		14694.8	0.3	0.3	0.4
	1				
926		16698.7	0.4	0.4	0.7
	0.3				
926.3		17285.8	0.4	0.1	0.9
	0.7				
927		18759.0	0.4	0.3	1.2
	1				
928		20876.1	0.5	0.5	1.6
	1				
929		23048.2	0.5	0.5	2.1
	1				
930		25277.8	0.6	0.6	2.7

UNIT HYDROGRAPH-EXISTING CONDITION
2 YR-24 HOUR

UNIT HYDROGRAPH-EXISTING CONDITION
2 YR-24 HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 11/17/10 File: BE1UH242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N   615

----------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



----------------------------------------------------------------------
TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (EXISTING CONDITION)
AREA "B" FOR AREAS "B1" & "B2"
2 YEAR - 24 HOUR
FN: BE1UH242
---------------------------------------------------------------------
Drainage Area =      22.90(Ac.)  =       0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       22.90(Ac.)  =      0.036 Sq. Mi.
Length along longest watercourse =     2025.00(Ft.)
Length along longest watercourse measured to centroid =    1140.00(Ft.)
Length along longest watercourse =       0.384 Mi.
Length along longest watercourse measured to centroid =      0.216 Mi.
Difference in elevation =      83.00(Ft.)
Slope along watercourse =    216.4148 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.050 Hr.
Lag time =     3.02 Min.
25% of lag time =     0.75 Min.
40% of lag time =     1.21 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      22.90              1.55                 35.49

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      22.90              4.80                109.92

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.550(In)
Area Averaged 100-Year Rainfall =    4.800(In)

Point rain (area averaged) =    1.550(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.550(In)

Sub-Area Data:
Area(Ac.)          Runoff Index   Impervious %
   22.900             75.80         0.100
 Total Area Entered =     22.90(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)      (In/Hr)       (Dec.)    (In/Hr)
75.8  75.8     0.294      0.100        0.267        1.000      0.267
                                                  Sum (F) =    0.267
Area averaged mean soil loss (F) (In/Hr) =  0.267
Minimum soil loss rate ((In/Hr)) =  0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.820
----------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                       VALLEY S-Curve
---------------------------------------------------------------------
```

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	165.713	36.773	8.487
2	0.167	331.426	45.837	10.579
3	0.250	497.140	10.346	2.388
4	0.333	662.853	4.400	1.015
5	0.417	828.566	2.644	0.610
			Sum = 100.000	Sum= 23.079

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.012	0.474	0.010	0.00
2	0.17	0.07	0.012	0.472	0.010	0.00
3	0.25	0.07	0.012	0.470	0.010	0.00
4	0.33	0.10	0.019	0.468	0.015	0.00
5	0.42	0.10	0.019	0.466	0.015	0.00
6	0.50	0.10	0.019	0.464	0.015	0.00
7	0.58	0.10	0.019	0.463	0.015	0.00
8	0.67	0.10	0.019	0.461	0.015	0.00
9	0.75	0.10	0.019	0.459	0.015	0.00
10	0.83	0.13	0.025	0.457	0.020	0.00
11	0.92	0.13	0.025	0.455	0.020	0.00
12	1.00	0.13	0.025	0.454	0.020	0.00
13	1.08	0.10	0.019	0.452	0.015	0.00
14	1.17	0.10	0.019	0.450	0.015	0.00
15	1.25	0.10	0.019	0.448	0.015	0.00
16	1.33	0.10	0.019	0.446	0.015	0.00
17	1.42	0.10	0.019	0.445	0.015	0.00
18	1.50	0.10	0.019	0.443	0.015	0.00
19	1.58	0.10	0.019	0.441	0.015	0.00
20	1.67	0.10	0.019	0.439	0.015	0.00
21	1.75	0.10	0.019	0.438	0.015	0.00
22	1.83	0.13	0.025	0.436	0.020	0.00
23	1.92	0.13	0.025	0.434	0.020	0.00
24	2.00	0.13	0.025	0.432	0.020	0.00
25	2.08	0.13	0.025	0.431	0.020	0.00
26	2.17	0.13	0.025	0.429	0.020	0.00
27	2.25	0.13	0.025	0.427	0.020	0.00
8	2.33	0.13	0.025	0.425	0.020	0.00
29	2.42	0.13	0.025	0.424	0.020	0.00
30	2.50	0.13	0.025	0.422	0.020	0.00
31	2.58	0.17	0.031	0.420	0.025	0.01
32	2.67	0.17	0.031	0.418	0.025	0.01
33	2.75	0.17	0.031	0.417	0.025	0.01
34	2.83	0.17	0.031	0.415	0.025	0.01
35	2.92	0.17	0.031	0.413	0.025	0.01
36	3.00	0.17	0.031	0.412	0.025	0.01
37	3.08	0.17	0.031	0.410	0.025	0.01
38	3.17	0.17	0.031	0.408	0.025	0.01
39	3.25	0.17	0.031	0.406	0.025	0.01
40	3.33	0.17	0.031	0.405	0.025	0.01
41	3.42	0.17	0.031	0.403	0.025	0.01
42	3.50	0.17	0.031	0.401	0.025	0.01
43	3.58	0.17	0.031	0.400	0.025	0.01
44	3.67	0.17	0.031	0.398	0.025	0.01
45	3.75	0.17	0.031	0.396	0.025	0.01
46	3.83	0.20	0.037	0.395	0.031	0.01
47	3.92	0.20	0.037	0.393	0.031	0.01
48	4.00	0.20	0.037	0.391	0.031	0.01
49	4.08	0.20	0.037	0.390	0.031	0.01
50	4.17	0.20	0.037	0.388	0.031	0.01
51	4.25	0.20	0.037	0.386	0.031	0.01
52	4.33	0.23	0.043	0.385	0.036	0.01
53	4.42	0.23	0.043	0.383	0.036	0.01
54	4.50	0.23	0.043	0.381	0.036	0.01
55	4.58	0.23	0.043	0.380	0.036	0.01
56	4.67	0.23	0.043	0.378	0.036	0.01
57	4.75	0.23	0.043	0.377	0.036	0.01
58	4.83	0.27	0.050	0.375	0.041	0.01
59	4.92	0.27	0.050	0.373	0.041	0.01
60	5.00	0.27	0.050	0.372	0.041	0.01
61	5.08	0.20	0.037	0.370	0.031	0.01
62	5.17	0.20	0.037	0.369	0.031	0.01
63	5.25	0.20	0.037	0.367	0.031	0.01
64	5.33	0.23	0.043	0.365	0.036	0.01
65	5.42	0.23	0.043	0.364	0.036	0.01
66	5.50	0.23	0.043	0.362	0.036	0.01
67	5.58	0.27	0.050	0.361	0.041	0.01
8	5.67	0.27	0.050	0.359	0.041	0.01
9	5.75	0.27	0.050	0.357	0.041	0.01

70	5.83	0.27	0.050	0.356	0.041	0.01
71	5.92	0.27	0.050	0.354	0.041	0.01
72	6.00	0.27	0.050	0.353	0.041	0.01
73	6.08	0.30	0.056	0.351	0.046	0.01
74	6.17	0.30	0.056	0.349	0.046	0.01
75	6.25	0.30	0.056	0.348	0.046	0.01
76	6.33	0.30	0.056	0.346	0.046	0.01
77	6.42	0.30	0.056	0.345	0.046	0.01
78	6.50	0.30	0.056	0.343	0.046	0.01
79	6.58	0.33	0.062	0.342	0.051	0.01
80	6.67	0.33	0.062	0.340	0.051	0.01
81	6.75	0.33	0.062	0.339	0.051	0.01
82	6.83	0.33	0.062	0.337	0.051	0.01
83	6.92	0.33	0.062	0.336	0.051	0.01
84	7.00	0.33	0.062	0.334	0.051	0.01
85	7.08	0.33	0.062	0.333	0.051	0.01
86	7.17	0.33	0.062	0.331	0.051	0.01
87	7.25	0.33	0.062	0.330	0.051	0.01
88	7.33	0.37	0.068	0.328	0.056	0.01
89	7.42	0.37	0.068	0.327	0.056	0.01
90	7.50	0.37	0.068	0.325	0.056	0.01
91	7.58	0.40	0.074	0.324	0.061	0.01
92	7.67	0.40	0.074	0.322	0.061	0.01
93	7.75	0.40	0.074	0.321	0.061	0.01
94	7.83	0.43	0.081	0.319	0.066	0.01
95	7.92	0.43	0.081	0.318	0.066	0.01
96	8.00	0.43	0.081	0.316	0.066	0.01
97	8.08	0.50	0.093	0.315	0.076	0.02
98	8.17	0.50	0.093	0.313	0.076	0.02
99	8.25	0.50	0.093	0.312	0.076	0.02
100	8.33	0.50	0.093	0.310	0.076	0.02
101	8.42	0.50	0.093	0.309	0.076	0.02
102	8.50	0.50	0.093	0.307	0.076	0.02
103	8.58	0.53	0.099	0.306	0.081	0.02
104	8.67	0.53	0.099	0.305	0.081	0.02
105	8.75	0.53	0.099	0.303	0.081	0.02
106	8.83	0.57	0.105	0.302	0.086	0.02
107	8.92	0.57	0.105	0.300	0.086	0.02
108	9.00	0.57	0.105	0.299	0.086	0.02
109	9.08	0.63	0.118	0.297	0.097	0.02
110	9.17	0.63	0.118	0.296	0.097	0.02
111	9.25	0.63	0.118	0.295	0.097	0.02
12	9.33	0.67	0.124	0.293	0.102	0.02
3	9.42	0.67	0.124	0.292	0.102	0.02
14	9.50	0.67	0.124	0.290	0.102	0.02
115	9.58	0.70	0.130	0.289	0.107	0.02
116	9.67	0.70	0.130	0.288	0.107	0.02
117	9.75	0.70	0.130	0.286	0.107	0.02
118	9.83	0.73	0.136	0.285	0.112	0.02
119	9.92	0.73	0.136	0.283	0.112	0.02
120	10.00	0.73	0.136	0.282	0.112	0.02
121	10.08	0.50	0.093	0.281	0.076	0.02
122	10.17	0.50	0.093	0.279	0.076	0.02
123	10.25	0.50	0.093	0.278	0.076	0.02
124	10.33	0.50	0.093	0.277	0.076	0.02
125	10.42	0.50	0.093	0.275	0.076	0.02
126	10.50	0.50	0.093	0.274	0.076	0.02
127	10.58	0.67	0.124	0.273	0.102	0.02
128	10.67	0.67	0.124	0.271	0.102	0.02
129	10.75	0.67	0.124	0.270	0.102	0.02
130	10.83	0.67	0.124	0.269	0.102	0.02
131	10.92	0.67	0.124	0.267	0.102	0.02
132	11.00	0.67	0.124	0.266	0.102	0.02
133	11.08	0.63	0.118	0.265	0.097	0.02
134	11.17	0.63	0.118	0.263	0.097	0.02
135	11.25	0.63	0.118	0.262	0.097	0.02
136	11.33	0.63	0.118	0.261	0.097	0.02
137	11.42	0.63	0.118	0.260	0.097	0.02
138	11.50	0.63	0.118	0.258	0.097	0.02
139	11.58	0.57	0.105	0.257	0.086	0.02
140	11.67	0.57	0.105	0.256	0.086	0.02
141	11.75	0.57	0.105	0.254	0.086	0.02
142	11.83	0.60	0.112	0.253	0.092	0.02
143	11.92	0.60	0.112	0.252	0.092	0.02
144	12.00	0.60	0.112	0.251	0.092	0.02
145	12.08	0.83	0.155	0.249	0.127	0.03
146	12.17	0.83	0.155	0.248	0.127	0.03
147	12.25	0.83	0.155	0.247	0.127	0.03
148	12.33	0.87	0.161	0.246	0.132	0.03
149	12.42	0.87	0.161	0.244	0.132	0.03
150	12.50	0.87	0.161	0.243	0.132	0.03
151	12.58	0.93	0.174	0.242	0.142	0.03
152	12.67	0.93	0.174	0.241	0.142	0.03
3	12.75	0.93	0.174	0.240	0.142	0.03
4	12.83	0.97	0.180	0.238	0.147	0.03

155	12.92	0.97	0.180	0.237	0.147	0.03
156	13.00	0.97	0.180	0.236	0.147	0.03
57	13.08	1.13	0.211	0.235	0.173	0.04
58	13.17	1.13	0.211	0.234	0.173	0.04
159	13.25	1.13	0.211	0.232	0.173	0.04
160	13.33	1.13	0.211	0.231	0.173	0.04
161	13.42	1.13	0.211	0.230	0.173	0.04
162	13.50	1.13	0.211	0.229	0.173	0.04
163	13.58	0.77	0.143	0.228	0.117	0.03
164	13.67	0.77	0.143	0.226	0.117	0.03
165	13.75	0.77	0.143	0.225	0.117	0.03
166	13.83	0.77	0.143	0.224	0.117	0.03
167	13.92	0.77	0.143	0.223	0.117	0.03
168	14.00	0.77	0.143	0.222	0.117	0.03
169	14.08	0.90	0.167	0.221	0.137	0.03
170	14.17	0.90	0.167	0.220	0.137	0.03
171	14.25	0.90	0.167	0.219	0.137	0.03
172	14.33	0.87	0.161	0.217	0.132	0.03
173	14.42	0.87	0.161	0.216	0.132	0.03
174	14.50	0.87	0.161	0.215	0.132	0.03
175	14.58	0.87	0.161	0.214	0.132	0.03
176	14.67	0.87	0.161	0.213	0.132	0.03
177	14.75	0.87	0.161	0.212	0.132	0.03
178	14.83	0.83	0.155	0.211	0.127	0.03
179	14.92	0.83	0.155	0.210	0.127	0.03
180	15.00	0.83	0.155	0.209	0.127	0.03
181	15.08	0.80	0.149	0.208	0.122	0.03
182	15.17	0.80	0.149	0.207	0.122	0.03
183	15.25	0.80	0.149	0.205	0.122	0.03
184	15.33	0.77	0.143	0.204	0.117	0.03
185	15.42	0.77	0.143	0.203	0.117	0.03
186	15.50	0.77	0.143	0.202	0.117	0.03
187	15.58	0.63	0.118	0.201	0.097	0.02
188	15.67	0.63	0.118	0.200	0.097	0.02
189	15.75	0.63	0.118	0.199	0.097	0.02
190	15.83	0.63	0.118	0.198	0.097	0.02
191	15.92	0.63	0.118	0.197	0.097	0.02
192	16.00	0.63	0.118	0.196	0.097	0.02
193	16.08	0.13	0.025	0.195	0.020	0.00
194	16.17	0.13	0.025	0.194	0.020	0.00
195	16.25	0.13	0.025	0.193	0.020	0.00
196	16.33	0.13	0.025	0.192	0.020	0.00
97	16.42	0.13	0.025	0.191	0.020	0.00
8	16.50	0.13	0.025	0.190	0.020	0.00
99	16.58	0.10	0.019	0.189	0.015	0.00
200	16.67	0.10	0.019	0.188	0.015	0.00
201	16.75	0.10	0.019	0.187	0.015	0.00
202	16.83	0.10	0.019	0.186	0.015	0.00
203	16.92	0.10	0.019	0.185	0.015	0.00
204	17.00	0.10	0.019	0.185	0.015	0.00
205	17.08	0.17	0.031	0.184	0.025	0.01
206	17.17	0.17	0.031	0.183	0.025	0.01
207	17.25	0.17	0.031	0.182	0.025	0.01
208	17.33	0.17	0.031	0.181	0.025	0.01
209	17.42	0.17	0.031	0.180	0.025	0.01
210	17.50	0.17	0.031	0.179	0.025	0.01
211	17.58	0.17	0.031	0.178	0.025	0.01
212	17.67	0.17	0.031	0.177	0.025	0.01
213	17.75	0.17	0.031	0.176	0.025	0.01
214	17.83	0.13	0.025	0.175	0.020	0.00
215	17.92	0.13	0.025	0.175	0.020	0.00
216	18.00	0.13	0.025	0.174	0.020	0.00
217	18.08	0.13	0.025	0.173	0.020	0.00
218	18.17	0.13	0.025	0.172	0.020	0.00
219	18.25	0.13	0.025	0.171	0.020	0.00
220	18.33	0.13	0.025	0.170	0.020	0.00
221	18.42	0.13	0.025	0.170	0.020	0.00
222	18.50	0.13	0.025	0.169	0.020	0.00
223	18.58	0.10	0.019	0.168	0.015	0.00
224	18.67	0.10	0.019	0.167	0.015	0.00
225	18.75	0.10	0.019	0.166	0.015	0.00
226	18.83	0.07	0.012	0.165	0.010	0.00
227	18.92	0.07	0.012	0.165	0.010	0.00
228	19.00	0.07	0.012	0.164	0.010	0.00
229	19.08	0.10	0.019	0.163	0.015	0.00
230	19.17	0.10	0.019	0.162	0.015	0.00
231	19.25	0.10	0.019	0.162	0.015	0.00
232	19.33	0.13	0.025	0.161	0.020	0.00
233	19.42	0.13	0.025	0.160	0.020	0.00
234	19.50	0.13	0.025	0.159	0.020	0.00
235	19.58	0.10	0.019	0.159	0.015	0.00
236	19.67	0.10	0.019	0.158	0.015	0.00
237	19.75	0.10	0.019	0.157	0.015	0.00
8	19.83	0.07	0.012	0.157	0.010	0.00
9	19.92	0.07	0.012	0.156	0.010	0.00

240	20.00	0.07	0.012	0.155	0.010	0.00
241	20.08	0.10	0.019	0.154	0.015	0.00
242	20.17	0.10	0.019	0.154	0.015	0.00
243	20.25	0.10	0.019	0.153	0.015	0.00
244	20.33	0.10	0.019	0.152	0.015	0.00
245	20.42	0.10	0.019	0.152	0.015	0.00
246	20.50	0.10	0.019	0.151	0.015	0.00
247	20.58	0.10	0.019	0.150	0.015	0.00
248	20.67	0.10	0.019	0.150	0.015	0.00
249	20.75	0.10	0.019	0.149	0.015	0.00
250	20.83	0.07	0.012	0.149	0.010	0.00
251	20.92	0.07	0.012	0.148	0.010	0.00
252	21.00	0.07	0.012	0.147	0.010	0.00
253	21.08	0.10	0.019	0.147	0.015	0.00
254	21.17	0.10	0.019	0.146	0.015	0.00
255	21.25	0.10	0.019	0.146	0.015	0.00
256	21.33	0.07	0.012	0.145	0.010	0.00
257	21.42	0.07	0.012	0.145	0.010	0.00
258	21.50	0.07	0.012	0.144	0.010	0.00
259	21.58	0.10	0.019	0.144	0.015	0.00
260	21.67	0.10	0.019	0.143	0.015	0.00
261	21.75	0.10	0.019	0.143	0.015	0.00
262	21.83	0.07	0.012	0.142	0.010	0.00
263	21.92	0.07	0.012	0.142	0.010	0.00
264	22.00	0.07	0.012	0.141	0.010	0.00
265	22.08	0.10	0.019	0.141	0.015	0.00
266	22.17	0.10	0.019	0.140	0.015	0.00
267	22.25	0.10	0.019	0.140	0.015	0.00
268	22.33	0.07	0.012	0.139	0.010	0.00
269	22.42	0.07	0.012	0.139	0.010	0.00
270	22.50	0.07	0.012	0.138	0.010	0.00
271	22.58	0.07	0.012	0.138	0.010	0.00
272	22.67	0.07	0.012	0.138	0.010	0.00
273	22.75	0.07	0.012	0.137	0.010	0.00
274	22.83	0.07	0.012	0.137	0.010	0.00
275	22.92	0.07	0.012	0.137	0.010	0.00
276	23.00	0.07	0.012	0.136	0.010	0.00
277	23.08	0.07	0.012	0.136	0.010	0.00
278	23.17	0.07	0.012	0.136	0.010	0.00
279	23.25	0.07	0.012	0.135	0.010	0.00
280	23.33	0.07	0.012	0.135	0.010	0.00
281	23.42	0.07	0.012	0.135	0.010	0.00
282	23.50	0.07	0.012	0.135	0.010	0.00
283	23.58	0.07	0.012	0.134	0.010	0.00
284	23.67	0.07	0.012	0.134	0.010	0.00
285	23.75	0.07	0.012	0.134	0.010	0.00
286	23.83	0.07	0.012	0.134	0.010	0.00
287	23.92	0.07	0.012	0.134	0.010	0.00
288	24.00	0.07	0.012	0.134	0.010	0.00
Sum =		100.0			Sum =	3.3

```
    Flood volume = Effective rainfall      0.28(In)
     times area      22.9(Ac.)/[(In)/(Ft.)] =      0.5(Ac.Ft)
    Total soil loss =       1.27(In)
    Total soil loss =      2.425(Ac.Ft)
    Total rainfall =       1.55(In)
    Flood volume =       23191.4 Cubic Feet
    Total soil loss =     105649.7 Cubic Feet
    ------------------------------------------------------------------
     Peak flow rate of this hydrograph =       0.876(CFS)
    ------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                   24 - 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   5   Minute intervals ((CFS))

    ------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0         2.5        5.0        7.5        10.0
-----------------------------------------------------------------------
  0+ 5       0.0001      0.02  Q          |          |          |          |
  0+10       0.0004      0.04  Q          |          |          |          |
  0+15       0.0008      0.05  Q          |          |          |          |
  0+20       0.0012      0.06  Q          |          |          |          |
  0+25       0.0017      0.07  Q          |          |          |          |
  0+30       0.0022      0.08  Q          |          |          |          |
  0+35       0.0027      0.08  Q          |          |          |          |
  0+40       0.0032      0.08  Q          |          |          |          |
  0+45       0.0038      0.08  Q          |          |          |          |
  0+50       0.0044      0.09  Q          |          |          |          |
  0+55       0.0051      0.10  Q          |          |          |          |
  1+ 0       0.0058      0.10  Q          |          |          |          |
  1+ 5       0.0064      0.09  Q          |          |          |          |
  1+10       0.0070      0.08  Q          |          |          |          |
  1+15       0.0075      0.08  Q          |          |          |          |
  1+20       0.0080      0.08  Q          |          |          |          |
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1+25	0.0086	0.08	Q				
1+30	0.0091	0.08	Q				
1+35	0.0096	0.08	Q				
1+40	0.0102	0.08	Q				
1+45	0.0107	0.08	Q				
1+50	0.0113	0.09	Q				
1+55	0.0120	0.10	Q				
2+ 0	0.0127	0.10	Q				
2+ 5	0.0134	0.10	QV				
2+10	0.0141	0.10	QV				
2+15	0.0148	0.10	QV				
2+20	0.0155	0.10	QV				
2+25	0.0162	0.10	QV				
2+30	0.0169	0.10	QV				
2+35	0.0177	0.11	QV				
2+40	0.0186	0.12	QV				
2+45	0.0194	0.13	QV				
2+50	0.0203	0.13	QV				
2+55	0.0212	0.13	QV				
3+ 0	0.0221	0.13	QV				
3+ 5	0.0230	0.13	QV				
3+10	0.0239	0.13	QV				
3+15	0.0248	0.13	QV				
3+20	0.0256	0.13	QV				
3+25	0.0265	0.13	QV				
3+30	0.0274	0.13	Q V				
3+35	0.0283	0.13	Q V				
3+40	0.0292	0.13	Q V				
3+45	0.0301	0.13	Q V				
3+50	0.0310	0.14	Q V				
3+55	0.0321	0.15	Q V				
4+ 0	0.0331	0.15	Q V				
4+ 5	0.0342	0.15	Q V				
4+10	0.0352	0.15	Q V				
4+15	0.0363	0.15	Q V				
4+20	0.0374	0.16	Q V				
4+25	0.0386	0.18	Q V				
4+30	0.0399	0.18	Q V				
4+35	0.0411	0.18	Q V				
4+40	0.0424	0.18	Q V				
4+45	0.0436	0.18	Q V				
4+50	0.0449	0.19	Q V				
4+55	0.0463	0.20	Q V				
5+ 0	0.0477	0.20	Q V				
5+ 5	0.0490	0.19	Q V				
5+10	0.0501	0.16	Q V				
5+15	0.0512	0.16	Q V				
5+20	0.0523	0.17	Q V				
5+25	0.0536	0.18	Q V				
5+30	0.0548	0.18	Q V				
5+35	0.0561	0.19	Q V				
5+40	0.0575	0.20	Q V				
5+45	0.0589	0.20	Q V				
5+50	0.0603	0.21	Q V				
5+55	0.0617	0.21	Q V				
6+ 0	0.0631	0.21	Q V				
6+ 5	0.0646	0.22	Q V				
6+10	0.0662	0.23	Q V				
6+15	0.0678	0.23	Q V				
6+20	0.0694	0.23	Q V				
6+25	0.0710	0.23	Q V				
6+30	0.0726	0.23	Q V				
6+35	0.0742	0.24	Q V				
6+40	0.0760	0.25	|Q V				
6+45	0.0777	0.26	|Q V				
6+50	0.0795	0.26	|Q V				
6+55	0.0813	0.26	|Q V				
7+ 0	0.0830	0.26	|Q V				
7+ 5	0.0848	0.26	|Q V				
7+10	0.0866	0.26	|Q V				
7+15	0.0884	0.26	|Q V				
7+20	0.0902	0.27	|Q V				
7+25	0.0921	0.28	|Q V				
7+30	0.0941	0.28	|Q V				
7+35	0.0961	0.29	|Q V				
7+40	0.0982	0.30	|Q V				
7+45	0.1003	0.31	|Q V				
7+50	0.1025	0.32	|Q V				
7+55	0.1048	0.33	|Q V				
8+ 0	0.1071	0.33	|Q V				
8+ 5	0.1095	0.35	|Q V				
8+10	0.1121	0.38	|Q V				
8+15	0.1147	0.38	|Q V				
8+20	0.1174	0.39	|Q V				
8+25	0.1200	0.39	|Q V				

8+30	0.1227	0.39
8+35	0.1254	0.40
8+40	0.1282	0.41
8+45	0.1311	0.41
8+50	0.1340	0.42
8+55	0.1370	0.43
9+ 0	0.1400	0.44
9+ 5	0.1431	0.46
9+10	0.1464	0.48
9+15	0.1498	0.49
9+20	0.1532	0.50
9+25	0.1567	0.51
9+30	0.1602	0.51
9+35	0.1639	0.52
9+40	0.1676	0.54
9+45	0.1713	0.54
9+50	0.1751	0.55
9+55	0.1789	0.56
10+ 0	0.1828	0.57
10+ 5	0.1863	0.50
10+10	0.1891	0.42
10+15	0.1919	0.40
10+20	0.1946	0.39
10+25	0.1972	0.39
10+30	0.1999	0.39
10+35	0.2029	0.43
10+40	0.2063	0.49
10+45	0.2098	0.51
10+50	0.2133	0.51
10+55	0.2169	0.52
11+ 0	0.2204	0.52
11+ 5	0.2239	0.51
11+10	0.2273	0.49
11+15	0.2307	0.49
11+20	0.2341	0.49
11+25	0.2374	0.49
11+30	0.2408	0.49
11+35	0.2440	0.47
11+40	0.2471	0.45
11+45	0.2502	0.44
11+50	0.2532	0.45
11+55	0.2564	0.46
12+ 0	0.2596	0.46
12+ 5	0.2632	0.53
12+10	0.2675	0.61
12+15	0.2718	0.63
12+20	0.2763	0.65
12+25	0.2809	0.67
12+30	0.2855	0.67
12+35	0.2902	0.69
12+40	0.2951	0.71
12+45	0.3001	0.72
12+50	0.3051	0.73
12+55	0.3102	0.74
13+ 0	0.3153	0.75
13+ 5	0.3208	0.79
13+10	0.3267	0.85
13+15	0.3326	0.87
13+20	0.3387	0.87
13+25	0.3447	0.88
13+30	0.3507	0.88
13+35	0.3560	0.77
13+40	0.3605	0.64
13+45	0.3647	0.61
13+50	0.3688	0.60
13+55	0.3729	0.59
14+ 0	0.3770	0.59
14+ 5	0.3813	0.63
14+10	0.3860	0.68
14+15	0.3907	0.69
14+20	0.3954	0.68
14+25	0.4001	0.67
14+30	0.4047	0.67
14+35	0.4093	0.67
14+40	0.4139	0.67
14+45	0.4186	0.67
14+50	0.4231	0.66
14+55	0.4276	0.65
15+ 0	0.4320	0.65
15+ 5	0.4364	0.64
15+10	0.4407	0.62
15+15	0.4450	0.62
15+20	0.4492	0.61
15+25	0.4533	0.60
15+30	0.4574	0.59

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15+35       0.4612      0.56   | Q       |         |         |   V     |
15+40       0.4647      0.51   | Q       |         |         |   V     |
15+45       0.4681      0.50   |Q        |         |         |    V    |
15+50       0.4715      0.49   |Q        |         |         |    V    |
15+55       0.4749      0.49   |Q        |         |         |    V    |
16+ 0       0.4782      0.49   |Q        |         |         |    V    |
16+ 5       0.4806      0.35   |Q        |         |         |     V   |
16+10       0.4818      0.17   Q         |         |         |     V   |
16+15       0.4827      0.13   Q         |         |         |     V   |
16+20       0.4835      0.11   Q         |         |         |     V   |
16+25       0.4842      0.10   Q         |         |         |     V   |
16+30       0.4849      0.10   Q         |         |         |     V   |
16+35       0.4856      0.09   Q         |         |         |     V   |
16+40       0.4861      0.08   Q         |         |         |     V   |
16+45       0.4867      0.08   Q         |         |         |     V   |
16+50       0.4872      0.08   Q         |         |         |     V   |
16+55       0.4877      0.08   Q         |         |         |     V   |
17+ 0       0.4883      0.08   Q         |         |         |     V   |
17+ 5       0.4889      0.10   Q         |         |         |     V   |
17+10       0.4898      0.12   Q         |         |         |     V   |
17+15       0.4906      0.13   Q         |         |         |     V   |
17+20       0.4915      0.13   Q         |         |         |     V   |
17+25       0.4924      0.13   Q         |         |         |     V   |
17+30       0.4933      0.13   Q         |         |         |      V  |
17+35       0.4942      0.13   Q         |         |         |      V  |
17+40       0.4950      0.13   Q         |         |         |      V  |
17+45       0.4959      0.13   Q         |         |         |      V  |
17+50       0.4968      0.12   Q         |         |         |      V  |
17+55       0.4975      0.11   Q         |         |         |      V  |
18+ 0       0.4982      0.10   Q         |         |         |      V  |
18+ 5       0.4989      0.10   Q         |         |         |      V  |
18+10       0.4996      0.10   Q         |         |         |      V  |
18+15       0.5003      0.10   Q         |         |         |      V  |
18+20       0.5011      0.10   Q         |         |         |      V  |
18+25       0.5018      0.10   Q         |         |         |      V  |
18+30       0.5025      0.10   Q         |         |         |      V  |
18+35       0.5031      0.09   Q         |         |         |      V  |
18+40       0.5037      0.08   Q         |         |         |      V  |
18+45       0.5042      0.08   Q         |         |         |      V  |
18+50       0.5047      0.07   Q         |         |         |      V  |
18+55       0.5051      0.06   Q         |         |         |      V  |
19+ 0       0.5055      0.05   Q         |         |         |      V  |
19+ 5       0.5059      0.06   Q         |         |         |       V |
19+10       0.5064      0.07   Q         |         |         |       V |
19+15       0.5069      0.08   Q         |         |         |       V |
19+20       0.5075      0.09   Q         |         |         |       V |
19+25       0.5082      0.10   Q         |         |         |       V |
19+30       0.5089      0.10   Q         |         |         |       V |
19+35       0.5095      0.09   Q         |         |         |       V |
19+40       0.5101      0.08   Q         |         |         |       V |
19+45       0.5106      0.08   Q         |         |         |       V |
19+50       0.5111      0.07   Q         |         |         |       V |
19+55       0.5115      0.06   Q         |         |         |       V |
20+ 0       0.5118      0.05   Q         |         |         |       V |
20+ 5       0.5123      0.06   Q         |         |         |       V |
20+10       0.5128      0.07   Q         |         |         |       V |
20+15       0.5133      0.08   Q         |         |         |       V |
20+20       0.5138      0.08   Q         |         |         |       V |
20+25       0.5144      0.08   Q         |         |         |       V |
20+30       0.5149      0.08   Q         |         |         |       V |
20+35       0.5154      0.08   Q         |         |         |       V |
20+40       0.5159      0.08   Q         |         |         |       V |
20+45       0.5165      0.08   Q         |         |         |       V |
20+50       0.5169      0.07   Q         |         |         |       V |
20+55       0.5173      0.06   Q         |         |         |       V |
21+ 0       0.5177      0.05   Q         |         |         |       V |
21+ 5       0.5181      0.06   Q         |         |         |       V |
21+10       0.5186      0.07   Q         |         |         |       V |
21+15       0.5191      0.08   Q         |         |         |        V|
21+20       0.5196      0.07   Q         |         |         |        V|
21+25       0.5200      0.06   Q         |         |         |        V|
21+30       0.5204      0.05   Q         |         |         |        V|
21+35       0.5208      0.06   Q         |         |         |        V|
21+40       0.5213      0.07   Q         |         |         |        V|
21+45       0.5218      0.08   Q         |         |         |        V|
21+50       0.5223      0.07   Q         |         |         |        V|
21+55       0.5227      0.06   Q         |         |         |        V|
22+ 0       0.5230      0.05   Q         |         |         |        V|
22+ 5       0.5235      0.06   Q         |         |         |        V|
22+10       0.5240      0.07   Q         |         |         |        V|
22+15       0.5245      0.08   Q         |         |         |        V|
22+20       0.5249      0.07   Q         |         |         |        V|
22+25       0.5253      0.06   Q         |         |         |        V|
22+30       0.5257      0.05   Q         |         |         |        V|
22+35       0.5260      0.05   Q         |         |         |        V|
```

22+40	0.5264	0.05	Q					V
22+45	0.5268	0.05	Q					V
22+50	0.5271	0.05	Q					V
22+55	0.5275	0.05	Q					V
23+ 0	0.5278	0.05	Q					V
23+ 5	0.5282	0.05	Q					V
23+10	0.5285	0.05	Q					V
23+15	0.5289	0.05	Q					V
23+20	0.5292	0.05	Q					V
23+25	0.5296	0.05	Q					V
23+30	0.5300	0.05	Q					V
23+35	0.5303	0.05	Q					V
23+40	0.5307	0.05	Q					V
23+45	0.5310	0.05	Q					V
23+50	0.5314	0.05	Q					V
23+55	0.5317	0.05	Q					V
24+ 0	0.5321	0.05	Q					V
24+ 5	0.5323	0.03	Q					V
24+10	0.5324	0.01	Q					V
24+15	0.5324	0.00	Q					V
24+20	0.5324	0.00	Q					V

UNIT HYDROGRAPH-EXISTING CONDITION
10 YR-24 HOUR

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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               Study date  11/17/10 File: BE1UH2410.out

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-----------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N   615

--------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format


--------------------------------------------------------------------
TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (EXISTING CONDITION)
AREA "B" FOR AREAS "B1" & "B2"
10 YEAR - 24 HOUR
FN: BE1UH2410
--------------------------------------------------------------------
Drainage Area =      22.90(Ac.)  =      0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      22.90(Ac.)  =      0.036 Sq. Mi.
Length along longest watercourse =    2025.00(Ft.)
Length along longest watercourse measured to centroid =   1140.00(Ft.)
Length along longest watercourse =      0.384 Mi.
Length along longest watercourse measured to centroid =     0.216 Mi.
Difference in elevation =      83.00(Ft.)
Slope along watercourse =   216.4148 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.050 Hr.
Lag time =     3.02 Min.
25% of lag time =     0.75 Min.
40% of lag time =     1.21 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
       22.90              1.55                 35.49

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
       22.90              4.80                109.92

STORM EVENT (YEAR) =   10.00
Area Averaged 2-Year Rainfall =    1.550(In)
Area Averaged 100-Year Rainfall =    4.800(In)

Point rain (area averaged) =    2.887(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.887(In)

Sub-Area Data:
Area(Ac.)          Runoff Index   Impervious %
    22.900             75.80          0.100
 Total Area Entered =     22.90(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2    (In/Hr)    (Dec.%)      (In/Hr)       (Dec.)   (In/Hr)
75.8  75.8     0.294     0.100        0.267        1.000     0.267
                                                 Sum (F) =   0.267
Area averaged mean soil loss (F) (In/Hr) =  0.267
Minimum soil loss rate ((In/Hr)) =  0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.820
--------------------------------------------------------------------

                U n i t   H y d r o g r a p h
                        VALLEY S-Curve
--------------------------------------------------------------------
```

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	165.713	36.773	8.487
2	0.167	331.426	45.837	10.579
3	0.250	497.140	10.346	2.388
4	0.333	662.853	4.400	1.015
5	0.417	828.566	2.644	0.610
			Sum = 100.000	Sum= 23.079

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.023	0.474	0.019	0.00
2	0.17	0.07	0.023	0.472	0.019	0.00
3	0.25	0.07	0.023	0.470	0.019	0.00
4	0.33	0.10	0.035	0.468	0.028	0.01
5	0.42	0.10	0.035	0.466	0.028	0.01
6	0.50	0.10	0.035	0.464	0.028	0.01
7	0.58	0.10	0.035	0.463	0.028	0.01
8	0.67	0.10	0.035	0.461	0.028	0.01
9	0.75	0.10	0.035	0.459	0.028	0.01
10	0.83	0.13	0.046	0.457	0.038	0.01
11	0.92	0.13	0.046	0.455	0.038	0.01
12	1.00	0.13	0.046	0.454	0.038	0.01
13	1.08	0.10	0.035	0.452	0.028	0.01
14	1.17	0.10	0.035	0.450	0.028	0.01
15	1.25	0.10	0.035	0.448	0.028	0.01
16	1.33	0.10	0.035	0.446	0.028	0.01
17	1.42	0.10	0.035	0.445	0.028	0.01
18	1.50	0.10	0.035	0.443	0.028	0.01
19	1.58	0.10	0.035	0.441	0.028	0.01
20	1.67	0.10	0.035	0.439	0.028	0.01
21	1.75	0.10	0.035	0.438	0.028	0.01
22	1.83	0.13	0.046	0.436	0.038	0.01
23	1.92	0.13	0.046	0.434	0.038	0.01
24	2.00	0.13	0.046	0.432	0.038	0.01
25	2.08	0.13	0.046	0.431	0.038	0.01
26	2.17	0.13	0.046	0.429	0.038	0.01
27	2.25	0.13	0.046	0.427	0.038	0.01
28	2.33	0.13	0.046	0.425	0.038	0.01
29	2.42	0.13	0.046	0.424	0.038	0.01
30	2.50	0.13	0.046	0.422	0.038	0.01
31	2.58	0.17	0.058	0.420	0.047	0.01
32	2.67	0.17	0.058	0.418	0.047	0.01
33	2.75	0.17	0.058	0.417	0.047	0.01
34	2.83	0.17	0.058	0.415	0.047	0.01
35	2.92	0.17	0.058	0.413	0.047	0.01
36	3.00	0.17	0.058	0.412	0.047	0.01
37	3.08	0.17	0.058	0.410	0.047	0.01
38	3.17	0.17	0.058	0.408	0.047	0.01
39	3.25	0.17	0.058	0.406	0.047	0.01
40	3.33	0.17	0.058	0.405	0.047	0.01
41	3.42	0.17	0.058	0.403	0.047	0.01
42	3.50	0.17	0.058	0.401	0.047	0.01
43	3.58	0.17	0.058	0.400	0.047	0.01
44	3.67	0.17	0.058	0.398	0.047	0.01
45	3.75	0.17	0.058	0.396	0.047	0.01
46	3.83	0.20	0.069	0.395	0.057	0.01
47	3.92	0.20	0.069	0.393	0.057	0.01
48	4.00	0.20	0.069	0.391	0.057	0.01
49	4.08	0.20	0.069	0.390	0.057	0.01
50	4.17	0.20	0.069	0.388	0.057	0.01
51	4.25	0.20	0.069	0.386	0.057	0.01
52	4.33	0.23	0.081	0.385	0.066	0.01
53	4.42	0.23	0.081	0.383	0.066	0.01
54	4.50	0.23	0.081	0.381	0.066	0.01
55	4.58	0.23	0.081	0.380	0.066	0.01
56	4.67	0.23	0.081	0.378	0.066	0.01
57	4.75	0.23	0.081	0.377	0.066	0.01
58	4.83	0.27	0.092	0.375	0.076	0.02
59	4.92	0.27	0.092	0.373	0.076	0.02
60	5.00	0.27	0.092	0.372	0.076	0.02
61	5.08	0.20	0.069	0.370	0.057	0.01
62	5.17	0.20	0.069	0.369	0.057	0.01
63	5.25	0.20	0.069	0.367	0.057	0.01
64	5.33	0.23	0.081	0.365	0.066	0.01
65	5.42	0.23	0.081	0.364	0.066	0.01
66	5.50	0.23	0.081	0.362	0.066	0.01
67	5.58	0.27	0.092	0.361	0.076	0.02
68	5.67	0.27	0.092	0.359	0.076	0.02
69	5.75	0.27	0.092	0.357	0.076	0.02

70	5.83	0.27	0.092	0.356	0.076	0.02
71	5.92	0.27	0.092	0.354	0.076	0.02
72	6.00	0.27	0.092	0.353	0.076	0.02
73	6.08	0.30	0.104	0.351	0.085	0.02
74	6.17	0.30	0.104	0.349	0.085	0.02
75	6.25	0.30	0.104	0.348	0.085	0.02
76	6.33	0.30	0.104	0.346	0.085	0.02
77	6.42	0.30	0.104	0.345	0.085	0.02
78	6.50	0.30	0.104	0.343	0.085	0.02
79	6.58	0.33	0.115	0.342	0.095	0.02
80	6.67	0.33	0.115	0.340	0.095	0.02
81	6.75	0.33	0.115	0.339	0.095	0.02
82	6.83	0.33	0.115	0.337	0.095	0.02
83	6.92	0.33	0.115	0.336	0.095	0.02
84	7.00	0.33	0.115	0.334	0.095	0.02
85	7.08	0.33	0.115	0.333	0.095	0.02
86	7.17	0.33	0.115	0.331	0.095	0.02
87	7.25	0.33	0.115	0.330	0.095	0.02
88	7.33	0.37	0.127	0.328	0.104	0.02
89	7.42	0.37	0.127	0.327	0.104	0.02
90	7.50	0.37	0.127	0.325	0.104	0.02
91	7.58	0.40	0.139	0.324	0.114	0.02
92	7.67	0.40	0.139	0.322	0.114	0.02
93	7.75	0.40	0.139	0.321	0.114	0.02
94	7.83	0.43	0.150	0.319	0.123	0.03
95	7.92	0.43	0.150	0.318	0.123	0.03
96	8.00	0.43	0.150	0.316	0.123	0.03
97	8.08	0.50	0.173	0.315	0.142	0.03
98	8.17	0.50	0.173	0.313	0.142	0.03
99	8.25	0.50	0.173	0.312	0.142	0.03
100	8.33	0.50	0.173	0.310	0.142	0.03
101	8.42	0.50	0.173	0.309	0.142	0.03
102	8.50	0.50	0.173	0.307	0.142	0.03
103	8.58	0.53	0.185	0.306	0.152	0.03
104	8.67	0.53	0.185	0.305	0.152	0.03
105	8.75	0.53	0.185	0.303	0.152	0.03
106	8.83	0.57	0.196	0.302	0.161	0.04
107	8.92	0.57	0.196	0.300	0.161	0.04
108	9.00	0.57	0.196	0.299	0.161	0.04
109	9.08	0.63	0.219	0.297	0.180	0.04
110	9.17	0.63	0.219	0.296	0.180	0.04
111	9.25	0.63	0.219	0.295	0.180	0.04
112	9.33	0.67	0.231	0.293	0.189	0.04
3	9.42	0.67	0.231	0.292	0.189	0.04
14	9.50	0.67	0.231	0.290	0.189	0.04
115	9.58	0.70	0.243	0.289	0.199	0.04
116	9.67	0.70	0.243	0.288	0.199	0.04
117	9.75	0.70	0.243	0.286	0.199	0.04
118	9.83	0.73	0.254	0.285	0.208	0.05
119	9.92	0.73	0.254	0.283	0.208	0.05
120	10.00	0.73	0.254	0.282	0.208	0.05
121	10.08	0.50	0.173	0.281	0.142	0.03
122	10.17	0.50	0.173	0.279	0.142	0.03
123	10.25	0.50	0.173	0.278	0.142	0.03
124	10.33	0.50	0.173	0.277	0.142	0.03
125	10.42	0.50	0.173	0.275	0.142	0.03
126	10.50	0.50	0.173	0.274	0.142	0.03
127	10.58	0.67	0.231	0.273	0.189	0.04
128	10.67	0.67	0.231	0.271	0.189	0.04
129	10.75	0.67	0.231	0.270	0.189	0.04
130	10.83	0.67	0.231	0.269	0.189	0.04
131	10.92	0.67	0.231	0.267	0.189	0.04
132	11.00	0.67	0.231	0.266	0.189	0.04
133	11.08	0.63	0.219	0.265	0.180	0.04
134	11.17	0.63	0.219	0.263	0.180	0.04
135	11.25	0.63	0.219	0.262	0.180	0.04
136	11.33	0.63	0.219	0.261	0.180	0.04
137	11.42	0.63	0.219	0.260	0.180	0.04
138	11.50	0.63	0.219	0.258	0.180	0.04
139	11.58	0.57	0.196	0.257	0.161	0.04
140	11.67	0.57	0.196	0.256	0.161	0.04
141	11.75	0.57	0.196	0.254	0.161	0.04
142	11.83	0.60	0.208	0.253	0.170	0.04
143	11.92	0.60	0.208	0.252	0.170	0.04
144	12.00	0.60	0.208	0.251	0.170	0.04
145	12.08	0.83	0.289	0.249	---	0.04
146	12.17	0.83	0.289	0.248	---	0.04
147	12.25	0.83	0.289	0.247	---	0.04
148	12.33	0.87	0.300	0.246	---	0.05
149	12.42	0.87	0.300	0.244	---	0.06
150	12.50	0.87	0.300	0.243	---	0.06
151	12.58	0.93	0.323	0.242	---	0.08
152	12.67	0.93	0.323	0.241	---	0.08
3	12.75	0.93	0.323	0.240	---	0.08
4	12.83	0.97	0.335	0.238	---	0.10

155	12.92	0.97	0.335	0.237	---	0.10
156	13.00	0.97	0.335	0.236	---	0.10
57	13.08	1.13	0.393	0.235	---	0.16
58	13.17	1.13	0.393	0.234	---	0.16
159	13.25	1.13	0.393	0.232	---	0.16
160	13.33	1.13	0.393	0.231	---	0.16
161	13.42	1.13	0.393	0.230	---	0.16
162	13.50	1.13	0.393	0.229	---	0.16
163	13.58	0.77	0.266	0.228	---	0.04
164	13.67	0.77	0.266	0.226	---	0.04
165	13.75	0.77	0.266	0.225	---	0.04
166	13.83	0.77	0.266	0.224	---	0.04
167	13.92	0.77	0.266	0.223	---	0.04
168	14.00	0.77	0.266	0.222	---	0.04
169	14.08	0.90	0.312	0.221	---	0.09
170	14.17	0.90	0.312	0.220	---	0.09
171	14.25	0.90	0.312	0.219	---	0.09
172	14.33	0.87	0.300	0.217	---	0.08
173	14.42	0.87	0.300	0.216	---	0.08
174	14.50	0.87	0.300	0.215	---	0.09
175	14.58	0.87	0.300	0.214	---	0.09
176	14.67	0.87	0.300	0.213	---	0.09
177	14.75	0.87	0.300	0.212	---	0.09
178	14.83	0.83	0.289	0.211	---	0.08
179	14.92	0.83	0.289	0.210	---	0.08
180	15.00	0.83	0.289	0.209	---	0.08
181	15.08	0.80	0.277	0.208	---	0.07
182	15.17	0.80	0.277	0.207	---	0.07
183	15.25	0.80	0.277	0.205	---	0.07
184	15.33	0.77	0.266	0.204	---	0.06
185	15.42	0.77	0.266	0.203	---	0.06
186	15.50	0.77	0.266	0.202	---	0.06
187	15.58	0.63	0.219	0.201	---	0.02
188	15.67	0.63	0.219	0.200	---	0.02
189	15.75	0.63	0.219	0.199	---	0.02
190	15.83	0.63	0.219	0.198	---	0.02
191	15.92	0.63	0.219	0.197	---	0.02
192	16.00	0.63	0.219	0.196	---	0.02
193	16.08	0.13	0.046	0.195	0.038	0.01
194	16.17	0.13	0.046	0.194	0.038	0.01
195	16.25	0.13	0.046	0.193	0.038	0.01
196	16.33	0.13	0.046	0.192	0.038	0.01
97	16.42	0.13	0.046	0.191	0.038	0.01
8	16.50	0.13	0.046	0.190	0.038	0.01
99	16.58	0.10	0.035	0.189	0.028	0.01
200	16.67	0.10	0.035	0.188	0.028	0.01
201	16.75	0.10	0.035	0.187	0.028	0.01
202	16.83	0.10	0.035	0.186	0.028	0.01
203	16.92	0.10	0.035	0.185	0.028	0.01
204	17.00	0.10	0.035	0.185	0.028	0.01
205	17.08	0.17	0.058	0.184	0.047	0.01
206	17.17	0.17	0.058	0.183	0.047	0.01
207	17.25	0.17	0.058	0.182	0.047	0.01
208	17.33	0.17	0.058	0.181	0.047	0.01
209	17.42	0.17	0.058	0.180	0.047	0.01
210	17.50	0.17	0.058	0.179	0.047	0.01
211	17.58	0.17	0.058	0.178	0.047	0.01
212	17.67	0.17	0.058	0.177	0.047	0.01
213	17.75	0.17	0.058	0.176	0.047	0.01
214	17.83	0.13	0.046	0.175	0.038	0.01
215	17.92	0.13	0.046	0.175	0.038	0.01
216	18.00	0.13	0.046	0.174	0.038	0.01
217	18.08	0.13	0.046	0.173	0.038	0.01
218	18.17	0.13	0.046	0.172	0.038	0.01
219	18.25	0.13	0.046	0.171	0.038	0.01
220	18.33	0.13	0.046	0.170	0.038	0.01
221	18.42	0.13	0.046	0.170	0.038	0.01
222	18.50	0.13	0.046	0.169	0.038	0.01
223	18.58	0.10	0.035	0.168	0.028	0.01
224	18.67	0.10	0.035	0.167	0.028	0.01
225	18.75	0.10	0.035	0.166	0.028	0.01
226	18.83	0.07	0.023	0.165	0.019	0.00
227	18.92	0.07	0.023	0.165	0.019	0.00
228	19.00	0.07	0.023	0.164	0.019	0.00
229	19.08	0.10	0.035	0.163	0.028	0.01
230	19.17	0.10	0.035	0.162	0.028	0.01
231	19.25	0.10	0.035	0.162	0.028	0.01
232	19.33	0.13	0.046	0.161	0.038	0.01
233	19.42	0.13	0.046	0.160	0.038	0.01
234	19.50	0.13	0.046	0.159	0.038	0.01
235	19.58	0.10	0.035	0.159	0.028	0.01
236	19.67	0.10	0.035	0.158	0.028	0.01
237	19.75	0.10	0.035	0.157	0.028	0.01
8	19.83	0.07	0.023	0.157	0.019	0.00
9	19.92	0.07	0.023	0.156	0.019	0.00

240	20.00	0.07	0.023	0.155	0.019	0.00
241	20.08	0.10	0.035	0.154	0.028	0.01
242	20.17	0.10	0.035	0.154	0.028	0.01
243	20.25	0.10	0.035	0.153	0.028	0.01
244	20.33	0.10	0.035	0.152	0.028	0.01
245	20.42	0.10	0.035	0.152	0.028	0.01
246	20.50	0.10	0.035	0.151	0.028	0.01
247	20.58	0.10	0.035	0.150	0.028	0.01
248	20.67	0.10	0.035	0.150	0.028	0.01
249	20.75	0.10	0.035	0.149	0.028	0.01
250	20.83	0.07	0.023	0.149	0.019	0.00
251	20.92	0.07	0.023	0.148	0.019	0.00
252	21.00	0.07	0.023	0.147	0.019	0.00
253	21.08	0.10	0.035	0.147	0.028	0.01
254	21.17	0.10	0.035	0.146	0.028	0.01
255	21.25	0.10	0.035	0.146	0.028	0.01
256	21.33	0.07	0.023	0.145	0.019	0.00
257	21.42	0.07	0.023	0.145	0.019	0.00
258	21.50	0.07	0.023	0.144	0.019	0.00
259	21.58	0.10	0.035	0.144	0.028	0.01
260	21.67	0.10	0.035	0.143	0.028	0.01
261	21.75	0.10	0.035	0.143	0.028	0.01
262	21.83	0.07	0.023	0.142	0.019	0.00
263	21.92	0.07	0.023	0.142	0.019	0.00
264	22.00	0.07	0.023	0.141	0.019	0.00
265	22.08	0.10	0.035	0.141	0.028	0.01
266	22.17	0.10	0.035	0.140	0.028	0.01
267	22.25	0.10	0.035	0.140	0.028	0.01
268	22.33	0.07	0.023	0.139	0.019	0.00
269	22.42	0.07	0.023	0.139	0.019	0.00
270	22.50	0.07	0.023	0.138	0.019	0.00
271	22.58	0.07	0.023	0.138	0.019	0.00
272	22.67	0.07	0.023	0.138	0.019	0.00
273	22.75	0.07	0.023	0.137	0.019	0.00
274	22.83	0.07	0.023	0.137	0.019	0.00
275	22.92	0.07	0.023	0.137	0.019	0.00
276	23.00	0.07	0.023	0.136	0.019	0.00
277	23.08	0.07	0.023	0.136	0.019	0.00
278	23.17	0.07	0.023	0.136	0.019	0.00
279	23.25	0.07	0.023	0.135	0.019	0.00
280	23.33	0.07	0.023	0.135	0.019	0.00
281	23.42	0.07	0.023	0.135	0.019	0.00
282	23.50	0.07	0.023	0.135	0.019	0.00
283	23.58	0.07	0.023	0.134	0.019	0.00
284	23.67	0.07	0.023	0.134	0.019	0.00
285	23.75	0.07	0.023	0.134	0.019	0.00
286	23.83	0.07	0.023	0.134	0.019	0.00
287	23.92	0.07	0.023	0.134	0.019	0.00
288	24.00	0.07	0.023	0.134	0.019	0.00
Sum =		100.0			Sum =	7.3

```
        Flood volume = Effective rainfall      0.61(In)
         times area      22.9(Ac.)/[(In)/(Ft.)] =       1.2(Ac.Ft)
        Total soil loss =       2.28(In)
        Total soil loss =      4.354(Ac.Ft)
        Total rainfall =       2.89(In)
        Flood volume =       50315.0 Cubic Feet
        Total soil loss =      189668.2 Cubic Feet
        --------------------------------------------------------------------
         Peak flow rate of this hydrograph =       3.758(CFS)
        --------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - 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   5   Minute intervals ((CFS))

        --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5        5.0        7.5       10.0
 -----------------------------------------------------------------------
   0+ 5       0.0002      0.04  Q          |          |          |          |
   0+10       0.0008      0.08  Q          |          |          |          |
   0+15       0.0014      0.09  Q          |          |          |          |
   0+20       0.0022      0.11  Q          |          |          |          |
   0+25       0.0031      0.14  Q          |          |          |          |
   0+30       0.0041      0.14  Q          |          |          |          |
   0+35       0.0051      0.14  Q          |          |          |          |
   0+40       0.0060      0.14  Q          |          |          |          |
   0+45       0.0070      0.14  Q          |          |          |          |
   0+50       0.0082      0.16  Q          |          |          |          |
   0+55       0.0094      0.18  Q          |          |          |          |
   1+ 0       0.0107      0.19  Q          |          |          |          |
   1+ 5       0.0119      0.17  Q          |          |          |          |
   1+10       0.0130      0.15  Q          |          |          |          |
   1+15       0.0140      0.15  Q          |          |          |          |
   1+20       0.0150      0.15  Q          |          |          |          |
```

1+25	0.0160	0.14	Q				
1+30	0.0170	0.14	Q				
1+35	0.0179	0.14	Q				
1+40	0.0189	0.14	Q				
1+45	0.0199	0.14	Q				
1+50	0.0210	0.16	Q				
1+55	0.0223	0.18	Q				
2+ 0	0.0236	0.19	Q				
2+ 5	0.0249	0.19	Q				
2+10	0.0262	0.19	Q				
2+15	0.0276	0.19	Q				
2+20	0.0289	0.19	QV				
2+25	0.0302	0.19	QV				
2+30	0.0315	0.19	QV				
2+35	0.0330	0.21	QV				
2+40	0.0346	0.23	QV				
2+45	0.0362	0.24	QV				
2+50	0.0378	0.24	QV				
2+55	0.0395	0.24	QV				
3+ 0	0.0411	0.24	QV				
3+ 5	0.0428	0.24	QV				
3+10	0.0445	0.24	QV				
3+15	0.0461	0.24	QV				
3+20	0.0478	0.24	QV				
3+25	0.0494	0.24	QV				
3+30	0.0511	0.24	QV				
3+35	0.0527	0.24	QV				
3+40	0.0544	0.24	QV				
3+45	0.0560	0.24	QV				
3+50	0.0578	0.26	|QV				
3+55	0.0597	0.28	|QV				
4+ 0	0.0617	0.28	|QV				
4+ 5	0.0637	0.29	|QV				
4+10	0.0656	0.29	|QV				
4+15	0.0676	0.29	|QV				
4+20	0.0697	0.31	|QV				
4+25	0.0720	0.33	|QV				
4+30	0.0743	0.33	|QV				
4+35	0.0766	0.33	|QV				
4+40	0.0789	0.34	|QV				
4+45	0.0812	0.34	|QV				
4+50	0.0836	0.35	|QV				
4+55	0.0862	0.38	|QV				
5+ 0	0.0889	0.38	|Q V				
5+ 5	0.0912	0.35	|Q V				
5+10	0.0933	0.30	|Q V				
5+15	0.0954	0.29	|Q V				
5+20	0.0975	0.31	|Q V				
5+25	0.0998	0.33	|Q V				
5+30	0.1020	0.33	|Q V				
5+35	0.1045	0.35	|Q V				
5+40	0.1071	0.38	|Q V				
5+45	0.1097	0.38	|Q V				
5+50	0.1123	0.38	|Q V				
5+55	0.1150	0.38	|Q V				
6+ 0	0.1176	0.38	|Q V				
6+ 5	0.1204	0.40	|Q V				
6+10	0.1233	0.42	|Q V				
6+15	0.1262	0.43	|Q V				
6+20	0.1292	0.43	|Q V				
6+25	0.1322	0.43	|Q V				
6+30	0.1352	0.43	|Q V				
6+35	0.1383	0.45	|Q V				
6+40	0.1415	0.47	|Q V				
6+45	0.1448	0.48	|Q V				
6+50	0.1481	0.48	|Q V				
6+55	0.1514	0.48	|Q V				
7+ 0	0.1547	0.48	|Q V				
7+ 5	0.1580	0.48	|Q V				
7+10	0.1613	0.48	|Q V				
7+15	0.1646	0.48	|Q V				
7+20	0.1680	0.50	|Q V				
7+25	0.1716	0.52	| Q V				
7+30	0.1752	0.52	| Q V				
7+35	0.1790	0.54	| Q V				
7+40	0.1829	0.57	| Q V				
7+45	0.1868	0.57	| Q V				
7+50	0.1909	0.59	| Q V				
7+55	0.1951	0.62	| Q V				
8+ 0	0.1994	0.62	| Q V				
8+ 5	0.2040	0.66	| Q V				
8+10	0.2088	0.70	| Q V				
8+15	0.2137	0.71	| Q V				
8+20	0.2186	0.72	| Q V				
8+25	0.2236	0.72	| Q V				

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  8+30     0.2286     0.72  | Q    V  |         |         |         |
  8+35     0.2336     0.74  | Q     V |         |         |         |
  8+40     0.2389     0.76  |  Q    V |         |         |         |
  8+45     0.2441     0.76  |  Q    V |         |         |         |
  8+50     0.2495     0.78  |  Q    V |         |         |         |
  8+55     0.2551     0.81  |  Q    V |         |         |         |
  9+ 0     0.2607     0.81  |  Q     V|         |         |         |
  9+ 5     0.2666     0.85  |  Q     V|         |         |         |
  9+10     0.2727     0.90  |  Q     V|         |         |         |
  9+15     0.2790     0.91  |  Q     V|         |         |         |
  9+20     0.2853     0.93  |  Q     V|         |         |         |
  9+25     0.2919     0.95  |  Q      V         |         |         |
  9+30     0.2985     0.96  |  Q      V         |         |         |
  9+35     0.3052     0.98  |  Q      V         |         |         |
  9+40     0.3121     1.00  |  Q      V         |         |         |
  9+45     0.3190     1.00  |   Q     |V        |         |         |
  9+50     0.3261     1.02  |   Q     |V        |         |         |
  9+55     0.3333     1.05  |   Q     |V        |         |         |
 10+ 0     0.3405     1.05  |   Q     |V        |         |         |
 10+ 5     0.3469     0.93  |  Q      | V       |         |         |
 10+10     0.3523     0.78  |  Q      | V       |         |         |
 10+15     0.3574     0.74  | Q       | V       |         |         |
 10+20     0.3624     0.73  | Q       | V       |         |         |
 10+25     0.3674     0.72  | Q       | V       |         |         |
 10+30     0.3724     0.72  | Q       | V       |         |         |
 10+35     0.3779     0.81  |  Q      |  V      |         |         |
 10+40     0.3842     0.92  |  Q      |  V      |         |         |
 10+45     0.3907     0.94  |  Q      |  V      |         |         |
 10+50     0.3973     0.95  |  Q      |  V      |         |         |
 10+55     0.4039     0.96  |  Q      |  V      |         |         |
 11+ 0     0.4105     0.96  |  Q      |   V     |         |         |
 11+ 5     0.4170     0.94  |  Q      |   V     |         |         |
 11+10     0.4234     0.92  |  Q      |   V     |         |         |
 11+15     0.4297     0.92  |  Q      |   V     |         |         |
 11+20     0.4360     0.91  |  Q      |    V    |         |         |
 11+25     0.4422     0.91  |  Q      |    V    |         |         |
 11+30     0.4485     0.91  |  Q      |    V    |         |         |
 11+35     0.4545     0.88  |  Q      |    V    |         |         |
 11+40     0.4603     0.83  |  Q      |    V    |         |         |
 11+45     0.4659     0.82  |  Q      |     V   |         |         |
 11+50     0.4717     0.84  |  Q      |     V   |         |         |
 11+55     0.4776     0.86  |  Q      |     V   |         |         |
 12+ 0     0.4835     0.86  |  Q      |     V   |         |         |
 12+ 5     0.4896     0.88  |  Q      |     V   |         |         |
 12+10     0.4959     0.91  |  Q      |      V  |         |         |
 12+15     0.5023     0.94  |  Q      |      V  |         |         |
 12+20     0.5097     1.07  |   Q     |      V  |         |         |
 12+25     0.5180     1.22  |   Q     |      V  |         |         |
 12+30     0.5268     1.27  |    Q    |       V |         |         |
 12+35     0.5372     1.51  |     Q   |       V |         |         |
 12+40     0.5495     1.79  |      Q  |        V|         |         |
 12+45     0.5624     1.87  |      Q  |        V|         |         |
 12+50     0.5764     2.02  |       Q |        V|         |         |
 12+55     0.5914     2.19  |       Q |         V         |         |
 13+ 0     0.6069     2.24  |       Q |         |V        |         |
 13+ 5     0.6259     2.77  |         |Q        |V        |         |
 13+10     0.6495     3.42  |         |  Q      | V       |         |
 13+15     0.6742     3.58  |         |   Q     |  V      |         |
 13+20     0.6994     3.67  |         |   Q     |   V     |         |
 13+25     0.7251     3.73  |         |   Q     |    V    |         |
 13+30     0.7510     3.76  |         |    Q    |     V   |         |
 13+35     0.7696     2.71  |         Q         |     V   |         |
 13+40     0.7792     1.39  |    Q    |         |     V   |         |
 13+45     0.7869     1.11  |   Q     |         |      V  |         |
 13+50     0.7938     1.01  |   Q     |         |      V  |         |
 13+55     0.8004     0.96  |  Q      |         |      V  |         |
 14+ 0     0.8072     0.99  |  Q      |         |      V  |         |
 14+ 5     0.8169     1.40  |    Q    |         |       V |         |
 14+10     0.8301     1.92  |      Q  |         |       V |         |
 14+15     0.8442     2.06  |       Q |         |        V|         |
 14+20     0.8582     2.03  |       Q |         |        V|         |
 14+25     0.8717     1.96  |      Q  |         |         V         |
 14+30     0.8852     1.96  |      Q  |         |         V         |
 14+35     0.8988     1.97  |      Q  |         |         |V        |
 14+40     0.9125     1.99  |      Q  |         |         |V        |
 14+45     0.9264     2.02  |       Q |         |         | V       |
 14+50     0.9398     1.94  |      Q  |         |         | V       |
 14+55     0.9526     1.85  |      Q  |         |         | V       |
 15+ 0     0.9653     1.84  |      Q  |         |         |  V      |
 15+ 5     0.9774     1.76  |      Q  |         |         |  V      |
 15+10     0.9888     1.66  |     Q   |         |         |   V     |
 15+15     1.0002     1.65  |     Q   |         |         |   V     |
 15+20     1.0109     1.57  |     Q   |         |         |    V    |
 15+25     1.0210     1.46  |    Q    |         |         |    V    |
 15+30     1.0311     1.46  |    Q    |         |         |    V    |
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15+35     1.0385    1.08  |   Q     |         |         |    V    |
15+40     1.0427    0.61  | Q       |         |         |     V   |
15+45     1.0462    0.52  | Q       |         |         |     V   |
15+50     1.0497    0.50  |Q        |         |         |     V   |
15+55     1.0531    0.49  |Q        |         |         |     V   |
16+ 0     1.0566    0.52  | Q       |         |         |     V   |
16+ 5     1.0594    0.40  |Q        |         |         |     V   |
16+10     1.0611    0.25  Q         |         |         |     V   |
16+15     1.0626    0.22  Q         |         |         |     V   |
16+20     1.0640    0.20  Q         |         |         |     V   |
16+25     1.0653    0.19  Q         |         |         |     V   |
16+30     1.0666    0.19  Q         |         |         |     V   |
16+35     1.0678    0.17  Q         |         |         |     V   |
16+40     1.0689    0.15  Q         |         |         |      V  |
16+45     1.0699    0.15  Q         |         |         |      V  |
16+50     1.0709    0.15  Q         |         |         |      V  |
16+55     1.0719    0.14  Q         |         |         |      V  |
17+ 0     1.0729    0.14  Q         |         |         |      V  |
17+ 5     1.0741    0.18  Q         |         |         |      V  |
17+10     1.0756    0.22  Q         |         |         |      V  |
17+15     1.0772    0.23  Q         |         |         |      V  |
17+20     1.0789    0.24  Q         |         |         |      V  |
17+25     1.0805    0.24  Q         |         |         |      V  |
17+30     1.0822    0.24  Q         |         |         |      V  |
17+35     1.0838    0.24  Q         |         |         |      V  |
17+40     1.0855    0.24  Q         |         |         |      V  |
17+45     1.0871    0.24  Q         |         |         |      V  |
17+50     1.0887    0.22  Q         |         |         |      V  |
17+55     1.0901    0.20  Q         |         |         |      V  |
18+ 0     1.0914    0.20  Q         |         |         |      V  |
18+ 5     1.0927    0.19  Q         |         |         |      V  |
18+10     1.0940    0.19  Q         |         |         |      V  |
18+15     1.0954    0.19  Q         |         |         |      V  |
18+20     1.0967    0.19  Q         |         |         |      V  |
18+25     1.0980    0.19  Q         |         |         |       V |
18+30     1.0993    0.19  Q         |         |         |       V |
18+35     1.1005    0.17  Q         |         |         |       V |
18+40     1.1016    0.15  Q         |         |         |       V |
18+45     1.1026    0.15  Q         |         |         |       V |
18+50     1.1035    0.13  Q         |         |         |       V |
18+55     1.1042    0.10  Q         |         |         |       V |
19+ 0     1.1049    0.10  Q         |         |         |       V |
19+ 5     1.1057    0.11  Q         |         |         |       V |
19+10     1.1066    0.14  Q         |         |         |       V |
19+15     1.1076    0.14  Q         |         |         |       V |
19+20     1.1087    0.16  Q         |         |         |       V |
19+25     1.1099    0.18  Q         |         |         |       V |
19+30     1.1112    0.19  Q         |         |         |       V |
19+35     1.1124    0.17  Q         |         |         |       V |
19+40     1.1135    0.15  Q         |         |         |       V |
19+45     1.1145    0.15  Q         |         |         |       V |
19+50     1.1154    0.13  Q         |         |         |       V |
19+55     1.1161    0.10  Q         |         |         |       V |
20+ 0     1.1168    0.10  Q         |         |         |       V |
20+ 5     1.1176    0.11  Q         |         |         |       V |
20+10     1.1185    0.14  Q         |         |         |       V |
20+15     1.1195    0.14  Q         |         |         |       V |
20+20     1.1205    0.14  Q         |         |         |       V |
20+25     1.1215    0.14  Q         |         |         |       V |
20+30     1.1224    0.14  Q         |         |         |       V |
20+35     1.1234    0.14  Q         |         |         |       V |
20+40     1.1244    0.14  Q         |         |         |       V |
20+45     1.1254    0.14  Q         |         |         |       V |
20+50     1.1263    0.13  Q         |         |         |        V|
20+55     1.1270    0.10  Q         |         |         |        V|
21+ 0     1.1277    0.10  Q         |         |         |        V|
21+ 5     1.1285    0.11  Q         |         |         |        V|
21+10     1.1294    0.14  Q         |         |         |        V|
21+15     1.1304    0.14  Q         |         |         |        V|
21+20     1.1312    0.13  Q         |         |         |        V|
21+25     1.1320    0.10  Q         |         |         |        V|
21+30     1.1327    0.10  Q         |         |         |        V|
21+35     1.1334    0.11  Q         |         |         |        V|
21+40     1.1344    0.14  Q         |         |         |        V|
21+45     1.1353    0.14  Q         |         |         |        V|
21+50     1.1362    0.13  Q         |         |         |        V|
21+55     1.1369    0.10  Q         |         |         |        V|
22+ 0     1.1376    0.10  Q         |         |         |        V|
22+ 5     1.1384    0.11  Q         |         |         |        V|
22+10     1.1393    0.14  Q         |         |         |        V|
22+15     1.1403    0.14  Q         |         |         |        V|
22+20     1.1412    0.13  Q         |         |         |        V|
22+25     1.1419    0.10  Q         |         |         |        V|
22+30     1.1426    0.10  Q         |         |         |        V|
22+35     1.1432    0.10  Q         |         |         |        V|
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   22+40       1.1439      0.10  Q         |          |          |       V|
   22+45       1.1446      0.10  Q         |          |          |       V|
   22+50       1.1452      0.10  Q         |          |          |       V|
   22+55       1.1459      0.10  Q         |          |          |       V|
   23+ 0       1.1465      0.10  Q         |          |          |       V|
   23+ 5       1.1472      0.10  Q         |          |          |       V|
   23+10       1.1479      0.10  Q         |          |          |       V|
   23+15       1.1485      0.10  Q         |          |          |       V|
   23+20       1.1492      0.10  Q         |          |          |       V|
   23+25       1.1498      0.10  Q         |          |          |       V|
   23+30       1.1505      0.10  Q         |          |          |       V|
   23+35       1.1512      0.10  Q         |          |          |       V|
   23+40       1.1518      0.10  Q         |          |          |       V|
   23+45       1.1525      0.10  Q         |          |          |       V|
   23+50       1.1532      0.10  Q         |          |          |       V|
   23+55       1.1538      0.10  Q         |          |          |       V|
   24+ 0       1.1545      0.10  Q         |          |          |       V|
   24+ 5       1.1549      0.06  Q         |          |          |       V|
   24+10       1.1550      0.02  Q         |          |          |       V|
   24+15       1.1551      0.01  Q         |          |          |       V|
   24+20       1.1551      0.00  Q         |          |          |        V
-----------------------------------------------------------------------
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UNIT HYDROGRAPH-PROPOSED CONDITION
2 YR-24 HOUR

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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                Study date  11/17/10 File: BUHMDP242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N   615

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (PROPOSED CONDITION)
AREA "B" FOR AREAS "B1" & "B2"
2 YEAR - 24 HOUR
FN: BUHMDP242
--------------------------------------------------------------------
Drainage Area =      22.90(Ac.)  =      0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      22.90(Ac.)  =      0.036 Sq. Mi.
Length along longest watercourse =    2025.00(Ft.)
Length along longest watercourse measured to centroid =    1140.00(Ft.)
Length along longest watercourse =      0.384 Mi.
Length along longest watercourse measured to centroid =     0.216 Mi.
Difference in elevation =      83.00(Ft.)
Slope along watercourse =    216.4148 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.050 Hr.
Lag time =     3.02 Min.
25% of lag time =     0.75 Min.
40% of lag time =     1.21 Min.
Unit time =      5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =      0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
       22.90             1.55                  35.49

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
       22.90             4.80                 109.92

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.550(In)
Area Averaged 100-Year Rainfall =    4.800(In)

Point rain (area averaged) =    1.550(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.550(In)

Sub-Area Data:
Area(Ac.)          Runoff Index   Impervious %
     8.000            57.30          0.650
    14.900            59.90          0.650
 Total Area Entered =      22.90(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2    (In/Hr)     (Dec.%)      (In/Hr)        (Dec.)    (In/Hr)
57.3  57.3     0.498      0.650         0.206         0.349     0.072
59.9  59.9     0.471      0.650         0.195         0.651     0.127
                                                 Sum (F) =      0.199
Area averaged mean soil loss (F) (In/Hr) =  0.199
Minimum soil loss rate ((In/Hr)) =  0.100
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.380
---------------------------------------------------------------------

                U n i t   H y d r o g r a p h
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VALLEY S-Curve

Unit Hydrograph Data

	Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	165.713	36.773	8.487
2	0.167	331.426	45.837	10.579
3	0.250	497.140	10.346	2.388
4	0.333	662.853	4.400	1.015
5	0.417	828.566	2.644	0.610
			Sum = 100.000	Sum= 23.079

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.012	0.353	0.005	0.01
2	0.17	0.07	0.012	0.352	0.005	0.01
3	0.25	0.07	0.012	0.351	0.005	0.01
4	0.33	0.10	0.019	0.349	0.007	0.01
5	0.42	0.10	0.019	0.348	0.007	0.01
6	0.50	0.10	0.019	0.347	0.007	0.01
7	0.58	0.10	0.019	0.345	0.007	0.01
8	0.67	0.10	0.019	0.344	0.007	0.01
9	0.75	0.10	0.019	0.342	0.007	0.01
10	0.83	0.13	0.025	0.341	0.009	0.02
11	0.92	0.13	0.025	0.340	0.009	0.02
12	1.00	0.13	0.025	0.338	0.009	0.02
13	1.08	0.10	0.019	0.337	0.007	0.01
14	1.17	0.10	0.019	0.336	0.007	0.01
15	1.25	0.10	0.019	0.334	0.007	0.01
16	1.33	0.10	0.019	0.333	0.007	0.01
17	1.42	0.10	0.019	0.332	0.007	0.01
18	1.50	0.10	0.019	0.330	0.007	0.01
19	1.58	0.10	0.019	0.329	0.007	0.01
20	1.67	0.10	0.019	0.328	0.007	0.01
21	1.75	0.10	0.019	0.327	0.007	0.01
22	1.83	0.13	0.025	0.325	0.009	0.02
23	1.92	0.13	0.025	0.324	0.009	0.02
24	2.00	0.13	0.025	0.323	0.009	0.02
25	2.08	0.13	0.025	0.321	0.009	0.02
26	2.17	0.13	0.025	0.320	0.009	0.02
27	2.25	0.13	0.025	0.319	0.009	0.02
28	2.33	0.13	0.025	0.317	0.009	0.02
29	2.42	0.13	0.025	0.316	0.009	0.02
30	2.50	0.13	0.025	0.315	0.009	0.02
31	2.58	0.17	0.031	0.314	0.012	0.02
32	2.67	0.17	0.031	0.312	0.012	0.02
33	2.75	0.17	0.031	0.311	0.012	0.02
34	2.83	0.17	0.031	0.310	0.012	0.02
35	2.92	0.17	0.031	0.308	0.012	0.02
36	3.00	0.17	0.031	0.307	0.012	0.02
37	3.08	0.17	0.031	0.306	0.012	0.02
38	3.17	0.17	0.031	0.305	0.012	0.02
39	3.25	0.17	0.031	0.303	0.012	0.02
40	3.33	0.17	0.031	0.302	0.012	0.02
41	3.42	0.17	0.031	0.301	0.012	0.02
42	3.50	0.17	0.031	0.300	0.012	0.02
43	3.58	0.17	0.031	0.298	0.012	0.02
44	3.67	0.17	0.031	0.297	0.012	0.02
45	3.75	0.17	0.031	0.296	0.012	0.02
46	3.83	0.20	0.037	0.295	0.014	0.02
47	3.92	0.20	0.037	0.293	0.014	0.02
48	4.00	0.20	0.037	0.292	0.014	0.02
49	4.08	0.20	0.037	0.291	0.014	0.02
50	4.17	0.20	0.037	0.290	0.014	0.02
51	4.25	0.20	0.037	0.288	0.014	0.02
52	4.33	0.23	0.043	0.287	0.016	0.03
53	4.42	0.23	0.043	0.286	0.016	0.03
54	4.50	0.23	0.043	0.285	0.016	0.03
55	4.58	0.23	0.043	0.283	0.016	0.03
56	4.67	0.23	0.043	0.282	0.016	0.03
57	4.75	0.23	0.043	0.281	0.016	0.03
58	4.83	0.27	0.050	0.280	0.019	0.03
59	4.92	0.27	0.050	0.279	0.019	0.03
60	5.00	0.27	0.050	0.277	0.019	0.03
61	5.08	0.20	0.037	0.276	0.014	0.02
62	5.17	0.20	0.037	0.275	0.014	0.02
63	5.25	0.20	0.037	0.274	0.014	0.02
64	5.33	0.23	0.043	0.273	0.016	0.03
65	5.42	0.23	0.043	0.271	0.016	0.03
66	5.50	0.23	0.043	0.270	0.016	0.03
67	5.58	0.27	0.050	0.269	0.019	0.03

68	5.67	0.27	0.050	0.268	0.019	0.03
69	5.75	0.27	0.050	0.267	0.019	0.03
70	5.83	0.27	0.050	0.265	0.019	0.03
71	5.92	0.27	0.050	0.264	0.019	0.03
72	6.00	0.27	0.050	0.263	0.019	0.03
73	6.08	0.30	0.056	0.262	0.021	0.03
74	6.17	0.30	0.056	0.261	0.021	0.03
75	6.25	0.30	0.056	0.260	0.021	0.03
76	6.33	0.30	0.056	0.258	0.021	0.03
77	6.42	0.30	0.056	0.257	0.021	0.03
78	6.50	0.30	0.056	0.256	0.021	0.03
79	6.58	0.33	0.062	0.255	0.024	0.04
80	6.67	0.33	0.062	0.254	0.024	0.04
81	6.75	0.33	0.062	0.253	0.024	0.04
82	6.83	0.33	0.062	0.252	0.024	0.04
83	6.92	0.33	0.062	0.250	0.024	0.04
84	7.00	0.33	0.062	0.249	0.024	0.04
85	7.08	0.33	0.062	0.248	0.024	0.04
86	7.17	0.33	0.062	0.247	0.024	0.04
87	7.25	0.33	0.062	0.246	0.024	0.04
88	7.33	0.37	0.068	0.245	0.026	0.04
89	7.42	0.37	0.068	0.244	0.026	0.04
90	7.50	0.37	0.068	0.243	0.026	0.04
91	7.58	0.40	0.074	0.241	0.028	0.05
92	7.67	0.40	0.074	0.240	0.028	0.05
93	7.75	0.40	0.074	0.239	0.028	0.05
94	7.83	0.43	0.081	0.238	0.031	0.05
95	7.92	0.43	0.081	0.237	0.031	0.05
96	8.00	0.43	0.081	0.236	0.031	0.05
97	8.08	0.50	0.093	0.235	0.035	0.06
98	8.17	0.50	0.093	0.234	0.035	0.06
99	8.25	0.50	0.093	0.233	0.035	0.06
100	8.33	0.50	0.093	0.232	0.035	0.06
101	8.42	0.50	0.093	0.230	0.035	0.06
102	8.50	0.50	0.093	0.229	0.035	0.06
103	8.58	0.53	0.099	0.228	0.038	0.06
104	8.67	0.53	0.099	0.227	0.038	0.06
105	8.75	0.53	0.099	0.226	0.038	0.06
106	8.83	0.57	0.105	0.225	0.040	0.07
107	8.92	0.57	0.105	0.224	0.040	0.07
108	9.00	0.57	0.105	0.223	0.040	0.07
109	9.08	0.63	0.118	0.222	0.045	0.07
110	9.17	0.63	0.118	0.221	0.045	0.07
111	9.25	0.63	0.118	0.220	0.045	0.07
112	9.33	0.67	0.124	0.219	0.047	0.08
113	9.42	0.67	0.124	0.218	0.047	0.08
114	9.50	0.67	0.124	0.217	0.047	0.08
115	9.58	0.70	0.130	0.216	0.049	0.08
116	9.67	0.70	0.130	0.215	0.049	0.08
117	9.75	0.70	0.130	0.214	0.049	0.08
118	9.83	0.73	0.136	0.213	0.052	0.08
119	9.92	0.73	0.136	0.212	0.052	0.08
120	10.00	0.73	0.136	0.210	0.052	0.08
121	10.08	0.50	0.093	0.209	0.035	0.06
122	10.17	0.50	0.093	0.208	0.035	0.06
123	10.25	0.50	0.093	0.207	0.035	0.06
124	10.33	0.50	0.093	0.206	0.035	0.06
125	10.42	0.50	0.093	0.205	0.035	0.06
126	10.50	0.50	0.093	0.204	0.035	0.06
127	10.58	0.67	0.124	0.203	0.047	0.08
128	10.67	0.67	0.124	0.202	0.047	0.08
129	10.75	0.67	0.124	0.201	0.047	0.08
130	10.83	0.67	0.124	0.200	0.047	0.08
131	10.92	0.67	0.124	0.199	0.047	0.08
132	11.00	0.67	0.124	0.198	0.047	0.08
133	11.08	0.63	0.118	0.198	0.045	0.07
134	11.17	0.63	0.118	0.197	0.045	0.07
135	11.25	0.63	0.118	0.196	0.045	0.07
136	11.33	0.63	0.118	0.195	0.045	0.07
137	11.42	0.63	0.118	0.194	0.045	0.07
138	11.50	0.63	0.118	0.193	0.045	0.07
139	11.58	0.57	0.105	0.192	0.040	0.07
140	11.67	0.57	0.105	0.191	0.040	0.07
141	11.75	0.57	0.105	0.190	0.040	0.07
142	11.83	0.60	0.112	0.189	0.042	0.07
143	11.92	0.60	0.112	0.188	0.042	0.07
144	12.00	0.60	0.112	0.187	0.042	0.07
145	12.08	0.83	0.155	0.186	0.059	0.10
146	12.17	0.83	0.155	0.185	0.059	0.10
147	12.25	0.83	0.155	0.184	0.059	0.10
148	12.33	0.87	0.161	0.183	0.061	0.10
149	12.42	0.87	0.161	0.182	0.061	0.10
150	12.50	0.87	0.161	0.181	0.061	0.10
1	12.58	0.93	0.174	0.181	0.066	0.11
2	12.67	0.93	0.174	0.180	0.066	0.11

153	12.75	0.93	0.174	0.179	0.066	0.11
154	12.83	0.97	0.180	0.178	---	0.00
155	12.92	0.97	0.180	0.177	---	0.00
156	13.00	0.97	0.180	0.176	---	0.00
157	13.08	1.13	0.211	0.175	---	0.04
158	13.17	1.13	0.211	0.174	---	0.04
159	13.25	1.13	0.211	0.173	---	0.04
160	13.33	1.13	0.211	0.172	---	0.04
161	13.42	1.13	0.211	0.172	---	0.04
162	13.50	1.13	0.211	0.171	---	0.04
163	13.58	0.77	0.143	0.170	0.054	0.09
164	13.67	0.77	0.143	0.169	0.054	0.09
165	13.75	0.77	0.143	0.168	0.054	0.09
166	13.83	0.77	0.143	0.167	0.054	0.09
167	13.92	0.77	0.143	0.166	0.054	0.09
168	14.00	0.77	0.143	0.166	0.054	0.09
169	14.08	0.90	0.167	0.165	---	0.00
170	14.17	0.90	0.167	0.164	---	0.00
171	14.25	0.90	0.167	0.163	---	0.00
172	14.33	0.87	0.161	0.162	0.061	0.10
173	14.42	0.87	0.161	0.161	0.061	0.10
174	14.50	0.87	0.161	0.161	---	0.00
175	14.58	0.87	0.161	0.160	---	0.00
176	14.67	0.87	0.161	0.159	---	0.00
177	14.75	0.87	0.161	0.158	---	0.00
178	14.83	0.83	0.155	0.157	0.059	0.10
179	14.92	0.83	0.155	0.156	0.059	0.10
180	15.00	0.83	0.155	0.156	0.059	0.10
181	15.08	0.80	0.149	0.155	0.057	0.09
182	15.17	0.80	0.149	0.154	0.057	0.09
183	15.25	0.80	0.149	0.153	0.057	0.09
184	15.33	0.77	0.143	0.153	0.054	0.09
185	15.42	0.77	0.143	0.152	0.054	0.09
186	15.50	0.77	0.143	0.151	0.054	0.09
187	15.58	0.63	0.118	0.150	0.045	0.07
188	15.67	0.63	0.118	0.149	0.045	0.07
189	15.75	0.63	0.118	0.149	0.045	0.07
190	15.83	0.63	0.118	0.148	0.045	0.07
191	15.92	0.63	0.118	0.147	0.045	0.07
192	16.00	0.63	0.118	0.146	0.045	0.07
193	16.08	0.13	0.025	0.146	0.009	0.02
194	16.17	0.13	0.025	0.145	0.009	0.02
195	16.25	0.13	0.025	0.144	0.009	0.02
196	16.33	0.13	0.025	0.143	0.009	0.02
197	16.42	0.13	0.025	0.143	0.009	0.02
198	16.50	0.13	0.025	0.142	0.009	0.02
199	16.58	0.10	0.019	0.141	0.007	0.01
200	16.67	0.10	0.019	0.141	0.007	0.01
201	16.75	0.10	0.019	0.140	0.007	0.01
202	16.83	0.10	0.019	0.139	0.007	0.01
203	16.92	0.10	0.019	0.138	0.007	0.01
204	17.00	0.10	0.019	0.138	0.007	0.01
205	17.08	0.17	0.031	0.137	0.012	0.02
206	17.17	0.17	0.031	0.136	0.012	0.02
207	17.25	0.17	0.031	0.136	0.012	0.02
208	17.33	0.17	0.031	0.135	0.012	0.02
209	17.42	0.17	0.031	0.134	0.012	0.02
210	17.50	0.17	0.031	0.134	0.012	0.02
211	17.58	0.17	0.031	0.133	0.012	0.02
212	17.67	0.17	0.031	0.132	0.012	0.02
213	17.75	0.17	0.031	0.132	0.012	0.02
214	17.83	0.13	0.025	0.131	0.009	0.02
215	17.92	0.13	0.025	0.130	0.009	0.02
216	18.00	0.13	0.025	0.130	0.009	0.02
217	18.08	0.13	0.025	0.129	0.009	0.02
218	18.17	0.13	0.025	0.128	0.009	0.02
219	18.25	0.13	0.025	0.128	0.009	0.02
220	18.33	0.13	0.025	0.127	0.009	0.02
221	18.42	0.13	0.025	0.127	0.009	0.02
222	18.50	0.13	0.025	0.126	0.009	0.02
223	18.58	0.10	0.019	0.125	0.007	0.01
224	18.67	0.10	0.019	0.125	0.007	0.01
225	18.75	0.10	0.019	0.124	0.007	0.01
226	18.83	0.07	0.012	0.123	0.005	0.01
227	18.92	0.07	0.012	0.123	0.005	0.01
228	19.00	0.07	0.012	0.122	0.005	0.01
229	19.08	0.10	0.019	0.122	0.007	0.01
230	19.17	0.10	0.019	0.121	0.007	0.01
231	19.25	0.10	0.019	0.121	0.007	0.01
232	19.33	0.13	0.025	0.120	0.009	0.02
233	19.42	0.13	0.025	0.119	0.009	0.02
234	19.50	0.13	0.025	0.119	0.009	0.02
235	19.58	0.10	0.019	0.118	0.007	0.01
236	19.67	0.10	0.019	0.118	0.007	0.01
237	19.75	0.10	0.019	0.117	0.007	0.01

238	19.83	0.07	0.012	0.117	0.005	0.01
239	19.92	0.07	0.012	0.116	0.005	0.01
240	20.00	0.07	0.012	0.116	0.005	0.01
241	20.08	0.10	0.019	0.115	0.007	0.01
242	20.17	0.10	0.019	0.115	0.007	0.01
243	20.25	0.10	0.019	0.114	0.007	0.01
244	20.33	0.10	0.019	0.114	0.007	0.01
245	20.42	0.10	0.019	0.113	0.007	0.01
246	20.50	0.10	0.019	0.113	0.007	0.01
247	20.58	0.10	0.019	0.112	0.007	0.01
248	20.67	0.10	0.019	0.112	0.007	0.01
249	20.75	0.10	0.019	0.111	0.007	0.01
250	20.83	0.07	0.012	0.111	0.005	0.01
251	20.92	0.07	0.012	0.110	0.005	0.01
252	21.00	0.07	0.012	0.110	0.005	0.01
253	21.08	0.10	0.019	0.110	0.007	0.01
254	21.17	0.10	0.019	0.109	0.007	0.01
255	21.25	0.10	0.019	0.109	0.007	0.01
256	21.33	0.07	0.012	0.108	0.005	0.01
257	21.42	0.07	0.012	0.108	0.005	0.01
258	21.50	0.07	0.012	0.107	0.005	0.01
259	21.58	0.10	0.019	0.107	0.007	0.01
260	21.67	0.10	0.019	0.107	0.007	0.01
261	21.75	0.10	0.019	0.106	0.007	0.01
262	21.83	0.07	0.012	0.106	0.005	0.01
263	21.92	0.07	0.012	0.106	0.005	0.01
264	22.00	0.07	0.012	0.105	0.005	0.01
265	22.08	0.10	0.019	0.105	0.007	0.01
266	22.17	0.10	0.019	0.105	0.007	0.01
267	22.25	0.10	0.019	0.104	0.007	0.01
268	22.33	0.07	0.012	0.104	0.005	0.01
269	22.42	0.07	0.012	0.104	0.005	0.01
270	22.50	0.07	0.012	0.103	0.005	0.01
271	22.58	0.07	0.012	0.103	0.005	0.01
272	22.67	0.07	0.012	0.103	0.005	0.01
273	22.75	0.07	0.012	0.102	0.005	0.01
274	22.83	0.07	0.012	0.102	0.005	0.01
275	22.92	0.07	0.012	0.102	0.005	0.01
276	23.00	0.07	0.012	0.102	0.005	0.01
277	23.08	0.07	0.012	0.101	0.005	0.01
278	23.17	0.07	0.012	0.101	0.005	0.01
279	23.25	0.07	0.012	0.101	0.005	0.01
280	23.33	0.07	0.012	0.101	0.005	0.01
281	23.42	0.07	0.012	0.101	0.005	0.01
282	23.50	0.07	0.012	0.100	0.005	0.01
283	23.58	0.07	0.012	0.100	0.005	0.01
284	23.67	0.07	0.012	0.100	0.005	0.01
285	23.75	0.07	0.012	0.100	0.005	0.01
286	23.83	0.07	0.012	0.100	0.005	0.01
287	23.92	0.07	0.012	0.100	0.005	0.01
288	24.00	0.07	0.012	0.100	0.005	0.01
Sum =		100.0			Sum =	10.0

```
   Flood volume = Effective rainfall      0.83(In)
    times area      22.9(Ac.)/[(In)/(Ft.)] =       1.6(Ac.Ft)
   Total soil loss =       0.72(In)
   Total soil loss =      1.375(Ac.Ft)
   Total rainfall =       1.55(In)
   Flood volume =        68966.1 Cubic Feet
   Total soil loss =        59875.0 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =       2.473(CFS)
   ---------------------------------------------------------------------
   +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     24 - 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   5   Minute intervals ((CFS))

   ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft    Q(CFS)  0        2.5       5.0       7.5      10.0
------------------------------------------------------------------------
  0+ 5      0.0004      0.07  Q         |         |         |         |
  0+10      0.0015      0.15  Q         |         |         |         |
  0+15      0.0026      0.17  Q         |         |         |         |
  0+20      0.0040      0.21  Q         |         |         |         |
  0+25      0.0057      0.25  VQ        |         |         |         |
  0+30      0.0075      0.26  VQ        |         |         |         |
  0+35      0.0093      0.26  VQ        |         |         |         |
  0+40      0.0112      0.27  VQ        |         |         |         |
  0+45      0.0130      0.27  VQ        |         |         |         |
  0+50      0.0151      0.30  VQ        |         |         |         |
  0+55      0.0174      0.34  VQ        |         |         |         |
  1+ 0      0.0198      0.35  VQ        |         |         |         |
  1+ 5      0.0220      0.32  VQ        |         |         |         |
  1+10      0.0240      0.28  VQ        |         |         |         |
```

1+15	0.0258	0.27	VQ
1+20	0.0277	0.27	VQ
1+25	0.0295	0.27	VQ
1+30	0.0314	0.27	VQ
1+35	0.0332	0.27	VQ
1+40	0.0350	0.27	VQ
1+45	0.0369	0.27	VQ
1+50	0.0389	0.30	VQ
1+55	0.0413	0.34	Q
2+ 0	0.0437	0.35	Q
2+ 5	0.0461	0.35	Q
2+10	0.0485	0.36	Q
2+15	0.0510	0.36	Q
2+20	0.0534	0.36	Q
2+25	0.0559	0.36	Q
2+30	0.0583	0.36	Q
2+35	0.0610	0.39	Q
2+40	0.0639	0.43	Q
2+45	0.0669	0.44	Q
2+50	0.0700	0.44	Q
2+55	0.0730	0.44	Q
3+ 0	0.0761	0.44	Q
3+ 5	0.0792	0.44	Q
3+10	0.0822	0.44	QV
3+15	0.0853	0.44	QV
3+20	0.0883	0.44	QV
3+25	0.0914	0.44	QV
3+30	0.0944	0.44	QV
3+35	0.0975	0.44	QV
3+40	0.1005	0.44	QV
3+45	0.1036	0.44	QV
3+50	0.1069	0.48	QV
3+55	0.1104	0.52	Q
4+ 0	0.1141	0.53	Q
4+ 5	0.1177	0.53	Q
4+10	0.1214	0.53	QV
4+15	0.1251	0.53	QV
4+20	0.1289	0.57	QV
4+25	0.1331	0.61	QV
4+30	0.1374	0.62	QV
4+35	0.1416	0.62	QV
4+40	0.1459	0.62	QV
4+45	0.1502	0.62	QV
4+50	0.1547	0.65	QV
4+55	0.1595	0.69	Q V
5+ 0	0.1643	0.70	Q V
5+ 5	0.1687	0.64	Q V
5+10	0.1726	0.56	Q V
5+15	0.1764	0.55	Q V
5+20	0.1803	0.57	Q V
5+25	0.1845	0.61	Q V
5+30	0.1887	0.62	Q V
5+35	0.1932	0.65	Q V
5+40	0.1980	0.69	Q V
5+45	0.2028	0.70	Q V
5+50	0.2077	0.71	Q V
5+55	0.2126	0.71	Q V
6+ 0	0.2175	0.71	Q V
6+ 5	0.2226	0.74	Q V
6+10	0.2280	0.78	Q V
6+15	0.2334	0.79	Q V
6+20	0.2389	0.80	Q V
6+25	0.2444	0.80	Q V
6+30	0.2499	0.80	Q V
6+35	0.2557	0.83	Q V
6+40	0.2617	0.87	Q V
6+45	0.2677	0.88	Q V
6+50	0.2738	0.89	Q V
6+55	0.2799	0.89	Q V
7+ 0	0.2861	0.89	Q V
7+ 5	0.2922	0.89	Q V
7+10	0.2983	0.89	Q V
7+15	0.3044	0.89	Q V
7+20	0.3107	0.92	Q V
7+25	0.3174	0.96	Q V
7+30	0.3240	0.97	Q V
7+35	0.3310	1.01	Q V
7+40	0.3382	1.05	Q V
7+45	0.3455	1.06	Q V
7+50	0.3530	1.10	Q V
7+55	0.3609	1.14	Q V
8+ 0	0.3688	1.15	Q V
8+ 5	0.3772	1.22	Q V
8+10	0.3861	1.30	Q V
8+15	0.3952	1.32	Q V

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  8+20     0.4043     1.33  |    Q    V         |         |         |
  8+25     0.4135     1.33  |    Q    V         |         |         |
  8+30     0.4227     1.33  |    Q    V         |         |         |
  8+35     0.4321     1.36  |    Q    V         |         |         |
  8+40     0.4417     1.40  |    Q    |V        |         |         |
  8+45     0.4515     1.41  |    Q    |V        |         |         |
  8+50     0.4615     1.45  |    Q    |V        |         |         |
  8+55     0.4717     1.49  |    Q    |V        |         |         |
  9+ 0     0.4821     1.50  |     Q   | V       |         |         |
  9+ 5     0.4929     1.57  |     Q   | V       |         |         |
  9+10     0.5043     1.66  |     Q   | V       |         |         |
  9+15     0.5159     1.67  |     Q   |  V      |         |         |
  9+20     0.5277     1.71  |     Q   |  V      |         |         |
  9+25     0.5398     1.76  |      Q  |  V      |         |         |
  9+30     0.5520     1.77  |      Q  |  V      |         |         |
  9+35     0.5644     1.81  |      Q  |   V     |         |         |
  9+40     0.5771     1.85  |      Q  |   V     |         |         |
  9+45     0.5899     1.86  |      Q  |   V     |         |         |
  9+50     0.6030     1.89  |      Q  |    V    |         |         |
  9+55     0.6163     1.94  |      Q  |    V    |         |         |
 10+ 0     0.6297     1.95  |      Q  |    V    |         |         |
 10+ 5     0.6416     1.72  |     Q   |     V   |         |         |
 10+10     0.6515     1.44  |    Q    |     V   |         |         |
 10+15     0.6610     1.38  |    Q    |     V   |         |         |
 10+20     0.6702     1.35  |    Q    |     V   |         |         |
 10+25     0.6794     1.33  |    Q    |      V  |         |         |
 10+30     0.6886     1.33  |    Q    |      V  |         |         |
 10+35     0.6989     1.49  |    Q    |      V  |         |         |
 10+40     0.7106     1.70  |     Q   |      V  |         |         |
 10+45     0.7226     1.74  |     Q   |       V |         |         |
 10+50     0.7347     1.76  |      Q  |       V |         |         |
 10+55     0.7469     1.78  |      Q  |       V |         |         |
 11+ 0     0.7592     1.78  |      Q  |        V|         |         |
 11+ 5     0.7712     1.74  |     Q   |        V|         |         |
 11+10     0.7829     1.70  |     Q   |        V|         |         |
 11+15     0.7945     1.69  |     Q   |         V         |         |
 11+20     0.8062     1.69  |     Q   |         V         |         |
 11+25     0.8178     1.69  |     Q   |         V         |         |
 11+30     0.8294     1.69  |     Q   |         V         |         |
 11+35     0.8406     1.62  |     Q   |         |V        |         |
 11+40     0.8512     1.54  |     Q   |         |V        |         |
 11+45     0.8617     1.52  |     Q   |         |V        |         |
 11+50     0.8723     1.55  |     Q   |         | V       |         |
 11+55     0.8832     1.58  |     Q   |         | V       |         |
 12+ 0     0.8942     1.59  |     Q   |         | V       |         |
 12+ 5     0.9067     1.82  |      Q  |         | V       |         |
 12+10     0.9213     2.11  |       Q |         |  V      |         |
 12+15     0.9362     2.18  |       Q |         |  V      |         |
 12+20     0.9516     2.24  |       Q |         |   V     |         |
 12+25     0.9674     2.29  |        Q|         |   V     |         |
 12+30     0.9833     2.30  |        Q|         |   V     |         |
 12+35     0.9996     2.37  |        Q|         |    V    |         |
 12+40     1.0165     2.45  |        Q|         |    V    |         |
 12+45     1.0335     2.47  |        Q|         |     V   |         |
 12+50     1.0444     1.58  |     Q   |         |     V   |         |
 12+55     1.0477     0.48  |Q        |         |     V   |         |
 13+ 0     1.0494     0.24  Q         |         |     V   |         |
 13+ 5     1.0523     0.42  |Q        |         |     V   |         |
 13+10     1.0571     0.70  | Q       |         |     V   |         |
 13+15     1.0626     0.80  |  Q      |         |     V   |         |
 13+20     1.0684     0.85  |  Q      |         |     V   |         |
 13+25     1.0745     0.89  |  Q      |         |      V  |         |
 13+30     1.0808     0.91  |  Q      |         |      V  |         |
 13+35     1.0899     1.33  |    Q    |         |      V  |         |
 13+40     1.1026     1.85  |      Q  |         |      V  |         |
 13+45     1.1161     1.96  |      Q  |         |       V |         |
 13+50     1.1300     2.01  |       Q |         |       V |         |
 13+55     1.1441     2.04  |       Q |         |       V |         |
 14+ 0     1.1581     2.04  |       Q |         |        V|         |
 14+ 5     1.1672     1.31  |    Q    |         |        V|         |
 14+10     1.1700     0.41  |Q        |         |        V|         |
 14+15     1.1716     0.22  Q         |         |        V|         |
 14+20     1.1782     0.96  |  Q      |         |        V|         |
 14+25     1.1914     1.92  |      Q  |         |         V         |
 14+30     1.2004     1.31  |    Q    |         |         V         |
 14+35     1.2029     0.36  |Q        |         |         V         |
 14+40     1.2043     0.20  Q         |         |         V         |
 14+45     1.2051     0.12  Q         |         |         V         |
 14+50     1.2110     0.86  |  Q      |         |         V         |
 14+55     1.2237     1.84  |      Q  |         |         V         |
 15+ 0     1.2379     2.07  |       Q |         |         |V        |
 15+ 5     1.2526     2.13  |       Q |         |         |V        |
 15+10     1.2674     2.15  |       Q |         |         | V       |
 15+15     1.2821     2.14  |       Q |         |         | V       |
 15+20     1.2965     2.10  |       Q |         |         | V       |
```

15+25	1.3107	2.06	Q			V
15+30	1.3248	2.05	Q			V
15+35	1.3380	1.91	Q			V
15+40	1.3500	1.75	Q			V
15+45	1.3618	1.71	Q			V
15+50	1.3735	1.70	Q			V
15+55	1.3851	1.69	Q			V
16+ 0	1.3967	1.69	Q			V
16+ 5	1.4050	1.20	Q			V
16+10	1.4090	0.59	Q			V
16+15	1.4121	0.45	Q			V
16+20	1.4148	0.39	Q			V
16+25	1.4172	0.36	Q			V
16+30	1.4197	0.36	Q			V
16+35	1.4219	0.32	Q			V
16+40	1.4238	0.28	Q			V
16+45	1.4257	0.27	Q			V
16+50	1.4275	0.27	Q			V
16+55	1.4294	0.27	Q			V
17+ 0	1.4312	0.27	Q			V
17+ 5	1.4335	0.33	Q			V
17+10	1.4363	0.41	Q			V
17+15	1.4393	0.43	Q			V
17+20	1.4423	0.44	Q			V
17+25	1.4454	0.44	Q			V
17+30	1.4484	0.44	Q			V
17+35	1.4515	0.44	Q			V
17+40	1.4546	0.44	Q			V
17+45	1.4576	0.44	Q			V
17+50	1.4604	0.41	Q			V
17+55	1.4630	0.37	Q			V
18+ 0	1.4655	0.36	Q			V
18+ 5	1.4679	0.36	Q			V
18+10	1.4704	0.36	Q			V
18+15	1.4728	0.36	Q			V
18+20	1.4753	0.36	Q			V
18+25	1.4777	0.36	Q			V
18+30	1.4802	0.36	Q			V
18+35	1.4824	0.32	Q			V
18+40	1.4843	0.28	Q			V
18+45	1.4862	0.27	Q			V
18+50	1.4878	0.24	Q			V
18+55	1.4892	0.19	Q			V
19+ 0	1.4904	0.18	Q			V
19+ 5	1.4919	0.21	Q			V
19+10	1.4936	0.25	Q			V
19+15	1.4954	0.26	Q			V
19+20	1.4975	0.30	Q			V
19+25	1.4998	0.34	Q			V
19+30	1.5022	0.35	Q			V
19+35	1.5044	0.32	Q			V
19+40	1.5063	0.28	Q			V
19+45	1.5082	0.27	Q			V
19+50	1.5098	0.24	Q			V
19+55	1.5112	0.19	Q			V
20+ 0	1.5124	0.18	Q			V
20+ 5	1.5139	0.21	Q			V
20+10	1.5156	0.25	Q			V
20+15	1.5174	0.26	Q			V
20+20	1.5192	0.26	Q			V
20+25	1.5211	0.27	Q			V
20+30	1.5229	0.27	Q			V
20+35	1.5247	0.27	Q			V
20+40	1.5266	0.27	Q			V
20+45	1.5284	0.27	Q			V
20+50	1.5300	0.23	Q			V
20+55	1.5313	0.19	Q			V
21+ 0	1.5326	0.18	Q			V
21+ 5	1.5341	0.21	Q			V
21+10	1.5358	0.25	Q			V
21+15	1.5376	0.26	Q			V
21+20	1.5392	0.23	Q			V
21+25	1.5405	0.19	Q			V
21+30	1.5418	0.18	Q			V
21+35	1.5432	0.21	Q			V
21+40	1.5450	0.25	Q			V
21+45	1.5468	0.26	Q			V
21+50	1.5484	0.23	Q			V
21+55	1.5497	0.19	Q			V
22+ 0	1.5509	0.18	Q			V
22+ 5	1.5524	0.21	Q			V
22+10	1.5541	0.25	Q			V
22+15	1.5559	0.26	Q			V
22+20	1.5575	0.23	Q			V
22+25	1.5589	0.19	Q			V

22+30	1.5601	0.18	Q	|	|	|	V|
22+35	1.5614	0.18	Q	|	|	|	V|
22+40	1.5626	0.18	Q	|	|	|	V|
22+45	1.5638	0.18	Q	|	|	|	V|
22+50	1.5650	0.18	Q	|	|	|	V|
22+55	1.5662	0.18	Q	|	|	|	V|
23+ 0	1.5675	0.18	Q	|	|	|	V|
23+ 5	1.5687	0.18	Q	|	|	|	V|
23+10	1.5699	0.18	Q	|	|	|	V|
23+15	1.5711	0.18	Q	|	|	|	V|
23+20	1.5724	0.18	Q	|	|	|	V|
23+25	1.5736	0.18	Q	|	|	|	V|
23+30	1.5748	0.18	Q	|	|	|	V|
23+35	1.5760	0.18	Q	|	|	|	V|
23+40	1.5772	0.18	Q	|	|	|	V|
23+45	1.5785	0.18	Q	|	|	|	V|
23+50	1.5797	0.18	Q	|	|	|	V|
23+55	1.5809	0.18	Q	|	|	|	V|
24+ 0	1.5821	0.18	Q	|	|	|	V|
24+ 5	1.5829	0.11	Q	|	|	|	V|
24+10	1.5831	0.03	Q	|	|	|	V|
24+15	1.5832	0.01	Q	|	|	|	V|
24+20	1.5832	0.00	Q	|	|	|	V

UNIT HYDROGRAPH-PROPOSED CONDITION
10 YR-24 HOUR

Unit Hydrograph Analysis

Study date 11/17/10 File: BUHMDP2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

TRI-8 Builders - S/N 615

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

TENTATIVE TRACT MAP 36294 - MASTER DRAINAGE STUDY (PROPOSED CONDITION)
AREA "B" FOR AREAS "B1" & "B2"
10 YEAR - 24 HOUR
FN: BUHMDP2410

Drainage Area = 22.90(Ac.) = 0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 22.90(Ac.) = 0.036 Sq. Mi.
Length along longest watercourse = 2025.00(Ft.)
Length along longest watercourse measured to centroid = 1140.00(Ft.)
Length along longest watercourse = 0.384 Mi.
Length along longest watercourse measured to centroid = 0.216 Mi.
Difference in elevation = 83.00(Ft.)
Slope along watercourse = 216.4148 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.050 Hr.
Lag time = 3.02 Min.
25% of lag time = 0.75 Min.
40% of lag time = 1.21 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
22.90	1.55	35.49

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
22.90	4.80	109.92

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.550(In)
Area Averaged 100-Year Rainfall = 4.800(In)

Point rain (area averaged) = 2.887(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.887(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
8.000	57.30	0.650
14.900	59.90	0.650

Total Area Entered = 22.90(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
57.3	57.3	0.498	0.650	0.206	0.349	0.072
59.9	59.9	0.471	0.650	0.195	0.651	0.127
					Sum (F) =	0.199

Area averaged mean soil loss (F) (In/Hr) = 0.199
Minimum soil loss rate ((In/Hr)) = 0.100
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.380

Unit Hydrograph

VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	165.713	36.773	8.487
2	0.167	331.426	45.837	10.579
3	0.250	497.140	10.346	2.388
4	0.333	662.853	4.400	1.015
5	0.417	828.566	2.644	0.610
			Sum = 100.000	Sum= 23.079

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.023	0.353	0.009	0.01
2	0.17	0.07	0.023	0.352	0.009	0.01
3	0.25	0.07	0.023	0.351	0.009	0.01
4	0.33	0.10	0.035	0.349	0.013	0.02
5	0.42	0.10	0.035	0.348	0.013	0.02
6	0.50	0.10	0.035	0.347	0.013	0.02
7	0.58	0.10	0.035	0.345	0.013	0.02
8	0.67	0.10	0.035	0.344	0.013	0.02
9	0.75	0.10	0.035	0.342	0.013	0.02
10	0.83	0.13	0.046	0.341	0.018	0.03
11	0.92	0.13	0.046	0.340	0.018	0.03
12	1.00	0.13	0.046	0.338	0.018	0.03
13	1.08	0.10	0.035	0.337	0.013	0.02
14	1.17	0.10	0.035	0.336	0.013	0.02
15	1.25	0.10	0.035	0.334	0.013	0.02
16	1.33	0.10	0.035	0.333	0.013	0.02
17	1.42	0.10	0.035	0.332	0.013	0.02
18	1.50	0.10	0.035	0.330	0.013	0.02
19	1.58	0.10	0.035	0.329	0.013	0.02
20	1.67	0.10	0.035	0.328	0.013	0.02
21	1.75	0.10	0.035	0.327	0.013	0.02
22	1.83	0.13	0.046	0.325	0.018	0.03
23	1.92	0.13	0.046	0.324	0.018	0.03
24	2.00	0.13	0.046	0.323	0.018	0.03
25	2.08	0.13	0.046	0.321	0.018	0.03
6	2.17	0.13	0.046	0.320	0.018	0.03
7	2.25	0.13	0.046	0.319	0.018	0.03
28	2.33	0.13	0.046	0.317	0.018	0.03
29	2.42	0.13	0.046	0.316	0.018	0.03
30	2.50	0.13	0.046	0.315	0.018	0.03
31	2.58	0.17	0.058	0.314	0.022	0.04
32	2.67	0.17	0.058	0.312	0.022	0.04
33	2.75	0.17	0.058	0.311	0.022	0.04
34	2.83	0.17	0.058	0.310	0.022	0.04
35	2.92	0.17	0.058	0.308	0.022	0.04
36	3.00	0.17	0.058	0.307	0.022	0.04
37	3.08	0.17	0.058	0.306	0.022	0.04
38	3.17	0.17	0.058	0.305	0.022	0.04
39	3.25	0.17	0.058	0.303	0.022	0.04
40	3.33	0.17	0.058	0.302	0.022	0.04
41	3.42	0.17	0.058	0.301	0.022	0.04
42	3.50	0.17	0.058	0.300	0.022	0.04
43	3.58	0.17	0.058	0.298	0.022	0.04
44	3.67	0.17	0.058	0.297	0.022	0.04
45	3.75	0.17	0.058	0.296	0.022	0.04
46	3.83	0.20	0.069	0.295	0.026	0.04
47	3.92	0.20	0.069	0.293	0.026	0.04
48	4.00	0.20	0.069	0.292	0.026	0.04
49	4.08	0.20	0.069	0.291	0.026	0.04
50	4.17	0.20	0.069	0.290	0.026	0.04
51	4.25	0.20	0.069	0.288	0.026	0.04
52	4.33	0.23	0.081	0.287	0.031	0.05
53	4.42	0.23	0.081	0.286	0.031	0.05
54	4.50	0.23	0.081	0.285	0.031	0.05
55	4.58	0.23	0.081	0.283	0.031	0.05
56	4.67	0.23	0.081	0.282	0.031	0.05
57	4.75	0.23	0.081	0.281	0.031	0.05
58	4.83	0.27	0.092	0.280	0.035	0.06
59	4.92	0.27	0.092	0.279	0.035	0.06
60	5.00	0.27	0.092	0.277	0.035	0.06
61	5.08	0.20	0.069	0.276	0.026	0.04
62	5.17	0.20	0.069	0.275	0.026	0.04
63	5.25	0.20	0.069	0.274	0.026	0.04
64	5.33	0.23	0.081	0.273	0.031	0.05
65	5.42	0.23	0.081	0.271	0.031	0.05
6	5.50	0.23	0.081	0.270	0.031	0.05
	5.58	0.27	0.092	0.269	0.035	0.06

68	5.67	0.27	0.092	0.268	0.035	0.06
69	5.75	0.27	0.092	0.267	0.035	0.06
70	5.83	0.27	0.092	0.265	0.035	0.06
71	5.92	0.27	0.092	0.264	0.035	0.06
72	6.00	0.27	0.092	0.263	0.035	0.06
73	6.08	0.30	0.104	0.262	0.039	0.06
74	6.17	0.30	0.104	0.261	0.039	0.06
75	6.25	0.30	0.104	0.260	0.039	0.06
76	6.33	0.30	0.104	0.258	0.039	0.06
77	6.42	0.30	0.104	0.257	0.039	0.06
78	6.50	0.30	0.104	0.256	0.039	0.06
79	6.58	0.33	0.115	0.255	0.044	0.07
80	6.67	0.33	0.115	0.254	0.044	0.07
81	6.75	0.33	0.115	0.253	0.044	0.07
82	6.83	0.33	0.115	0.252	0.044	0.07
83	6.92	0.33	0.115	0.250	0.044	0.07
84	7.00	0.33	0.115	0.249	0.044	0.07
85	7.08	0.33	0.115	0.248	0.044	0.07
86	7.17	0.33	0.115	0.247	0.044	0.07
87	7.25	0.33	0.115	0.246	0.044	0.07
88	7.33	0.37	0.127	0.245	0.048	0.08
89	7.42	0.37	0.127	0.244	0.048	0.08
90	7.50	0.37	0.127	0.243	0.048	0.08
91	7.58	0.40	0.139	0.241	0.053	0.09
92	7.67	0.40	0.139	0.240	0.053	0.09
93	7.75	0.40	0.139	0.239	0.053	0.09
94	7.83	0.43	0.150	0.238	0.057	0.09
95	7.92	0.43	0.150	0.237	0.057	0.09
96	8.00	0.43	0.150	0.236	0.057	0.09
97	8.08	0.50	0.173	0.235	0.066	0.11
98	8.17	0.50	0.173	0.234	0.066	0.11
99	8.25	0.50	0.173	0.233	0.066	0.11
100	8.33	0.50	0.173	0.232	0.066	0.11
101	8.42	0.50	0.173	0.230	0.066	0.11
102	8.50	0.50	0.173	0.229	0.066	0.11
103	8.58	0.53	0.185	0.228	0.070	0.11
104	8.67	0.53	0.185	0.227	0.070	0.11
105	8.75	0.53	0.185	0.226	0.070	0.11
106	8.83	0.57	0.196	0.225	0.075	0.12
107	8.92	0.57	0.196	0.224	0.075	0.12
108	9.00	0.57	0.196	0.223	0.075	0.12
109	9.08	0.63	0.219	0.222	0.083	0.14
110	9.17	0.63	0.219	0.221	0.083	0.14
111	9.25	0.63	0.219	0.220	0.083	0.14
112	9.33	0.67	0.231	0.219	---	0.01
113	9.42	0.67	0.231	0.218	---	0.01
114	9.50	0.67	0.231	0.217	---	0.01
115	9.58	0.70	0.243	0.216	---	0.03
116	9.67	0.70	0.243	0.215	---	0.03
117	9.75	0.70	0.243	0.214	---	0.03
118	9.83	0.73	0.254	0.213	---	0.04
119	9.92	0.73	0.254	0.212	---	0.04
120	10.00	0.73	0.254	0.210	---	0.04
121	10.08	0.50	0.173	0.209	0.066	0.11
122	10.17	0.50	0.173	0.208	0.066	0.11
123	10.25	0.50	0.173	0.207	0.066	0.11
124	10.33	0.50	0.173	0.206	0.066	0.11
125	10.42	0.50	0.173	0.205	0.066	0.11
126	10.50	0.50	0.173	0.204	0.066	0.11
127	10.58	0.67	0.231	0.203	---	0.03
128	10.67	0.67	0.231	0.202	---	0.03
129	10.75	0.67	0.231	0.201	---	0.03
130	10.83	0.67	0.231	0.200	---	0.03
131	10.92	0.67	0.231	0.199	---	0.03
132	11.00	0.67	0.231	0.198	---	0.03
133	11.08	0.63	0.219	0.198	---	0.02
134	11.17	0.63	0.219	0.197	---	0.02
135	11.25	0.63	0.219	0.196	---	0.02
136	11.33	0.63	0.219	0.195	---	0.02
137	11.42	0.63	0.219	0.194	---	0.03
138	11.50	0.63	0.219	0.193	---	0.03
139	11.58	0.57	0.196	0.192	---	0.00
140	11.67	0.57	0.196	0.191	---	0.01
141	11.75	0.57	0.196	0.190	---	0.01
142	11.83	0.60	0.208	0.189	---	0.02
143	11.92	0.60	0.208	0.188	---	0.02
144	12.00	0.60	0.208	0.187	---	0.02
145	12.08	0.83	0.289	0.186	---	0.10
146	12.17	0.83	0.289	0.185	---	0.10
147	12.25	0.83	0.289	0.184	---	0.10
148	12.33	0.87	0.300	0.183	---	0.12
149	12.42	0.87	0.300	0.182	---	0.12
150	12.50	0.87	0.300	0.181	---	0.12
151	12.58	0.93	0.323	0.181	---	0.14
152	12.67	0.93	0.323	0.180	---	0.14

153	12.75	0.93	0.323	0.179	---	0.14
154	12.83	0.97	0.335	0.178	---	0.16
5	12.92	0.97	0.335	0.177	---	0.16
56	13.00	0.97	0.335	0.176	---	0.16
157	13.08	1.13	0.393	0.175	---	0.22
158	13.17	1.13	0.393	0.174	---	0.22
159	13.25	1.13	0.393	0.173	---	0.22
160	13.33	1.13	0.393	0.172	---	0.22
161	13.42	1.13	0.393	0.172	---	0.22
162	13.50	1.13	0.393	0.171	---	0.22
163	13.58	0.77	0.266	0.170	---	0.10
164	13.67	0.77	0.266	0.169	---	0.10
165	13.75	0.77	0.266	0.168	---	0.10
166	13.83	0.77	0.266	0.167	---	0.10
167	13.92	0.77	0.266	0.166	---	0.10
168	14.00	0.77	0.266	0.166	---	0.10
169	14.08	0.90	0.312	0.165	---	0.15
170	14.17	0.90	0.312	0.164	---	0.15
171	14.25	0.90	0.312	0.163	---	0.15
172	14.33	0.87	0.300	0.162	---	0.14
173	14.42	0.87	0.300	0.161	---	0.14
174	14.50	0.87	0.300	0.161	---	0.14
175	14.58	0.87	0.300	0.160	---	0.14
176	14.67	0.87	0.300	0.159	---	0.14
177	14.75	0.87	0.300	0.158	---	0.14
178	14.83	0.83	0.289	0.157	---	0.13
179	14.92	0.83	0.289	0.156	---	0.13
180	15.00	0.83	0.289	0.156	---	0.13
181	15.08	0.80	0.277	0.155	---	0.12
182	15.17	0.80	0.277	0.154	---	0.12
183	15.25	0.80	0.277	0.153	---	0.12
184	15.33	0.77	0.266	0.153	---	0.11
185	15.42	0.77	0.266	0.152	---	0.11
186	15.50	0.77	0.266	0.151	---	0.11
187	15.58	0.63	0.219	0.150	---	0.07
188	15.67	0.63	0.219	0.149	---	0.07
189	15.75	0.63	0.219	0.149	---	0.07
190	15.83	0.63	0.219	0.148	---	0.07
191	15.92	0.63	0.219	0.147	---	0.07
192	16.00	0.63	0.219	0.146	---	0.07
193	16.08	0.13	0.046	0.146	0.018	0.03
194	16.17	0.13	0.046	0.145	0.018	0.03
95	16.25	0.13	0.046	0.144	0.018	0.03
6	16.33	0.13	0.046	0.143	0.018	0.03
97	16.42	0.13	0.046	0.143	0.018	0.03
198	16.50	0.13	0.046	0.142	0.018	0.03
199	16.58	0.10	0.035	0.141	0.013	0.02
200	16.67	0.10	0.035	0.141	0.013	0.02
201	16.75	0.10	0.035	0.140	0.013	0.02
202	16.83	0.10	0.035	0.139	0.013	0.02
203	16.92	0.10	0.035	0.138	0.013	0.02
204	17.00	0.10	0.035	0.138	0.013	0.02
205	17.08	0.17	0.058	0.137	0.022	0.04
206	17.17	0.17	0.058	0.136	0.022	0.04
207	17.25	0.17	0.058	0.136	0.022	0.04
208	17.33	0.17	0.058	0.135	0.022	0.04
209	17.42	0.17	0.058	0.134	0.022	0.04
210	17.50	0.17	0.058	0.134	0.022	0.04
211	17.58	0.17	0.058	0.133	0.022	0.04
212	17.67	0.17	0.058	0.132	0.022	0.04
213	17.75	0.17	0.058	0.132	0.022	0.04
214	17.83	0.13	0.046	0.131	0.018	0.03
215	17.92	0.13	0.046	0.130	0.018	0.03
216	18.00	0.13	0.046	0.130	0.018	0.03
217	18.08	0.13	0.046	0.129	0.018	0.03
218	18.17	0.13	0.046	0.128	0.018	0.03
219	18.25	0.13	0.046	0.128	0.018	0.03
220	18.33	0.13	0.046	0.127	0.018	0.03
221	18.42	0.13	0.046	0.127	0.018	0.03
222	18.50	0.13	0.046	0.126	0.018	0.03
223	18.58	0.10	0.035	0.125	0.013	0.02
224	18.67	0.10	0.035	0.125	0.013	0.02
225	18.75	0.10	0.035	0.124	0.013	0.02
226	18.83	0.07	0.023	0.123	0.009	0.01
227	18.92	0.07	0.023	0.123	0.009	0.01
228	19.00	0.07	0.023	0.122	0.009	0.01
229	19.08	0.10	0.035	0.122	0.013	0.02
230	19.17	0.10	0.035	0.121	0.013	0.02
231	19.25	0.10	0.035	0.121	0.013	0.02
232	19.33	0.13	0.046	0.120	0.018	0.03
233	19.42	0.13	0.046	0.119	0.018	0.03
234	19.50	0.13	0.046	0.119	0.018	0.03
235	19.58	0.10	0.035	0.118	0.013	0.02
6	19.67	0.10	0.035	0.118	0.013	0.02
7	19.75	0.10	0.035	0.117	0.013	0.02

238	19.83	0.07	0.023	0.117	0.009	0.01
239	19.92	0.07	0.023	0.116	0.009	0.01
240	20.00	0.07	0.023	0.116	0.009	0.01
241	20.08	0.10	0.035	0.115	0.013	0.02
242	20.17	0.10	0.035	0.115	0.013	0.02
243	20.25	0.10	0.035	0.114	0.013	0.02
244	20.33	0.10	0.035	0.114	0.013	0.02
245	20.42	0.10	0.035	0.113	0.013	0.02
246	20.50	0.10	0.035	0.113	0.013	0.02
247	20.58	0.10	0.035	0.112	0.013	0.02
248	20.67	0.10	0.035	0.112	0.013	0.02
249	20.75	0.10	0.035	0.111	0.013	0.02
250	20.83	0.07	0.023	0.111	0.009	0.01
251	20.92	0.07	0.023	0.110	0.009	0.01
252	21.00	0.07	0.023	0.110	0.009	0.01
253	21.08	0.10	0.035	0.110	0.013	0.02
254	21.17	0.10	0.035	0.109	0.013	0.02
255	21.25	0.10	0.035	0.109	0.013	0.02
256	21.33	0.07	0.023	0.108	0.009	0.01
257	21.42	0.07	0.023	0.108	0.009	0.01
258	21.50	0.07	0.023	0.107	0.009	0.01
259	21.58	0.10	0.035	0.107	0.013	0.02
260	21.67	0.10	0.035	0.107	0.013	0.02
261	21.75	0.10	0.035	0.106	0.013	0.02
262	21.83	0.07	0.023	0.106	0.009	0.01
263	21.92	0.07	0.023	0.106	0.009	0.01
264	22.00	0.07	0.023	0.105	0.009	0.01
265	22.08	0.10	0.035	0.105	0.013	0.02
266	22.17	0.10	0.035	0.105	0.013	0.02
267	22.25	0.10	0.035	0.104	0.013	0.02
268	22.33	0.07	0.023	0.104	0.009	0.01
269	22.42	0.07	0.023	0.104	0.009	0.01
270	22.50	0.07	0.023	0.103	0.009	0.01
271	22.58	0.07	0.023	0.103	0.009	0.01
272	22.67	0.07	0.023	0.103	0.009	0.01
273	22.75	0.07	0.023	0.102	0.009	0.01
274	22.83	0.07	0.023	0.102	0.009	0.01
275	22.92	0.07	0.023	0.102	0.009	0.01
276	23.00	0.07	0.023	0.102	0.009	0.01
277	23.08	0.07	0.023	0.101	0.009	0.01
278	23.17	0.07	0.023	0.101	0.009	0.01
279	23.25	0.07	0.023	0.101	0.009	0.01
280	23.33	0.07	0.023	0.101	0.009	0.01
281	23.42	0.07	0.023	0.101	0.009	0.01
282	23.50	0.07	0.023	0.100	0.009	0.01
283	23.58	0.07	0.023	0.100	0.009	0.01
284	23.67	0.07	0.023	0.100	0.009	0.01
285	23.75	0.07	0.023	0.100	0.009	0.01
286	23.83	0.07	0.023	0.100	0.009	0.01
287	23.92	0.07	0.023	0.100	0.009	0.01
288	24.00	0.07	0.023	0.100	0.009	0.01
	Sum =	100.0			Sum =	15.8

```
Flood volume = Effective rainfall      1.32(In)
 times area      22.9(Ac.)/[(In)/(Ft.)] =      2.5(Ac.Ft)
Total soil loss =      1.57(In)
Total soil loss =      2.994(Ac.Ft)
Total rainfall =      2.89(In)
Flood volume =      109575.7 Cubic Feet
Total soil loss =      130407.6 Cubic Feet
--------------------------------------------------------------------
 Peak flow rate of this hydrograph =      5.106(CFS)
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - 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   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft    Q(CFS)  0        2.5       5.0       7.5       10.0
----------------------------------------------------------------------------
  0+ 5      0.0008     0.12  Q         |         |         |         |
  0+10      0.0027     0.27  VQ        |         |         |         |
  0+15      0.0048     0.31  VQ        |         |         |         |
  0+20      0.0075     0.38  VQ        |         |         |         |
  0+25      0.0107     0.47  VQ        |         |         |         |
  0+30      0.0140     0.48  VQ        |         |         |         |
  0+35      0.0174     0.49  VQ        |         |         |         |
  0+40      0.0208     0.50  VQ        |         |         |         |
  0+45      0.0242     0.50  VQ        |         |         |         |
  0+50      0.0281     0.56  V Q       |         |         |         |
  0+55      0.0324     0.63  V Q       |         |         |         |
  1+ 0      0.0369     0.65  V Q       |         |         |         |
  1+ 5      0.0410     0.60  V Q       |         |         |         |
  1+10      0.0446     0.52  V Q       |         |         |         |
```

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 1+15       0.0481      0.51  V Q         |         |         |         |
 1+20       0.0516      0.50  V Q         |         |         |         |
 1+25       0.0550      0.50  VQ          |         |         |         |
 1+30       0.0584      0.50  VQ          |         |         |         |
 1+35       0.0618      0.50  VQ          |         |         |         |
 1+40       0.0652      0.50  |Q          |         |         |         |
 1+45       0.0686      0.50  |Q          |         |         |         |
 1+50       0.0725      0.56  |VQ         |         |         |         |
 1+55       0.0768      0.63  |VQ         |         |         |         |
 2+ 0       0.0813      0.65  |VQ         |         |         |         |
 2+ 5       0.0858      0.66  |VQ         |         |         |         |
 2+10       0.0904      0.66  |VQ         |         |         |         |
 2+15       0.0949      0.66  |VQ         |         |         |         |
 2+20       0.0995      0.66  |VQ         |         |         |         |
 2+25       0.1041      0.66  |VQ         |         |         |         |
 2+30       0.1086      0.66  |VQ         |         |         |         |
 2+35       0.1136      0.72  |VQ         |         |         |         |
 2+40       0.1191      0.80  |V Q        |         |         |         |
 2+45       0.1247      0.81  |V Q        |         |         |         |
 2+50       0.1304      0.82  | VQ        |         |         |         |
 2+55       0.1360      0.83  | VQ        |         |         |         |
 3+ 0       0.1417      0.83  | VQ        |         |         |         |
 3+ 5       0.1474      0.83  | VQ        |         |         |         |
 3+10       0.1531      0.83  | VQ        |         |         |         |
 3+15       0.1588      0.83  | VQ        |         |         |         |
 3+20       0.1645      0.83  | VQ        |         |         |         |
 3+25       0.1702      0.83  | VQ        |         |         |         |
 3+30       0.1759      0.83  | VQ        |         |         |         |
 3+35       0.1816      0.83  | VQ        |         |         |         |
 3+40       0.1873      0.83  | VQ        |         |         |         |
 3+45       0.1930      0.83  |  Q        |         |         |         |
 3+50       0.1991      0.89  |  Q        |         |         |         |
 3+55       0.2057      0.96  |  Q        |         |         |         |
 4+ 0       0.2125      0.98  |  Q        |         |         |         |
 4+ 5       0.2193      0.99  |  Q        |         |         |         |
 4+10       0.2261      0.99  |  Q        |         |         |         |
 4+15       0.2329      0.99  |  Q        |         |         |         |
 4+20       0.2402      1.05  |  VQ       |         |         |         |
 4+25       0.2480      1.13  |  VQ       |         |         |         |
 4+30       0.2558      1.15  |   Q       |         |         |         |
 4+35       0.2638      1.15  |   Q       |         |         |         |
 4+40       0.2718      1.16  |   Q       |         |         |         |
 4+45       0.2797      1.16  |   Q       |         |         |         |
 4+50       0.2881      1.22  |   Q       |         |         |         |
 4+55       0.2970      1.29  |   VQ      |         |         |         |
 5+ 0       0.3061      1.31  |   VQ      |         |         |         |
 5+ 5       0.3143      1.20  |   Q       |         |         |         |
 5+10       0.3215      1.05  |   QV      |         |         |         |
 5+15       0.3285      1.02  |   QV      |         |         |         |
 5+20       0.3358      1.06  |   QV      |         |         |         |
 5+25       0.3436      1.13  |   QV      |         |         |         |
 5+30       0.3515      1.15  |   QV      |         |         |         |
 5+35       0.3598      1.21  |   QV      |         |         |         |
 5+40       0.3688      1.29  |    Q      |         |         |         |
 5+45       0.3778      1.31  |    QV     |         |         |         |
 5+50       0.3869      1.32  |    QV     |         |         |         |
 5+55       0.3960      1.32  |    QV     |         |         |         |
 6+ 0       0.4051      1.32  |    QV     |         |         |         |
 6+ 5       0.4146      1.38  |    QV     |         |         |         |
 6+10       0.4247      1.46  |    QV     |         |         |         |
 6+15       0.4348      1.48  |    QV     |         |         |         |
 6+20       0.4450      1.48  |    Q V    |         |         |         |
 6+25       0.4553      1.49  |    Q V    |         |         |         |
 6+30       0.4655      1.49  |    Q V    |         |         |         |
 6+35       0.4762      1.55  |     QV    |         |         |         |
 6+40       0.4874      1.62  |     QV    |         |         |         |
 6+45       0.4987      1.64  |     QV    |         |         |         |
 6+50       0.5100      1.65  |     Q V   |         |         |         |
 6+55       0.5214      1.65  |     Q V   |         |         |         |
 7+ 0       0.5328      1.65  |     Q V   |         |         |         |
 7+ 5       0.5442      1.65  |     Q V   |         |         |         |
 7+10       0.5556      1.65  |     Q V   |         |         |         |
 7+15       0.5670      1.65  |     Q   V|         |         |         |
 7+20       0.5788      1.71  |     Q   V|         |         |         |
 7+25       0.5911      1.79  |      Q  V|         |         |         |
 7+30       0.6036      1.81  |      Q  V|         |         |         |
 7+35       0.6165      1.87  |      Q  V|         |         |         |
 7+40       0.6299      1.96  |      Q   V         |         |         |
 7+45       0.6435      1.97  |      Q   V         |         |         |
 7+50       0.6576      2.04  |       Q  V         |         |         |
 7+55       0.6722      2.12  |       Q  V         |         |         |
 8+ 0       0.6869      2.14  |       Q  V         |         |         |
 8+ 5       0.7025      2.27  |         Q|V        |         |         |
 8+10       0.7192      2.42  |         Q|V        |         |         |
 8+15       0.7361      2.46  |         Q|V        |         |         |
```

8+20	0.7531	2.47
8+25	0.7702	2.48
8+30	0.7873	2.48
8+35	0.8048	2.54
8+40	0.8228	2.62
8+45	0.8409	2.63
8+50	0.8595	2.70
8+55	0.8787	2.78
9+ 0	0.8980	2.80
9+ 5	0.9181	2.93
9+10	0.9394	3.08
9+15	0.9608	3.12
9+20	0.9752	2.08
9+25	0.9806	0.79
9+30	0.9841	0.51
9+35	0.9876	0.51
9+40	0.9916	0.58
9+45	0.9959	0.63
9+50	1.0012	0.76
9+55	1.0075	0.91
10+ 0	1.0141	0.97
10+ 5	1.0247	1.53
10+10	1.0400	2.22
10+15	1.0563	2.38
10+20	1.0732	2.44
10+25	1.0902	2.48
10+30	1.1073	2.48
10+35	1.1197	1.80
10+40	1.1264	0.96
10+45	1.1318	0.79
10+50	1.1369	0.73
10+55	1.1417	0.71
11+ 0	1.1468	0.73
11+ 5	1.1513	0.65
11+10	1.1551	0.55
11+15	1.1589	0.55
11+20	1.1627	0.56
11+25	1.1667	0.57
11+30	1.1708	0.60
11+35	1.1737	0.42
11+40	1.1751	0.20
11+45	1.1762	0.17
11+50	1.1781	0.26
11+55	1.1808	0.39
12+ 0	1.1838	0.44
12+ 5	1.1918	1.16
12+10	1.2059	2.05
12+15	1.2215	2.26
12+20	1.2385	2.46
12+25	1.2568	2.66
12+30	1.2754	2.71
12+35	1.2956	2.93
12+40	1.3177	3.21
12+45	1.3403	3.28
12+50	1.3639	3.43
12+55	1.3886	3.58
13+ 0	1.4136	3.63
13+ 5	1.4422	4.15
13+10	1.4752	4.79
13+15	1.5093	4.95
13+20	1.5439	5.03
13+25	1.5790	5.09
13+30	1.6141	5.11
13+35	1.6420	4.05
13+40	1.6608	2.72
13+45	1.6776	2.44
13+50	1.6936	2.33
13+55	1.7093	2.27
14+ 0	1.7250	2.29
14+ 5	1.7437	2.70
14+10	1.7658	3.21
14+15	1.7888	3.34
14+20	1.8116	3.31
14+25	1.8339	3.24
14+30	1.8561	3.23
14+35	1.8784	3.23
14+40	1.9007	3.25
14+45	1.9232	3.27
14+50	1.9452	3.19
14+55	1.9664	3.08
15+ 0	1.9876	3.07
15+ 5	2.0081	2.98
15+10	2.0279	2.87
15+15	2.0476	2.86
15+20	2.0667	2.77

15+25	2.0850	2.66	Q	V
15+30	2.1033	2.65	Q	V
15+35	2.1188	2.26	Q	V
15+40	2.1311	1.79	Q	V
15+45	2.1428	1.69	Q	V
15+50	2.1543	1.66	Q	V
15+55	2.1657	1.65	Q	V
16+ 0	2.1772	1.67	Q	V
16+ 5	2.1861	1.30	Q	V
16+10	2.1919	0.84	Q	V
16+15	2.1970	0.73	Q	V
16+20	2.2017	0.69	Q	V
16+25	2.2063	0.66	Q	V
16+30	2.2108	0.66	Q	V
16+35	2.2149	0.60	Q	V
16+40	2.2186	0.52	Q	V
16+45	2.2221	0.51	Q	V
16+50	2.2255	0.50	Q	V
16+55	2.2289	0.50	Q	V
17+ 0	2.2323	0.50	Q	V
17+ 5	2.2366	0.62	Q	V
17+10	2.2419	0.77	Q	V
17+15	2.2474	0.80	Q	V
17+20	2.2531	0.82	Q	V
17+25	2.2587	0.83	Q	V
17+30	2.2644	0.83	Q	V
17+35	2.2701	0.83	Q	V
17+40	2.2758	0.83	Q	V
17+45	2.2815	0.83	Q	V
17+50	2.2868	0.77	Q	V
17+55	2.2915	0.69	Q	V
18+ 0	2.2962	0.67	Q	V
18+ 5	2.3008	0.67	Q	V
18+10	2.3053	0.66	Q	V
18+15	2.3099	0.66	Q	V
18+20	2.3144	0.66	Q	V
18+25	2.3190	0.66	Q	V
18+30	2.3235	0.66	Q	V
18+35	2.3277	0.60	Q	V
18+40	2.3313	0.52	Q	V
18+45	2.3348	0.51	Q	V
18+50	2.3378	0.44	Q	V
18+55	2.3403	0.36	Q	V
19+ 0	2.3426	0.34	Q	V
19+ 5	2.3454	0.40	Q	V
19+10	2.3486	0.47	Q	V
19+15	2.3519	0.48	Q	V
19+20	2.3557	0.55	Q	V
19+25	2.3601	0.63	Q	V
19+30	2.3646	0.65	Q	V
19+35	2.3687	0.60	Q	V
19+40	2.3723	0.52	Q	V
19+45	2.3758	0.51	Q	V
19+50	2.3788	0.44	Q	V
19+55	2.3813	0.36	Q	V
20+ 0	2.3836	0.34	Q	V
20+ 5	2.3864	0.40	Q	V
20+10	2.3896	0.47	Q	V
20+15	2.3929	0.48	Q	V
20+20	2.3963	0.49	Q	V
20+25	2.3997	0.50	Q	V
20+30	2.4031	0.50	Q	V
20+35	2.4065	0.50	Q	V
20+40	2.4100	0.50	Q	V
20+45	2.4134	0.50	Q	V
20+50	2.4164	0.44	Q	V
20+55	2.4188	0.36	Q	V
21+ 0	2.4212	0.34	Q	V
21+ 5	2.4239	0.40	Q	V
21+10	2.4271	0.47	Q	V
21+15	2.4305	0.48	Q	V
21+20	2.4334	0.43	Q	V
21+25	2.4359	0.36	Q	V
21+30	2.4383	0.34	Q	V
21+35	2.4410	0.40	Q	V
21+40	2.4442	0.47	Q	V
21+45	2.4476	0.48	Q	V
21+50	2.4505	0.43	Q	V
21+55	2.4530	0.36	Q	V
22+ 0	2.4554	0.34	Q	V
22+ 5	2.4581	0.40	Q	V
22+10	2.4613	0.47	Q	V
22+15	2.4646	0.48	Q	V
22+20	2.4676	0.43	Q	V
22+25	2.4701	0.36	Q	V

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  22+30      2.4724     0.34  |Q          |          |          |         V|
  22+35      2.4747     0.34  |Q          |          |          |         V|
  22+40      2.4770     0.33  |Q          |          |          |         V|
  22+45      2.4793     0.33  |Q          |          |          |         V|
  22+50      2.4816     0.33  |Q          |          |          |         V|
  22+55      2.4839     0.33  |Q          |          |          |         V|
  23+ 0      2.4861     0.33  |Q          |          |          |         V|
  23+ 5      2.4884     0.33  |Q          |          |          |         V|
  23+10      2.4907     0.33  |Q          |          |          |         V|
  23+15      2.4930     0.33  |Q          |          |          |         V|
  23+20      2.4952     0.33  |Q          |          |          |         V|
  23+25      2.4975     0.33  |Q          |          |          |         V|
  23+30      2.4998     0.33  |Q          |          |          |         V|
  23+35      2.5021     0.33  |Q          |          |          |         V|
  23+40      2.5043     0.33  |Q          |          |          |         V|
  23+45      2.5066     0.33  |Q          |          |          |         V|
  23+50      2.5089     0.33  |Q          |          |          |         V|
  23+55      2.5112     0.33  |Q          |          |          |         V|
  24+ 0      2.5135     0.33  |Q          |          |          |         V|
  24+ 5      2.5149     0.21  Q           |          |          |         V|
  24+10      2.5153     0.06  Q           |          |          |         V|
  24+15      2.5155     0.02  Q           |          |          |         V|
  24+20      2.5155     0.01  Q           |          |          |          V
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Appendix D

Educational Materials

THE FOLLOWING MATERIALS REQUIRE ANNUAL UPDATING

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description
Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach
Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications
Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations
Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- 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.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

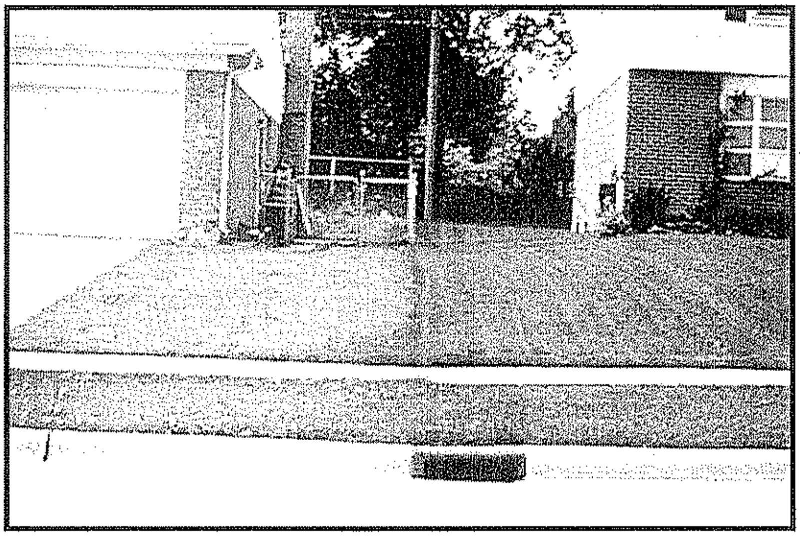
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.

- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:

  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff

  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect

  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible

  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth

- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Landscape Maintenance

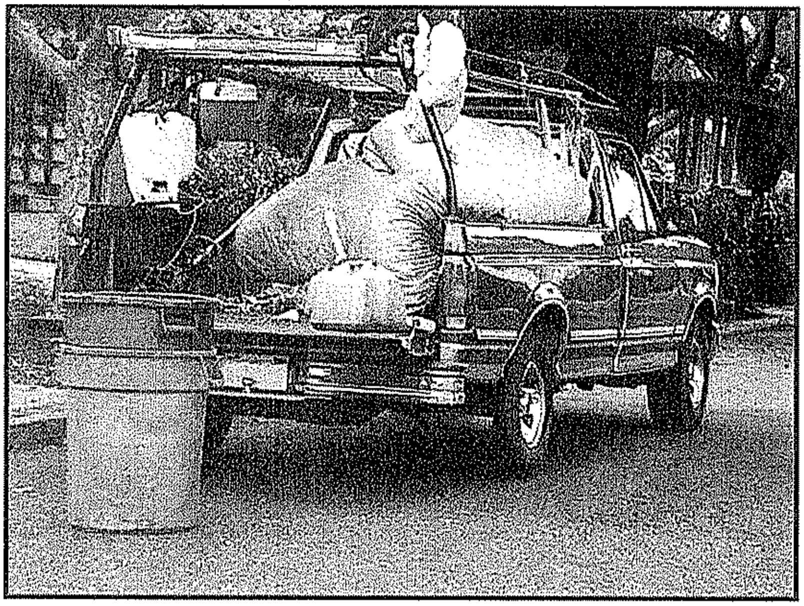


Photo Credit: Geoff Brosseau

Description

This category includes businesses that provide landscaping and landscape maintenance/gardening services.

Pollutant Sources

The following are sources of pollutants:

- Selecting plants or landscape design
- Installing new landscaping
- Maintaining landscapes
- Using pesticides and fertilizers
- Using gas-powered equipment
- Working near waterbodies

Pollutants can include:

- Nutrients (fertilizers, yard wastes)
- Pesticides
- Heavy metals (copper, lead, and zinc)
- Hydrocarbons (fuels, oils and grease)
- Sediments

Approach

Minimize the potential for stormwater pollution and the need for resources/controls (water, pesticides, fertilizers) by creating and maintaining landscapes in a way that is compatible with the local soils, climate, and amount of rain and sun. Make stormwater

CASQA California Stormwater Quality Association pollution prevention BMPs a part of standard operating procedures and the employee training program. Provide employee education materials in the first language of employees, as necessary.

Source Control BMPs

The best management practices are listed by activity or area.

Landscape Design

- Specify native, low maintenance, and insectary (attract beneficial insects) plants and landscape designs.
- Design zoned, water-efficient irrigation systems using technologies such drip irrigation, soaker hoses, or microspray systems.
- Do not landscape riparian areas, except to remove non-native plants and replace them with native riparian landscaping.
- Replant with native species where possible when landscaping or building an ornamental pond. Do not assume something is native because you have seen it in your area. Contact the local nursery for information or visit the California Exotic Pest Plant Council website (www.caleppc.org).

Landscape Installation

- Protect stockpiles and landscaping materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Schedule grading and excavation projects during dry weather.
- Divert runoff from exposed soils or lower its velocity by leveling and terracing.
- Use temporary check dams or ditches to divert runoff away from storm drains.
- Protect storm drains with sandbags or other sediment controls.
- Revegetation is an excellent form of erosion control for any site. Keep soils covered with vegetation or temporary cover material (mulch) to control erosion.
- Check plant roots before buying a plant. Do not buy plants with roots are that kinked or circling around the container. Do not buy plants with soft, rotten, or deformed root crowns.
- Do not pile soil around the plant any higher than the root crown.

Landscape Maintenance

Yard Waste

- Allow leaf drop to become part of the mulch layer in tree, shrub, and groundcover areas.
- Keep lawn mower blades sharp and grasscycle.
- Grasscycle – leave grass clippings on the lawn when mowing. Once cut, grass clippings first dehydrate, then decompose, quickly disappearing from view. Proper mowing is required for successful grasscycling. Cut grass when the surface is dry, and keep mower blades sharp. Follow the "1/3 Rule": mow the lawn often enough so that no more than 1/3 of the length of the grass blade is cut in any one mowing. Frequent mowing will produce short clippings that will not cover up the grass surface. The lawn may have to be cut every seven days when the lawn is growing fast but only every 7 to 14 days when the lawn is growing slowly.

- Do not leave clippings on pavement or sidewalks where they can wash off into the street, gutter, or storm drain.
- Collect lawn and garden clippings, pruning waste, and tree trimmings. Chip if necessary, and compost or take to the local municipal yard waste recycling/composting facility.
- In communities with curbside pick-up of yard waste, place clippings and pruning waste at the curb in approved bags or containers. No curbside pickup of yard waste is available for commercial properties.
- Do not blow or rake leaves or other yard waste into the street, or place yard waste in gutters or on dirt shoulders, unless it is being piled up for recycling (allowed by some municipalities). After pick-up, sweep up any leaves, litter, or residue in gutters or on street.

Fertilizing and Pruning

- Perform soil analysis seasonally to determine actual fertilization need and application rates.
- Fertilize garden areas with a mulch of leaves, bark, or composted manure and/or garden waste.
- Apply chemical fertilizer only as needed, when plants can best use it, and when the potential for it being carried away by runoff is low. Make sure the fertilizer spreader is calibrated.
- Prune plants sparingly, if at all. A healthy plant – one that is native to the area and growing under the right conditions – should not need pruning, except when it is not in the right location (where safety or liability is a concern).

Watering

- Use soil probes to determine soil moisture depth, overall moisture levels, and the need to adjust irrigation schedules.

Pest and Weed Control

- Anyone who is in the business of landscape maintenance and performs pest control as part of providing that service must have a license from the state to apply pesticides. Contact the Department of Pesticide Regulation for more information.
- Become trained in and offer customers less-toxic pest control or Integrated Pest Management (IPM).
- The label on a pesticide container is a legal document. Use a pesticide only as instructed on the label.
- Store pesticides, fertilizers, and other chemicals indoors or in a shed or storage cabinet.
- Use pesticides sparingly, according to instructions on the label. Rinse empty containers, and use rinsewater as product.
- Dispose of rinsed, empty containers in the trash. Dispose of unused pesticides as hazardous waste.
- To control weeds, use drip irrigation and mulch. Hand-pull weeds including roots or cut down to ground. Repeat cutting before they flower, grow new leaves, or go to seed. Use herbicides containing pelargonic acid or herbicidal soap as a last resort.

Handling Gasoline

- Use only containers approved by a nationally recognized testing lab, such as Underwriters Laboratories (UL). Keep the container tightly sealed. Containers should be fitted with a spout to allow pouring without spilling and to minimize the generation of vapors.
- Fill cautiously. Always use a funnel and/or spout to prevent spilling or splashing when fueling power mowers, blowers, and all other gas-powered equipment.
- Avoid spilling gasoline on the ground, especially near wells. If a spill occurs use kitty litter, saw dust, or an absorbent towel to soak up the spill, then dispose of it properly.
- Store carefully. Gasoline moves quickly through soil and into groundwater, therefore, store and use gasoline and fuel equipment as far away from your drinking water well as possible. Be certain to keep a closed cap on the gasoline container. Store at ground level, not on a shelf to minimize the danger of falling and spilling.
- Do not dispose of gasoline down the drain, into surface water, onto the ground, or in the trash. Contact the local municipality for directions on proper disposal of excess or old gasoline. Transport old gas in an approved gasoline container.

Working Near Waterbodies

- Do not dump lawn clippings, other yard waste, or soil along creek banks or in creeks.
- Do not store stockpiles of materials (soil, mulch) along creek banks. These piles can erode over time into a creek.
- Do not spray pesticides or fertilizers by creeks.
- Do not over water near streams. The excess water may carry pesticides, fertilizers, sediments, and anything else in its path directly into the creek.
- Do not remove native vegetation along creek banks or remove large woody debris from creek banks or creeks. Instead, contact the local municipal planning department and Department of Fish & Game for guidance.

Treatment Control BMPs

Not applicable.

More Information

Bay Area Stormwater Management Agencies Association, 1999. Start at the Source – Design Guidance Manual for Stormwater Quality Protection. (http://www.basmaa.org).

Bay Area Water Pollution Prevention Agencies, 1998 - 2002. Less-Toxic Pest Management Fact Sheets, Less-Toxic Product List, and In-store display and promotion materials. (http://www.basmaa.org)

California Exotic Pest Plant Council, 1999. Exotic Pest Plant List. (http://www.caleppc.org)

California Integrated Waste Management Board, 1999. Grasscycle! Make the Most of Your Lawn. Make the Most of Your Time. (http://www.ciwmb.ca.gov/organics/Pubs.htm).

California Integrated Waste Management Board, 2001. Resource-Efficient Turf Management and Resource-Efficient Landscaping. (http://www.ciwmb.ca.gov/organics/Pubs.htm).

Contra Costa County, no date. Grasscycle! Clip your waste! (http://grasscycle.abag.ca.gov).

Marin County Stormwater Pollution Prevention Program, no date. Creek Care: A Guide for Urban Marin Residents. (http://www.mcstoppp.org/).

Professional Lawn Care Association of America, 1997. Water Quality and Your Lawn. (http://www.pesp.org/1995/plcaa95-final.htm).

San Francisquito Watershed Council and San Mateo Countywide Stormwater Pollution Prevention Program, no date. Streamside Planting Guide for San Mateo and Santa Clara County Streams. (http://www.acterra.org/watershed/)

The Alliance for Proper Gasoline Handling, 1999. Consumer Tips for Proper Gasoline Handling. (http://www.gas-care.org/consumer_tips.htm).

Videos

California Integrated Waste Management Board, 1999. Grasscycle! Make the Most of Your Lawn. Make the Most of Your Time. (http://www.ciwmb.ca.gov/organics/Pubs.htm).

CCCSD, 2001. The Healthy Home & Garden - Less-Toxic Pest Control (for residents). (http://www.centralsan.org/education/ipm/hgonlineguide.html).

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Bay Area Stormwater Management Agencies Association, 1999. Start at the Source – Design Guidance Manual for Stormwater Quality Protection. (http://www.basmaa.org).

Bay Area Water Pollution Prevention Agencies, 1998 - 2002. Less-Toxic Pest Management Fact Sheets, Less-Toxic Product List, and In-store display and promotion materials. (http://www.basmaa.org)

California Integrated Waste Management Board, 1999. Grasscycle! Make the Most of Your Lawn. Make the Most of Your Time. (http://www.ciwmb.ca.gov/organics/Pubs.htm).

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City of Bellevue, 1991. Water Quality Protection for Landscaping Businesses, Business Partners for Clean Water.

Contra Costa County, no date. Grasscycle! Clip your waste! (http://grasscycle.abag.ca.gov).

County of Los Angeles, no date. Landscaping and Nursery Facilities – Best Management Practices, Project Pollution Prevention.

Marin County Stormwater Pollution Prevention Program, no date. Creek Care: A Guide for Urban Marin Residents. (http://www.mcstoppp.org/).

Professional Lawn Care Association of America, 1997. Water Quality and Your Lawn. (http://www.pesp.org/1995/plcaa95-final.htm).

San Francisquito Watershed Council and San Mateo Countywide Stormwater Pollution Prevention Program, no date. Streamside Planting Guide for San Mateo and Santa Clara County Streams. (http://www.acterra.org/watershed/)

Santa Clara Valley Urban Runoff Pollution Prevention Program, 2001. Landscaping, Gardening, and Pool Maintenance – Best Management Practices for the Construction Industry.

The Alliance for Proper Gasoline Handling, 1999. Consumer Tips for Proper Gasoline Handling. (http://www.gas-care.org/consumer_tips.htm).

Appendix E

Soils Report
Percolation Test to be provided in F-WQMP

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

PRELIMINARY GEOTECHNICAL FEASIBILITY INVESTIGATION 580± ACRES BEDFORD CANYON CORONA AREA RIVERSIDE COUNTY, CALIFORNIA

PROJECT NO. 31558.1
MARCH 25, 2002

Prepared For:

Bluestone Communities
1300 N. Bristol Street
Newport Beach, California 92660

Attention: Mr. Ralph Emerson

6121 Quail Valley Court ▲ Riverside, CA 92507 ▲ (951) 653-1760 ▲ (951) 653-1741 (Fax) ▲ www.lorgeo.com
19-438 Ruppert Street ▲ P.O. Box 580799 ▲ N. Palm Springs, CA 92258 ▲ (760) 329-2727 ▲ (760) 329-2626 (Fax)

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

March 25, 2002

Bluestone Communities
1300 N. Bristol Street
Newport Beach, California 92660

Project No. 31558.1

Attention: Mr. Ralph Emerson

Subject Preliminary Geotechnical Feasibility Investigation, 580± Acre Project, Bedford Canyon, Corona Area, Riverside County, California

LOR Geotechnical Group, Inc. is pleased to present this report summarizing our preliminary geotechnical feasibility investigation for the above referenced project. This report was based upon a scope of services generally outlined in our Proposal dated January 22, 2002 and other written and verbal communications.

In summary, it is our opinion that the site can be developed from a geotechnical perspective, provided the recommendations presented in the attached report are incorporated into design and construction.

LOR Geotechnical Group, Inc.

6121 Quail Valley Court ▲ Riverside, CA 92507 ▲ (951) 653-1760 ▲ (951) 653-1741 (Fax) ▲ www.lorgeo.com
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APPENDICES

INTRODUCTION

During January, February, and March of 2002, a Preliminary Geotechnical Feasibility Investigation was performed by LOR Geotechnical Group, Inc. for the proposed residential and commercial development of 580 ± acres within Bedford Canyon wash in the Corona area of Riverside County, California. The purpose of this investigation was to provide preliminary data regarding the geologic and geotechnical setting of the site to assist in preliminary concept designs for development of the site as well as to coordinate future geotechnical studies. The scope of our services included:

- Review of available pertinent geotechnical literature, reports, maps, and agency information pertinent to the study area;
- Interpretation of stereo aerial photograph pairs of the site and surrounding regions dated 1931 through 2000;
- Geologic field reconnaissance mapping to verify the areal distribution of earth units and significance of surficial features as compiled from documents, literature, and reports reviewed,
- A subsurface field investigation to estimate the average physical soil conditions pertinent to the proposed development;
- Laboratory testing of selected soil samples obtained during the field investigation;
- Development of feasibility geotechnical guidelines for site planning and
- Preparation of this report summarizing our findings and providing conclusions and recommendations for site development feasibility.

The approximate location of the site is shown on the attached Index Map, Enclosure A-1 within Appendix A.

To orient our investigation at the site, a 200-scale Site Map, prepared by AEI-CASC Engineering, Inc., undated, was furnished for our use. The proposed planning areas and existing topography were indicated on this plan. In addition, several 200-scale orthotopo maps were obtained from the Riverside County Flood Control and Water Conservation District. These maps showed the existing topography of the site overlain on aerial photography taken in April of 1991.

PROJECT CONSIDERATIONS

It is our understanding that the subject site is being considered for a master-planned residential development. While at this time no specific development plans have been prepared, the proposed development will consist of the construction residential housing, parks, a school, open space including a de-silting basin, and commercial/industrial development as well as the associated improvements to be developed on the 580± acre site.

No grading plans were available for our use during this investigation. However, observation of the site topography and adjacent properties indicates site development will entail minimal cuts and fills except in two or three locations where fill up to 100 feet may be needed to join the lower lying regions of the site with the higher elevations of the site.

At this time no design plans for structures have been formulated. However, the structures are anticipated to be wood frame and stucco for the residential housing and school and tilt-up, metal frame, reinforced masonry or similar type construction for the commercial/industrial buildings. Light to moderate foundation loads are anticipated with such structures, respectively.

EXISTING SITE CONDITIONS

The site consists of roughly 580± acres of land situated south of Eagle Glen Parkway and Cajalco Road, east and west of the I-15 freeway. Approximately 40 of the 580± acres lies east of the I-15 freeway, which cuts diagonally across the northeastern portion of the site. Current access to the site is from Eagle Glen Parkway via a small dirt road located along the north center portion of the site. Citrus groves cover the majority of the site. Those areas not planted with citrus groves, are typically in a relatively natural state. The site can be divided into two basic regions based on topography: the lower lying Bedford canyon wash area; and the higher, elevated, regions above and southwest of the canyon.

The lower lying canyon areas comprise the majority of the site and are make up the northern portions. This lower lying area is relatively planar, with an overall gentle gradient to the northeast. Citrus groves are present across the majority of the lower lying regions of the site except for two small areas which are in a relatively natural state, with a moderate to heavy growth of brush. The active drainage of the site lies along the southern portion of the lower lying region and marks the boundary to the elevated areas of the site.

The elevated portions of the site rise steeply to the south from the lower lying regions some 100+ feet. These areas are also relatively planar with an overall gentle gradient to the northeast. Within the southern portion of the site, two planar areas are divided by a relatively steep, natural drainage trending northeast and another similar drainage exists on the far southern end. The majority of the planar areas within the elevated portions of the site are also planted with citrus groves. Along the southwest side of Bedford Canyon, the canyon walls have been eroded off to near vertical cliffs. The canyon walls along the northeast side are much more subdued. Based on our review of the aerial photos, it appears that the grading of the Eagle Glen Golf Course in the early 1990's shifted the current drainage coarse along the southwest edge of Bedford Canyon wash. This appears to be rapidly eroding these banks. Evidences for this was also noted in the presence of an old irrigation pipe which prior to the construction of the golf course, ran down this old canyon wall from the bluffs above. At the time of our visit this pipe was hanging out over the slope approximately 50 feet, evidence that the slope has been drastically eroded back.

Located near the center of the site was the grove caretaker's residence. This consisted of a mobile home, a steel storage and workshop buildings. At various places across the site there were small, above ground storage tanks for chemical additives, as well as wind machines and power poles. A large retention basin was noted along the southern portion of the site, and five water wells were also noted across the site. The site is bordered on the northwest by residential homes. The 15-freeway cuts diagonally across the northeastern portion of the site. The Corona Clay Quarry borders the northeastern portion of the site. The Eagle Glen Golf Course borders the site to the west.

AERIAL PHOTOGRAPH ANALYSIS

During the course of this study, an analysis of time-sequential stereoscopic aerial photograph pairs of the site and surrounding region, on file at the Riverside County Flood Control and Water Conservation District, were reviewed. Stereoscopic aerial photograph pairs of the site and surrounding region dating from 1931 to 2000 were examined. A complete list of the photographs studied is given in the references at the back of this report.

SUBSURFACE FIELD INVESTIGATION

Our subsurface field exploration program was conducted on January 31, February 1, 4 through 7, and 14 of 2002 and consisted of excavating a total of 31 exploratory trenches using a tractor-mounted backhoe and drilling a total of 23 exploratory borings with a truck-mounted CME 55 drill rig equipped with an 8-inch diameter hollow stem auger. The trenches were excavated to depths ranging from 4.5 feet to 15.0 feet below the existing ground surface. The borings were drilled to depths ranging from 24.0 feet to 51.5 feet below the existing ground surface. The approximate locations of our exploratory trenches and borings are presented on the enclosed Site Geologic Map, Enclosures A-7 and A-8, within Appendix A.

Logs of the subsurface conditions encountered in the exploratory trenches were maintained by a geologist from this firm. In-place density tests were taken at various depths within the trenches using the Nuclear Density Method (ASTM D 2922). Bulk samples of the encountered materials were obtained and returned to the laboratory in sealed containers for further testing and evaluation.

Logs of the subsurface conditions encountered in the exploratory borings were also maintained by a geologist from this firm. Relatively undisturbed and bulk samples were obtained at a maximum depth interval of 10 feet and returned to the laboratory in sealed containers for further testing and evaluation.

A detailed description of the field exploration program and the trench and boring logs are presented in Appendix B.

LABORATORY TESTING PROGRAM

Selected soil samples obtained during the field investigation were subjected to laboratory testing to evaluate their physical and engineering properties. Laboratory testing included moisture content, dry density, laboratory compaction, direct shear, sieve analysis, sand equivalent, R-Value, percent passing the No. 200 sieve, expansion index, and chemical analysis. A detailed description of the laboratory testing program and the test results are presented in Appendix C.

GEOLOGIC CONDITIONS

Regional Geologic Setting

The subject site is located along the northeastern foothills of the Santa Ana Mountains, just northwest of the Elsinore-Temecula basin, which in turn lies within the Perris Plain. The Santa Ana Mountains and Perris Plain lies within the larger Peninsular Ranges Geomorphic Province of southern California. The Peninsular Ranges Geomorphic Province is characterized by a series of north westerly trending mountain ranges extending from the coast of California eastward into the California desert and south to the tip of Baja California. These ranges are separated by wide valleys such as the Elsinore-Temecula basin and the Perris Plain. The Santa Ana Mountains are composed of a core of metamorphic rocks of the Bedford Canyon formation with lesser amounts of volcanic rocks. The age of these rocks is not known, but they are considered to be early Mesozoic or older (on the order of several hundred million years or more). Overlying the core of metamorphic rocks there is a relatively thick sequence of younger, late Mesozoic through Quaternary age, sedimentary rocks. The Elsinore-Temecula basin to the southeast was created by oblique movement along the Elsinore fault system which moved the Santa Ana Mountains to the northwest, away from the broad Perris Plain to the east. This tensional movement results in the down dropping of the Elsinore basin along, dip-slip faults that bounds the highlands. Erosion of the surrounding highlands has resulted in perhaps several thousands of feet of valley in-fill into the basin. Similar erosion of the Santa Ana Mountains to the northwest, along the southern Corona area, has resulted in the carving of a series a sub-parallel canyons leading down out of the mountains. The buildup of sediments from these canyons has over time built up into a very large coalescing alluvial fan which forms much of the elevated areas of southern Corona. However this fan has been dissected by a few of the larger drainage courses, such as Bedford Canyon.

The majority of the site lies within the Bedford Canyon wash. This wash is comprised of relatively young alluvial sediments. The depth of these units at the site was not determined during this study, but is considered to be highly variable ranging from a few feet to on the order of several hundred or more to the older sedimentary bedrock and crystalline bedrock which underlies the valley floor.

The site lies within a relatively seismically active region of southern California. The nearest known active earthquake fault is the Elsinore fault zone. This system runs along the southwestern portion of the site other faults in the region include the Cucamonga fault located, approximately 23 miles to the north, the San Jacinto fault located approximately 20 miles to the northeast, the Newport-Inglewood fault located approximately 25 miles to the southwest, and the San Andreas fault approximately 30 miles to the northeast.

Site Geologic Conditions

As noted above the subject site is underlain by various ages of relatively unconsolidated alluvial materials overlying various ages of sedimentary rocks. While units of the crystalline metamorphic rocks were noted in the mountains just adjacent the site, they were not exposed at the site. The materials exposed at the site were categorized into the following geologic units: topsoil, fill, alluvium, older alluvium of the Corona Compound Alluvial Fan, terrace deposits, and sedimentary bedrock. These units are described as encountered during this investigation, in further detail in the following sections and are shown on the enclosed Site Geologic Map, Enclosures A-7 and A-8, within Appendix A.

Bedrock Units: The oldest rock units noted exposed at the site included a series of grayish-green, white, tan, or reddish-brown sandstone and siltstone rocks. These materials were noted cropping out at several places along the base of the southwestern canyon wall, and within several of our borings and trenches. These units were typically composed of greenish tan to tan silty sandstone to greenish tan sandy siltstone with sand and silt size grains of quartz and feldspars. There were occasional gravel and cobbles of a dark brown quartzite composition and a reddish brown volcanic rock. The overall units were typically moderately hard and dense, but highly weathered, were exposed, with a "hacky" or "puffy" appearance. Most of the units were moderately fractured and filled with secondary deposits of calcite.

The age and formation of these units was not determined during this study. However an earlier study of the region conducted by Gray (1961) indicated that these rocks belong to either the Upper Eocene age (about 36 million years old) Sespe sandstone and conglomerate formation, or the Lower Miocene age (about 23 million years old) Vaqueros sandstone and siltstone formation. For this study we therefore labeled this group the Vaqueros/Sespe formation undifferentiated.

Terrace Deposits: Overlying the sandstone and siltstone bedrock materials is a coarse grained unit composed of relatively unconsolidated, yet very dense, sandy gravel with cobbles and gravelly sand. These units varied in composition from a medium and grained sand to a poorly graded gravel with up to 60% of medium, sub-rounded gravel in a coarse sand matrix. These units were typically reddish to yellowish-brown and composed of rocks with the similar composition as exposed in the Santa Ana Mountains to the southwest, suggesting a source. The overall units were unconsolidated yet they were very dense with some induration. Bedding was crude, predominately noted by the layering of the gravels and cobbles. Some of these units were noted to dip back towards the mountains at up to 10 degrees.

The age and formation of these units was not determined during this study. However the earlier study of the region conducted by Gray (1961) indicated that older alluvial terrace deposits in some areas are overidden by Pleistocene landslide materials and or thus thought to be, at least in part, of Pleistocene age (older than 11,000 years but younger than 1.8 million years).

Older Alluvial Deposits: The upper portions of the bluffs were noted, at least in part, to be composed of unconsolidated alluvial materials which form the southern portion of a coalescing alluvial fan that forms the southern portion of the town of Corona, described by Gray (1961) as the Corona Compound Fan. These units are lying unconformably upon the terrace deposits and bedrock units described above. They are similar in composition to the terrace deposits. However the clasts in general are finer grained and the color is typically brown to grayish-brown.

Alluvium: Recent alluvial deposits were encountered within all of our exploratory borings and trenches placed across the lower elevations of the site, within the Bedford Canyon wash area. These units consisted primarily of silty sand with various amounts of gravel and cobbles. Other units encountered included some units of sandy gravel and well graded gravel with sand and lessor units of sandy silt and well graded sand.

These younger alluvial units were typically loose in the upper 1 to 2 feet, increasing in relative density with depth.

Fills: Fill materials, where encountered at the site, varied in thickness from approximately 2 to 48 feet. The majority of the fills encountered at the site are believed to be the result of the leveling of the site from the citrus crops i.e., filling in of gullies. These typically ranged from 1 to 5 feet, however some of these were up to 10 feet (deep). An extremely deep area of fill was encountered within boring B-10 and trench T-28. The fill materials encountered within the boring were approximately 48 feet thick and contained brick, concrete, and trash debris. Based on the topography on the maps utilized in the field which pre-date the fill in this area and the current topography, these fill materials appear to have been recently pushed in to fill a previous large canyon in this area. The depth of the fill materials in this area are anticipated to be up to 60 or more feet in total thickness. Other than as encountered in boring B-10, trenches T-9 and T-23, the fill materials encountered were clean of trash and debris and consisted primarily of silty sand with angular gravel with lessor units of sandy gravel and well graded gravel with sand and some boulders up to 16-inches in diameter. The fill materials encountered were typically in a relatively loose state. In addition there is a very long, narrow, levee of fill running along the southeastern canyon wall, which is about 10 to 15 feet tall.

Topsoil: The majority of the site contained a relatively thin veneer of topsoil materials as encountered within our explorations at the site. In numerous locations, cattle manure, associated with the citrus grove usage of the site, was found overlying the topsoil materials and was noted to be approximately 1-inch thick. The topsoil materials were noted to typically consist of dry to damp, loose, brown to dark brown, silty sand with some angular gravel.

Our mapping of these units noted that they were composed a numerous channel fills that ranged from fine silts, uncommon, to the more predominate coarse gravelly sand. However, we did not that the lower portions of this unit tended to be slightly more indurated and yellowish brown in color, while the upper portions tended to be slightly looser and brown. This is most likely due to the obvious fact that the upper portions are younger.

Again, the age and formation of these units was not determined during this study. However the earlier study of the region conducted by Gray (1961) indicated that older alluvial deposits most likely predominately recent in age (up to 11,000 years) with some of the older units may be late Pleistocene (up to 700,000 years). The study conducted by Weber in 1977 indicated that these units are on the order of 500,000 years.

Regardless of the age, most all of these units oriented in near horizontal layers, with a slight dip to the northeast. However in several areas this dip was disturbed by localized faulting.

A detailed description of the subsurface soil conditions as encountered within our exploratory trenches and borings, is presented on the Trench and Boring Logs within Appendix B.

Groundwater Hydrology

Groundwater was not encountered within any of our exploratory trenches or borings, nor was any groundwater seepage observed during our site reconnaissance.

The nearest known groundwater wells lie within the center portion of the site. Groundwater records in this well, provided by the care taker of the citrus orchard, indicates that the regional groundwater lies at a depth of approximately 160 feet below the surface in the lower elevations of the site. Groundwater is anticipated to flow to the northeast following the regional topography within the lower elevations of the site.

Surface Runoff

Current surface runoff of precipitation waters across the site is typically from the southwest to the northeast as sheet flow on the relatively planar portions of the site. The active Bedford Canyon drainage is currently as a stream flow emanating from the Santa Ana Mountains adjacent to the southwest of the site and traversing the site along the southern edge of the lower lying portions adjacent to the bluffs on the southeast, flowing towards the northeast. Another smaller canyon runoff is present between the two southern bluffs and flows to the northeast where it joins the Bedford Canyon wash runoff near the north portion of the site.

Mass Movement

The majority of the site lies on a relatively flat surface. The occurrence of mass movement failures such as landslides, rockfalls or debris flows within such areas are generally not considered common and no evidence of mass movement was observed within the relatively flat areas of the site. However, areas of moderate topographic relief are present across the site. Along both the north and south portions of the lower lying wash region, very steep, near vertical cliffs are present. As shown on the enclosed Site Geologic Map, Enclosures A-7 and A-8, within Appendix A, a relatively small landslide was noted along the southern wall of the northern bluff west of the I-15 freeway. This feature is assumed to be related to the mapped faulting in this location as interpolated from the aerial photographs. In addition, larger landslides were observed within the southeastern and southwestern portions of the site. The natural stability of these features should be addressed within specific studies for the individual tracts/development areas.

Faulting

As previously noted, the site is located within, and around, Bedford Canyon in the far southern regions of the city of Corona. This canyon emanates out of the Santa Ana Mountains which rise abruptly just southwest of the site. Past studies have long noted the Elsinore fault zone running along the base of these mountains. This fault was first shown on a published map and given the name "Elsinore" by A.C. Lawson in 1908 (Lawson and others 1908). The geology of the region was later studied by C.H. Gray with the State of California in 1961, who noted the recency of movement along this fault and a series of sub-parallel fault strands off the main fault zone. This early study was complemented by a seismic hazards study in 1977 by F. H. Weber, also with the State of California Division of Mines and Geology. The most recent mapping reviewed during our study of the area, was the Open File Report 02-21 by the United States Geological Survey. This latest study was a geologic map of the Corona 7.5 minute quadrangle by Gray, Morton, and Weber (Gray, Morton, and Weber, 2002). A copy of this map is included as Enclosure A-2 and a description of the geologic units is enclosed as Enclosure A-3, within Appendix A of this report.

These and other studies have long documented the presence of the Elsinore fault zone as a major active fault zone of southern California. Regionally it is part of the San Andreas system which in concert with other "sister" faults, the San Jacinto fault to the east and the Newport-Inglewood fault to the west, acts to distribute the right lateral movement across the North American and Pacific plates. Understandably the bulk of the movement along this fault is attributed as right lateral with some studies claiming lateral offsetting of the Santa Ana Mountains up to 18 miles to the northwest in relation to the Perris plain (Norris and Webb, 1990). However, the seismic movement and activity of this zone is considered to be very complicated with tensional motion also occurring. This is noted by a series of "normal" or pull apart faults which parallel the Elsinore fault zone. This "pulling apart" motion is generally considered responsible for the opening of the Elsinore Valley "graben" to the southeast of the site.

The Elsinore fault system consists of a sub-parallel set of faults which extend from below the US/Mexico border northwestwards through the Temecula and Elsinore Valleys and then into the southern Corona area. At this point the fault system bifurcates into the Chino fault to the north and the Whittier fault to the northwest. The work by Weber (1977) studied the portion of fault from Corona southeast into Temecula. Along this portion, the fault system was divided into the following eight segments: Fresno, Tin Mine, Eagle, Main Street, Glen Ivy North, Glen Ivy South, Willard and Wildomar. The portion of the fault zone which crosses the site was shown on that study as the Eagle fault zone. This portion consisted of a very complicated series of sub-parallel faults with vastly differing movement and history of activity. The southwestern side of this zone was marked by a thrust fault, were metamorphic bedrock units of the Bedford Canyon Formation have been pushed up over younger, sedimentary bedrock units. Just northeast of this thrust fault Weber noted the presence of the main active trace, lying just southwest of the subject site. Movement along this fault is considered right lateral and is responsible for offsetting the canyon. Northeast of the main fault Weber noted the presence of a series of pull-apart, or normal faults which break and offset units of Tertiary sedimentary rocks and older alluvial materials of Pleistocene age.

The information from these earlier studies resulted in the State of California zoning the Elsinore fault as a significant active fault and included it within the Alqiust-Priolo Earthquake fault zone (DMG CD-2000). This designation requires that prior to development, special fault studies must be conducted to evaluate the hazards associated with the development. At that time the state only included the main break of the Elsinore fault within this zone, which lies just southwest of the site, therefore no A-P zone actually exists on the site. This A-P zone in relation to the site is shown on Enclosure A-4, within Appendix A.

Based on our review of documents on file at the city of Corona Department of Public Works, a series of unpublished studies were conducted for the Eagle Glen development project, located adjacent to the site on the northwest, were conducted by private geologic consulting firms in the late 1980's and early 1990's. These included a fault hazard evaluation of the McMillian Ranch properties, by the geologic consulting firm of Leighton and Associates in 1989, and a series of similar studies by the firm of Geosoils Inc., in 1999, conducted for the Eagle Glen development adjacent the site to the northwest. Unfortunately the city of Corona was only able to produce incomplete copies of these reports. They referred us to the County of Riverside. These documents had not yet been obtained by the date of this report. However. the portions of the GeoSoils reports that we were able to review at the city did indicate that Leighton and Associates and Geosoils had found evidence of active faulting along several of the main strands of the Elsinore fault and recommended building set backs.

Our geologic mapping of the site noted the presence of these faults in the general locations as the studies conducted by Gray (1961) and Weber (1977). In addition evidence for one additional splay was also noted. Since none of the earlier studies used any nomenclature for these sub-parallel faults, other than "un-named faults", for this study we have adopted an alphabetical nomenclature for the faults starting with "Fault A" on the strand noted the farthest to the northeast then working to the southwest to the main fault labeled as "Fault I". A complete description of each of the conditions of these features is given below.

It should also be noted that the latest map by the U.S.G.S. all of the faults at the site except for one (Gray, Morton, and Weber, 2002). We contacted one of the authors of this map, D. Morton, who informed us that these faults were removed for lack of exposures. However, the recent erosions of the canyon walls have recently exposed their locations.

Fault "A"

Fault "A" was noted only from an aerial photograph lineament, and some indirect geomorphic and geologic evidence. In the early photographs taken of the site prior to the planting of citrus groves on the site, there is a very distinct linear alignment trending across the northeastern portion of Bedford Canyon. This feature trends to the northwest, some-what parallel to the 15 freeway and lies approximately 950 feet southwest of the freeway. At the location were this lineament intersects with the southeastern canyon wall the feature has been covered by a small landslide. However, the geologic materials exposed in the canyon wall northeast of the landslide consist of the upper portion of the Corona Compound Alluvial fan to the northeast of this feature, while the materials exposed in the canyon wall to the southwest of the landslide consist of the Vaqueros/Sespe sandstone unit at the base of the canyon, overlain by the older terrace materials, which in turn are overlain by the lower members of the Corona Compound Alluvial fan.

This sequence of relatively younger, "older alluvial", materials juxtaposed against relatively older bedrock and terrace deposits may represent the southwest end of a small normal fault, or pull apart fault. This would imply that the north-end of this pull apart system should be located to the northeast. We did note the exposure older terrace materials along the canyon wall northeast of the freeway, and our boring B-22 encountered shallow sandstone bedrock at this location. This may imply that the Fault "A" is the southwestern fault of a small "graben" or pull apart basin with the northeast fault covered by the freeway. However, this feature could also simply represent a lithology change with younger alluvial materials placed against older materials to the southwest.

The intersection of Fault "A" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.986' North, 117° 31.072' West. From this point the aerial photograph lineament trends North 40 to 50° to the west across the canyon for about 1,800 feet.

Faults "B" and "C"

The mapping conducted by Weber in 1977 noted four queried, or conjectural faults which were noted only from exposures along the southwestern canyon wall (see

Enclosures A-7 and A-8, within Appendix A). Along this approximate area, our field mapping noted two "pull-apart" fault sets. Each of these sets was noted to be a graben, or down-dropped fault block with relatively younger materials juxtaposed on both sides by older materials, bounded by a dip slip fault on each side.

The two faults bounding the northeastern most of these two grabens were labeled as Faults "B" and "C" from the northeast to the southwest. The intersection of Fault "B" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.707', North 117° 31.378' West. At this point the fault plane was noted as a very thin layer of brown silty clay which was trending about north 20 degrees to the west and dipping about 70 degrees to the southwest. This fault offset a sequence of sandstone bedrock overlain by older terrace deposits and older alluvial materials against the older alluvial materials.

A few hundred feet to the southwest of Fault "B" the other side of the graben was encountered, with older alluvial juxtaposed against sandstone and terrace deposits. Here the bounding fault was labeled as Fault "C". The intersection of Fault "C" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.670' North, 117° 31.402' West, and the attitude of the fault plane was about north 80 degrees to the west and dipping about 50 degrees to the northeast.

Faults "D" and "E"

The second set of graben faults noted in our field mapping roughly correlated to a similar graben originally mapped by Gray (1961). Gray mapped a block of relatively younger bedrock siltstone materials bounded on the northeast and southwest by units of relatively older sandstone units, with the contact marked by normal, or dip-slip faults on the bluffs along the far southeastern portions of the site (see Enclosures A-7 and A-8, within Appendix A). From this point, this set of faults trended to the northwest to Bedford Canyon. At the approximate location were these faults intersected with the southeastern canyon wall, our field mapping noted evidence for a similar set of normal faults. The northeastern fault on this system we labeled Fault "D" with the southwest fault labeled as Fault "E".

The intersection of Fault "D" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.586' North, 117° 31.481' West. The attitude of the fault plane curved with and average strike of about North 50 to 70 degrees to the west and dipping from about 65 to 85 degrees to the southwest. This fault juxtaposed units of the relatively older terrace materials, overlain by the lower portion of the older alluvial fans, against the upper portion of older alluvial fans.

Again, a few hundred feet to the southwest of Fault "D" the other side of the graben was encountered, with older alluvial juxtaposed against the terrace deposits. The intersection of Fault "E" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.476' North, 117° 31.643' West. Here no distinct fault plane was noted. Instead there was a series of disturbed alluvial materials with a sequence of northeast dipping calcite filled shears over a zone about 2 to 3 feet wide.

<u>Faults "G" and "F"</u>

The mapping by Gray (1961) indicated that at least two the faults noted on the southeastern canyon walls of Bedford Canyon may project across the canyon. The approximate location of these were labeled as faults "G" and "F". However during our study the mapping of these faults was hampered by a dense growth of brush along the northwestern canyon wall. However at these locations we did not the presence of several clusters of small trees and palm trees which may indicated shallow groundwater.

<u>Fault "H"</u>

The mapping by Gray, Morton, and Weber (2002) indicated one fault crossing the southeastern portion of the site. This fault is shown to trend from the southeast to the northwest through the larger canyon fill along the canyon wall in this area and "conceded" with the wash. This feature is covered by the larger canyon fill and citrus groves which may conceal this fault.

<u>Fault "I"</u>

Along the very far southwestern corner of the site there is relatively faint aerial photo lineament which runs to the northwest. While no evidence of this feature was noted during our field mapping of the site, this lineament does approximately correlate with the dotted, or "concealed" fault at the far southwest end of the site on the mapping conducted by Gray (1961) and Weber (1976). However it should be noted that the areas where this feature is thought to cross the site was predominately covered by heavy brush which may conceal the fault.

Historical Seismicity

In order to obtain a general perspective of the historical seismicity of the site and surrounding region a search was conducted for seismic events at and around the area within various radii. This search was conducted utilizing the historical seismic search program by EPI Software, Inc. This program conducts a search of a user selected cataloged seismic events database, within a specified radius and selected magnitudes, and then plots the events onto an overlay map of known faults. For this investigation the database of seismic events utilized by the EPI program was obtained from the Southern California Seismic Network (SCSN) available from the Southern California Earthquake Center. At the time of our search the data base contained data from January 1, 1932 through February 28, 2002.

In our first search the general seismicity of the region was analyzed by selecting an epicenter map listing all events of magnitude 4.0 and greater, recorded since 1932, within a 100 kilometer (62 mile) radius of the site, in accordance with guidelines of the California Division of Mines and Geology. This map illustrates the regional seismic history of moderate to large events. As noted on Enclosure A-5, within Appendix A, the site lies within a relatively active region associated with the Elsinore fault trending northwest-southwest. Of these events, the closest was a magnitude 4.2 located approximately 8 kilometers (5 miles) to the southeast of the site.

In the second search, the micro seismicity of the area lying within a 10 kilometer (6.2 mile) radius of the site was examined by selecting an epicenter map listing events on the order of 0.0 and greater since 1975. In addition, only the "A" events, or most accurate events were selected. Caltech indicates the accuracy of the "A" events to be approximately 1 km. The results of this search is a map that presents the seismic history around the area of the site with much greater detail, not permitted on the larger map. The reason for limiting the events to the last 25 years on the detail map is to enhance the accuracy of the map. Events recorded prior the mid 1970's are generally considered to be less accurate due to advancements in technology. As noted on this map, Enclosure A-6, the Elsinore fault zone appears to be the source of numerous events. It should be noted that the cluster of events to the northwest of the site are believed to be associated with the quarry operations in that area.

In summary, the historical seismicity of the site entails numerous small to medium magnitude earthquake events occurring around the subject site, predominately associated with the presence of the Elsinore fault zone. Any future developments at the subject site should anticipate that moderate to large seismic events could occur very near the site.

Secondary Seismic Hazards

Other secondary seismic hazards generally associated with severe ground shaking during an earthquake include liquefaction, seiches and tsunamis, earthquake induced flooding, landsliding and rockfalls, and seismic-induced settlement.

Liquefaction. The potential for liquefaction generally occurs during strong ground shaking within relatively cohesionless loose, sediments where the groundwater is usually less than 50-feet. The Bedford Canyon portion of the site is underlain by relatively unconsolidated coarse grained materials. However, our borings data indicates that this depth to groundwater levels is in excess of 50 feet. The elevated portions of the site ar underlain by dense materials of older alluvium which generally preclude liquefaction. In addition these materials are relatively dense, therefore, the possibility of liquefaction at the site is considered very low.

Seiches/Tsunamis. The potential for the site to be effected by a seiche or Tsunamis (earthquake generated wave) is considered nil due to absence of any large bodies of water near the site.

Flooding (Water Storage Facility Failure). There are no large water storage facilities located on or near the site which could possibly rupture during in earthquake and effect the site by flooding.

Seismically-Induced Landsliding.

The existing over steepened slope located along the southwestern side of Bedford Canyon appears to be subject to sluffing and landsliding. Any significant shaking of the ground, such as during a large event on the Elsinore fault adjacent to the site, may increase this activity.

Rockfalls. No large, exposed, loose or unrooted boulders are present above the site that would affect the integrity of the site.

Seismically-Induced Settlement. Settlement generally occurs within areas of loose, granular soils with relatively low density. Since the site is underlain by relatively dense alluvial and dense sedimentary bedrock materials, the potential for settlement is considered low, however the earthwork operations during the development of the site most probably mitigated any such loose soil conditions.

CONCLUSIONS

General

This investigation provides a broad overview of the preliminary geotechnical and geologic factors which are expected to influence future site planning and development. On the basis of our field investigation and testing program, it is the opinion of LOR Geotechnical Group, Inc. that the proposed development is feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into design and implemented during grading and construction. In addition, site specific preliminary soils and other investigations as recommended within should be conducted for the individual tracts/development areas within the final project area once specific development plans are made available.

The subsurface conditions encountered in our exploratory trenches and borings are indicative of the locations explored. The subsurface conditions presented here are not to be construed as being present the same everywhere on the site. If conditions are encountered during the construction of the project which differ significantly from those presented in this report. This firm should be notified immediately so we may assess the impact to the recommendations provided.

Foundation Support

Based upon the field investigation and test data, it is our opinion that the upper native soils and existing fills will not, in their present condition, provide uniform and/or adequate support for the proposed structures. Our compaction test and Standard Penetration Test (SPT) data indicated variable in-situ conditions of the upper native and fill soils, ranging from loose to medium dense states. This condition may cause unacceptable differential and/or overall settlements upon application of the anticipated foundation loads.

To provide adequate support for the proposed residential and commercial/industrial structures, we recommend a compacted fill mat be constructed beneath footings and slabs. This compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. In addition, the construction of this compacted fill mat will allow for the removal of any old fill material, and recompaction of existing upper disturbed soils within building pad areas.

Conventional spread foundations, either individual spread footings and/or continuous wall footings, will provide adequate support for the anticipated downward and lateral loads when utilized in conjunction with the recommended fill mat.

Geologic Mitigations

One of the goals of this feasibility study was to identify if there is a potential for the hazard of fault rupture at the site by one of the subsidiary faults located at the site associated with the Elsinore fault system. Our studies have noted the presence of eight various fault splays which exist at or cross the site. The State of California considers a fault to be "active" if it displays evidence of activity within the last 11,000 years. This would typically be conducted by noting the age of the youngest materials broken by the fault. Several of the faults described within this report were noted to offset alluvial units which may be younger than 11,000 years, such as the splays labeled as "A" "B-E". The precise age of these materials, such as through carbon dating of the units, was not conducted during our study. Therefore, the activity rating of these faults is not yet known. However, there is some indication that at least some of the faults onsite may have already been studied by other firms (Leigthon 1989).

The stability of the large, near vertical cliffs noted along the southwestern side of Bedford Canyon were not evaluated during this study. However, evidence was noted that the recent change in the drainage course along the canyon bottom is rapidly eroding back this wall, perhaps as much as 5 feet per year. While this rate is anticipated to slow, if the current stream course is not controlled these canyon walls will potentially continue eroding back. This process will most likely be associated with and aided by sluffing of the walls and other failures. However, even if the stream course is diverted away from the base of the existing cliffs, the sluffing of these materials is still expected due to the over-steepened nature of these slopes.

Seismicity

Due to the site's close proximity to the Elsinore fault system, it is reasonable to expect a strong ground motion seismic event to occur during the lifetime of the proposed development on the site. Large earthquakes could occur on other faults in the general area, but because of their lesser anticipated magnitude and/or greater distance, they are considered less significant from a ground motion standpoint.

The effects of ground shaking anticipated at the subject site, should be mitigated by the seismic design requirements and procedures outlined in Chapter 16 of the Uniform Building Code. However, it should be noted that the current building code requires the minimum design to allow a structure to remain standing after a seismic event, in order to allow for safe evacuation. A structure built to code may still sustain damage which might ultimately result in the demolishing of the structure (Larson and Slosson 1992).

RECOMMENDATIONS

Geologic Recommendations

Due to the potential for seismic hazards at the site, it is our recommendations that prior to the development of specific design plans, a specific fault hazard study should be conducted to evaluate the potential for fault rupture at the site. This study should include an in-depth search of past documents, which were not readily available during this study. This search may reveal data to help to further refine the scope of future studies. However additional studies will must likely involve the trenching of some the fault strands noted on the site and age dating of the materials to analyze the activity rating of these features and determine the extent of faulting at the site.

The rapid erosion of the canyon walls along the southwestern side of Bedford Canyon could be mitigated by controlling the run-off waters. This could be done by either diverting the flow away from this area, or into a lined channel. However the existing near vertical canyon walls may need to be graded into less steep angles and/or setbacks may be required.

Review of Specific Plans

Future development plans should be reviewed by the geotechnical consultant to ensure that the proposed development has been designed and grading will be performed in accordance with the following recommendations as well as applicable portions of Appendix Chapter 33 of the Uniform Building Code, and/or applicable local ordinances.

Initial Site Preparation

All loose, compressible alluvial and fill materials should be removed from areas to receive engineered compacted fill. For preliminary design purposes, the data developed during this investigation indicates that the majority of the removals required from currently planned fill areas are on the order of 2 to 5 feet. However, larger removals on the order of 10 feet will be required in areas as indicated previously. In addition, removals on the order of 60+ feet will be required within the previously filled canyon area of the site. The actual depths of removal should be verified during future site specific preliminary soils investigations and ultimately during the grading operation by observation and in-place density testing.

Preliminary Foundation Design

For planning purposes we anticipate that if the site is prepared as recommended, the proposed residential and commercial/industrial structures may be safely founded on conventional spread foundations, either individual spread footings and/or continuous wall footings, bearing either on a minimum of 24 inches of engineered compacted fill or bearing entirely on competent native materials. All foundations should have a minimum width of 12 inches and should be established a minimum of 12 inches below lowest adjacent grade.

Final foundation design considerations obtained from the site specific preliminary soils investigations conducted for the individual tracts/development areas once specific grading/development plans are made available.

Engineered Compacted Fill

The on-site soils should provide adequate quality fill material, provided they are free from organic matter and other deleterious materials. Unless approved by the geotechnical engineer, rock or similar irreducible material with a maximum dimension greater than 6 inches should not be buried or placed in fills. Oversized material may be stockpiled for landscaping purposes or placed in a rock disposal area as approved by the owner, developer, geotechnical engineer, and local agency having jurisdiction.

Import fill should be inorganic, non-expansive granular soils free from rocks or lumps greater than 6 inches in maximum dimension. Sources for import fill should be approved by the geotechnical engineer prior to their use.

Fill should be spread in maximum 8 inch uniform, loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557.

Based upon the relative compaction of the near surface soils determined during this investigation and the relative compaction anticipated for compacted fill soil, we estimate a compaction shrinkage of approximately 10 to 15 percent. Therefore, 1.10 cubic yards to 1.15 cubic yards of in-place materials would be necessary to yield one cubic yard of properly compacted fill material. In addition, we would anticipate subsidence of approximately 0.10 feet. These values are for estimating purposes only, and are exclusive of losses due to stripping or the removal of subsurface obstructions. These values may vary due to differing conditions within the project boundaries and the limitations of this investigation. Shrinkage should be monitored during construction. If percentages vary, provisions should be made to revise final grades or adjust quantities of borrow or export.

Slope Construction

Preliminary data indicates that cut and fill slopes should be planned at gradients no steeper than two horizontal to one vertical. Preliminary evidence indicates that the steep, near vertical cliffs of the site may not be grossly stable. Additional information regarding any proposed cut slopes and the existing natural slope stability should be addressed within the site specific preliminary soils investigations when actual grading/development plans are made available for the specific tracts/development areas.

Where fills are to be placed against existing slopes steeper than five horizontal to one vertical, the fill should be properly keyed and benched into competent native materials. The key, constructed across the toe of the slope, should be a minimum of 12 to 15 feet wide, a minimum of two feet deep at the toe, and sloped back at two percent. Benches should be constructed at approximately two to four feet vertical intervals. Typical keying and benching operations are presented on Enclosure D-1, within Appendix D.

Slope Protection

Since the native materials are susceptible to erosion by running water, measures should be provided to prevent surface water from flowing over slope faces. Slopes at the project should be planted with a deep rooted ground cover as soon as possible after completion. The use of succulent ground covers such as iceplant or sedum is not recommended. If watering is necessary to sustain plant growth on slopes, then the watering operation should be monitored to assure proper operation of the irrigation system and to prevent over watering.

Soil Expansiveness

The upper materials encountered during this investigation were generally observed to be granular and considered to have a very low expansion potential. However, one area was noted to contain clayey fines and are considered to have a medium expansion potential when tested in accordance with Uniform Building Code, Standard 18-2. This medium expansive soil is considered to be an anomaly since it was observed within two of fifty-four excavations placed at the site. Therefore, specialized construction procedures to specifically resist expansive soil activity are not anticipated at this time. In order to verify this, additional evaluation of on-site and any imported soils for their expansion potential should be conducted during the specific preliminary soils investigations conducted for the individual tracts/development areas and ultimately following completion of the grading operation.

Settlement

Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Maximum settlement of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be on the order of 0.5 inch. Differential settlements between adjacent footings should be about one-half of the total settlement. Settlement of all foundations is expected to occur rapidly, primarily as a result of elastic compression of supporting soils as the loads are applied, and should be essentially completed shortly after initial application of the loads.

Slabs-On-Grade

To provide adequate support, concrete slabs-on-grade should bear on a minimum of 12 inches of compacted soil. The final pad surfaces should be rolled to provide smooth, dense surfaces upon which to place the concrete.

Slabs to receive moisture-sensitive coverings should be provided with a moisture vapor barrier. This barrier may consist of an impermeable membrane. Two inches of sand over the membrane will reduce punctures and aid in obtaining a satisfactory concrete cure. The sand should be moistened just prior to placing of concrete.

The slabs should be protected from rapid and excessive moisture loss which could result in slab curling. Careful attention should be given to slab curing procedures, as the site area is subject to large temperature extremes, humidity, and strong winds.

Preliminary Pavement Design

Testing and design for preliminary on-site pavement was conducted in accordance with the California Highway Design Manual. Based upon our preliminary sampling and testing, and upon assumed Traffic Indices, it appears that the structural sections tabulated below should provide satisfactory pavements within the subject development:

AREA	T.I.	PRELIMINARY SECTION	
		DESIGN R-VALUE	
		20	50
Local Streets and On-Site Parking	5.0	0.25'AC/0.6'AB	0.25'AC/0.35'AB
Local Collector Streets	7.0	0.30'AC/1.05'AB	0.30'AC/0.45'AB
Major Collector	8.0	0.40'AC/1.15'AB	0.40'AC/0.45'AB
Major Arterial	9.0	0.45'AC/1.30'AB	0.45'AC/0.55'AB
AC - Asphalt Concrete			
AB - Class 2 Aggregate Base			

The above structural sections are predicated upon 90 percent relative compaction (ASTM 1557) of all utility trench backfills and 95 percent relative compaction (ASTM 1557) of the upper 12 inches of street subgrade soils and of any aggregate base utilized. In addition, the aggregate base should meet Caltrans specifications for Class 2 Aggregate Base.

The above pavement designs were based upon the results of preliminary sampling and testing and should be verified by additional sampling and testing during the site specific preliminary soils investigations for the individual tracts/development areas and ultimately when the actual subgrade soils are exposed during site grading.

Chemical Protection

Electrical resistivity is a major factor in determining soil corrosivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal to the soil. Following Ohm's Law, corrosion currents are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and chemical contents and indicate corrosive soil. Other soil characteristics that may influence corrosivity towards metals are pH, chemical content (sulfate, chloride, etc.), soil types, aeration, anaerobic conditions, and site drainage.

The results of the sulfate, pH, sulfide, redox potential, and electrical resistivity tests conducted on selected subgrade soils expected to be encountered at foundation levels are presented as Enclosures C-3 through C-27 within Appendix C.

Based on the test results, the sulfate exposures of on site soils is considered negligible to moderate by the UBC. Specific recommendations are given for concrete elements to be in contact with on site soils is shown on UBC Table 19-A-4.

Soil pH values varied from 7.1 to 7.6. This range is neutral to mildly alkaline and does not particularly increase soil corrosivity.

Sulfide, which is aggressive to copper and ferrous metals, showed no reaction in a qualitative test. The positive redox potential indicates oxidizing conditions in which anaerobic, sulfide producing bacteria are inactive.

Based on the test results of the electrical resistivity, the on site soils are considered to be moderately corrosive to corrosive. In addition, one sample tested was found to be severely corrosive and is considered to be an anomaly.

In addition soil corrosivity, the life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc. and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

Final chemical analysis should be verified by additional sampling and testing during the site specific preliminary soils investigations for the individual tracts/development areas and ultimately when the actual subgrade soils are exposed during site grading. A qualified corrosion engineer should evaluate the general corrosion potential with respect to construction materials at the site.

CLOSURE

The additional studies recommended in this report are an important and necessary continuation of this investigation. Site specific preliminary soils investigations for the individual tracts/development areas should be conducted and project plans and specifications should be reviewed prior to construction to confirm that the intent of the recommendations presented in the site specific preliminary soils investigations have been incorporated into the design.

In addition during construction, sufficient and timely geotechnical observation and testing should be provided to correlate the findings of this investigation with the actual subsurface conditions exposed during construction. For planning purposes, future items requiring observation and testing include, but are not necessarily limited to, the following:

1. Site preparation-stripping and removals.

2. Excavations, including approval of the bottom of excavation prior to backfilling.

3. Scarifying and recompacting prior to fill placement.

4. Subgrade preparation for pavements and slabs-on-grade.

5. Placement of engineered compacted fill and backfill, including approval of fill materials and the performance of sufficient density tests to evaluate the degree of compaction being achieved.

6. Foundation excavations, including footings, pile caps and pile installation as appropriate.

LIMITATIONS

This report contains preliminary geotechnical conclusions and recommendations developed solely for use by Bluestone Communities, and their design consultants, for the purposes described earlier. It may not contain sufficient information for other uses or the purposes of other parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations, and a surficial site reconnaissance. The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed and tested by the project geotechnical consultant.

If parties other than LOR Geotechnical Group, Inc. provide construction monitoring services, they must be notified that they will be required to assume responsibility for the geotechnical phase of the project being completed by concurring with the recommendations provided in this report or by providing alternative recommendations.

The report was prepared using generally accepted geotechnical engineering practices under the direction of a state licensed geotechnical engineer. No warranty, express or implied, is made as to conclusions and professional advice included in this report. Any persons using this report for bidding or construction purposes should perform such independent investigations as deemed necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

It has been a pleasure to assist you with this project. We look forward to being of further assistance to you as construction begins. Should conditions be encountered during construction that appear to be different than indicated by this report, please contact this office immediately in order that we might evaluate their effect.

Should you have any questions regarding this report, please contact us.

Respectfully submitted,
LOR Geotechnical Group, Inc.

Andrew A. Tardie
Staff Geologist

Jeffrey J. Johnston, CEG 1893
Engineering Geologist

John P. Leuer, GE 2030
President

AAT:JJJ:JPL:qal

Distribution: Addressee (5)
AEI-CASC Engineering, Inc. (1)

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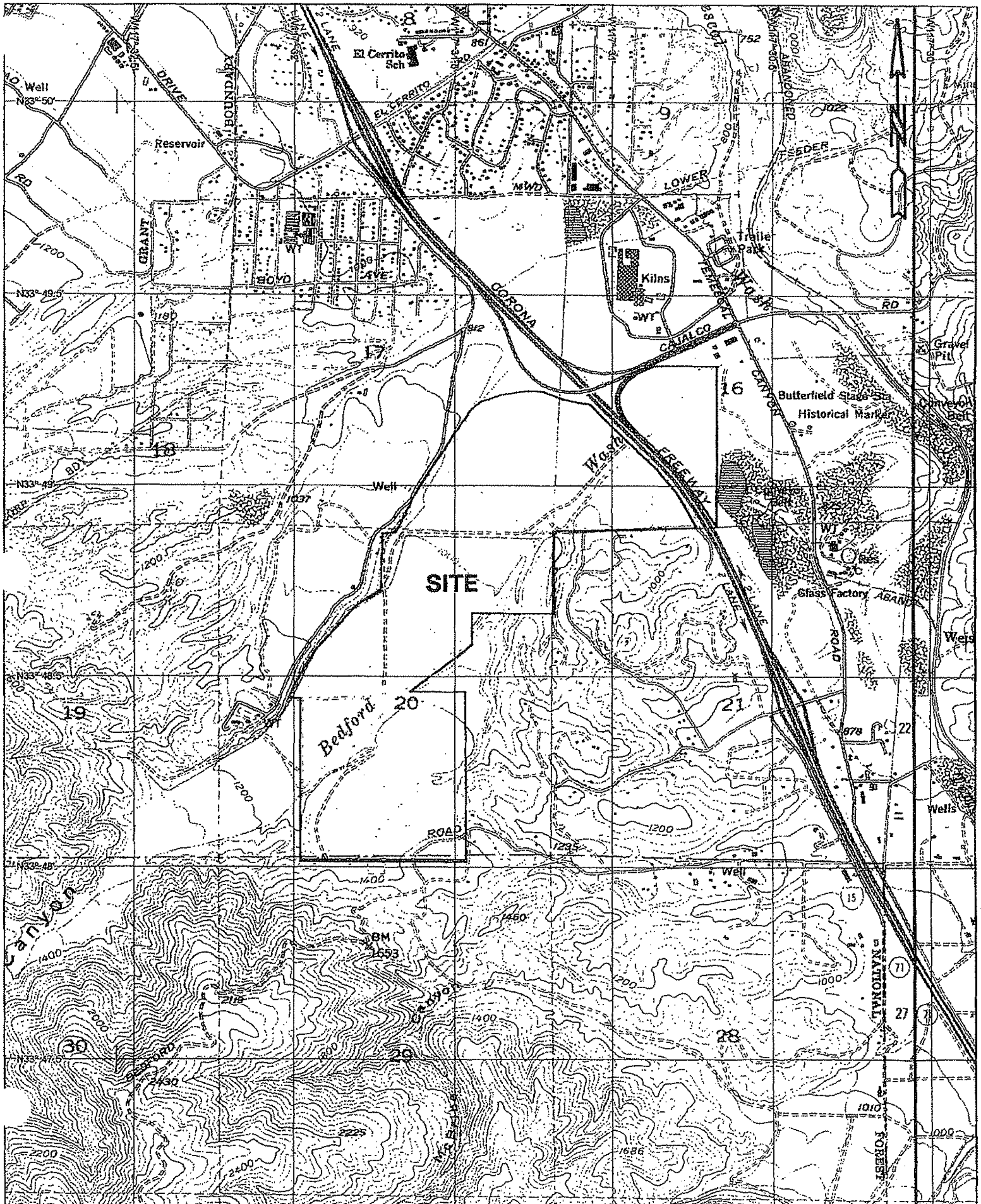
AERIAL PHOTOGRAPHS

DATE	PHOTO NOS.	SCALE
September 24, 1931	360 through 363	1" = 1,000'
January 30, 1962	503 and 504	1" = 2,000'
May 24, 1974	367 through 369	1" = 2,000'
April 10, 1980	385 and 386	1" = 2,000'
February 4, 1984	1130 through 1132	1" = 2,000'
January 21, 1990	8-7 and 8-8	1" = 2,000'
January 30, 1995	8-9 and 8-10	1" = 2,000'
March 11, 2000	8-8 through 8-10	1" = 2,000'

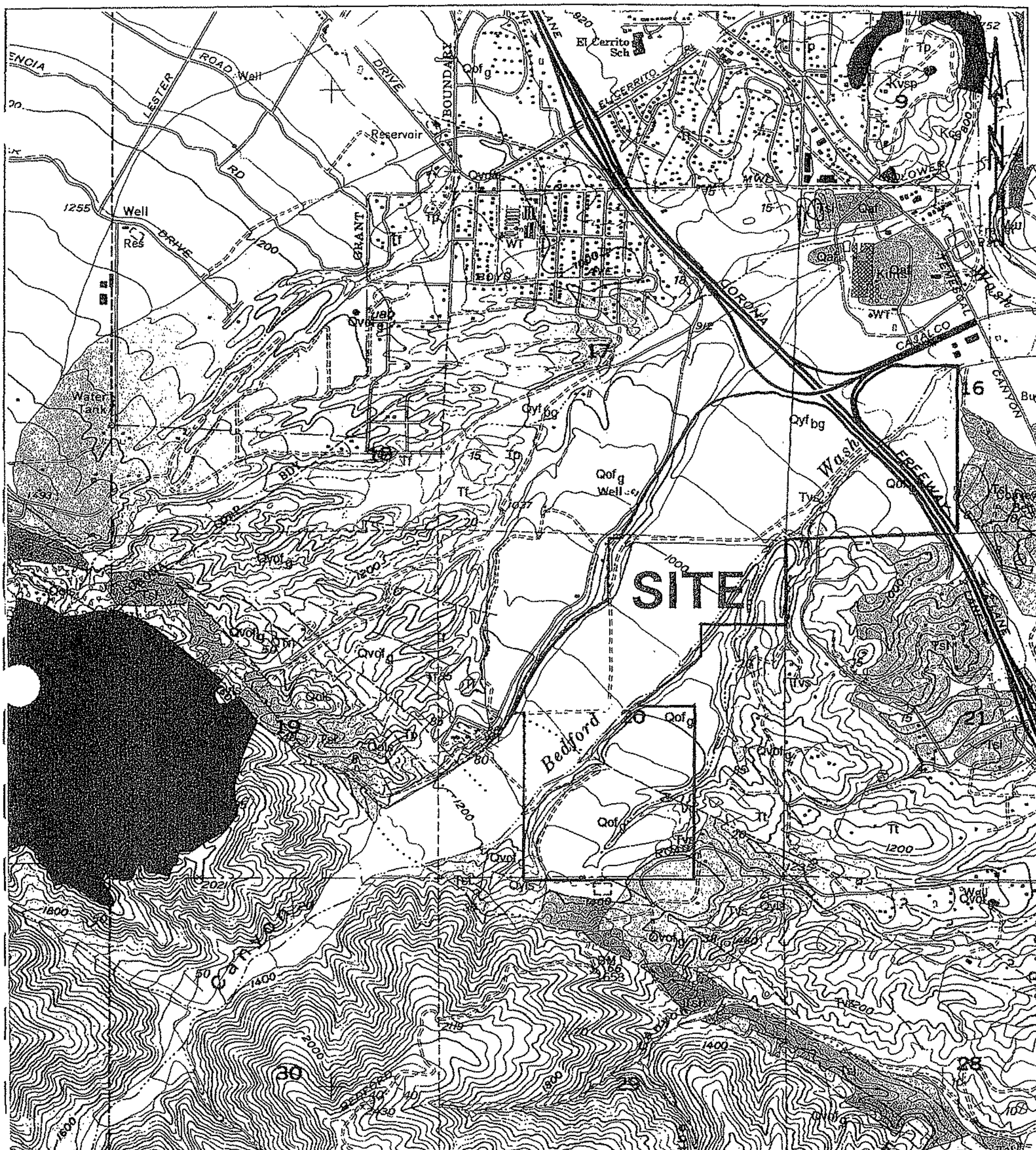
APPENDIX A
Index Map
Regional Geologic Map
Historical Seismicity Maps
Site Geologic Map



950 ft Scale: 1 : 24,000 Detail: 13-0 Datum: WGS84

Project No. 31558.1

Enclosure A-1



REGIONAL GEOLOGIC MAP

OJECT: 580 ± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: A-2
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: 1" = 2000'

DESCRIPTION OF MAP UNITS

MODERN SURFICIAL DEPOSITS—Sediment recently transported and deposited in channels and washes, on surfaces of alluvial fans and alluvial plains, and on hillslopes. Soil-profile development is non-existent. Includes:

Artificial fill (late Holocene)—Deposits of fill resulting from human construction or mining activities; includes numerous noncontiguous areas related to sand and gravel operations and flood control in and adjacent to Temescal Wash and to road grade and ramps along Corona Freeway segment of Interstate 15

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Qyf series) typically have high coarse:fine clast ratios. Younger surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (A/C to A/AC/B/C_{ox} profiles). Includes:

Qyw — **Young wash deposits (Holocene and late Pleistocene)**—Sand, gravel and boulder deposits. Restricted to Silverado Canyon in southern part of quadrangle

Qyf — **Young alluvial fan deposits (Holocene and late Pleistocene)**—Gray-hued gravel and boulder deposits derived largely from volcanic and sedimentary units of Santa Ana Mountains. Fans consisting mainly of gravel emanate and coalesce from Tin Mine, Hagador, Main Street, and Eagle Canyons. Fan emanating from Bedford Canyon is coarser grained, containing a large component of boulders. All fans coarsen toward mountains. Locally, young alluvial fan deposits are divided into subunits based on sequential terrace development and other factors; one such unit is found in quadrangle:

Qyf_1 — **Young alluvial fan deposits, Unit 1 (Holocene and late Pleistocene)**—Consists of pale-gray, unconsolidated, cobble- to granule-sized gravel. Restricted to single fan bisected by younger Qyf fan emanating from Main Street and Eagle Canyons. Forms older part of Qyf unit. Precise distance this unit may have been displaced from its source area by young faults terminating upper part of fan is unknown, but estimated to be small

Qya — **Young alluvial channel deposits (Holocene and late Pleistocene)**—Gray, unconsolidated alluvium. Found chiefly in Temescal Wash and its tributaries, where it consists of medium- to fine-grained sand in lower reaches and coarsens to gravel and cobbles up stream. Also found in Wardlaw Canyon and its tributaries, and in Ladd Canyon in southwestern part of quadrangle

Qyls — **Young landslide deposits (Holocene and late Pleistocene)**—Rock debris and rubble, unsorted. All or parts of many Qyls landslides subject to renewed movement; primary landslide morphology typically preserved. Found mainly on lower part of northeastern slope of Santa Ana Mountains

OLD SURFICIAL DEPOSITS—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed pedogenic soils (A/AB/B/C_{ox} profiles and Bt horizons as much as 1 to 2 m thick and maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature Bt horizons reaching 5YR 5/6). Includes:

Qof — **Old alluvial fan deposits (late to middle Pleistocene)**—Moderately indurated, gravel and cobble alluvial fan deposits. Flanks Qyf unit emanating from Bedford Canyon and Qyf_1 unit emanating from main Street and Eagle Canyons. Most of unit is slightly to moderately dissected and reddish-brown. Some Qof includes thin, discontinuous surface layer of Holocene alluvial fan material. Includes:

Qof_1 — **Old alluvial fan deposits, Unit 1 (middle Pleistocene)**—Indurated, gravely alluvial fan deposits. Most are slightly to moderately dissected; reddish-brown. Some deposits include thin, discontinuous surface layer of Holocene alluvial fan material. In quadrangle, restricted to single occurrence flanking Qyf fan west of Corona

Qols — **Old landslide deposits (late to middle Pleistocene)**—Mostly fragmented rock debris. Landslide morphology moderately to greatly modified. Restricted to fault-bounded deposits at foot of Santa Ana Mountains between Eagle and Bedford Canyons

VERY OLD SURFICIAL DEPOSITS—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/AB/B/C_{ox} profiles having Bt horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6)

Qvof — **Very old alluvial fan deposits (early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown cobble and gravel deposits. Commonly contains duripans and locally silcretes. Found scattered along foot of Santa Ana Mountains and extending out from foot for 3 km. Most are fault-bounded and probably displaced laterally, as they commonly do not head at major canyons. Includes:

$Qvof_1$ — **Very old alluvial fan deposits, Unit 1 (early Pleistocene)**—Mostly well-dissected, well indurated, reddish-brown alluvial fan deposits. Grain size chiefly cobbles and gravel. Represents old part of Qvof. Found as fault slices and noncontiguous deposits resting on Paleocene Silverado Formation and on Cretaceous heterogeneous granitic rock in Temescal Valley

Qvoa — **Very old alluvial channel deposits (early Pleistocene)**—Gravel, sand, and silt; reddish-brown, well-indurated, surfaces well-dissected. Underlies large area between Santa Ana River and Temescal Wash

QTn — **Late Cenozoic sedimentary rocks in Norco area (early Pleistocene to late Pliocene?)**—Moderately indurated sandstone, conglomeratic sandstone, and conglomerate. In Norco area, unit includes locally derived clasts as well as clasts derived from San Bernardino Mountains

Tf — **Fernando Formation (Pliocene)**—Siltstone, sandstone, pebbly sandstone, and conglomerate. Name introduced by Eldridge and Arnold (1907) for marine deposits on northwest side of San Fernando Valley. Formalized by Kew (1923) for similar-appearing rocks in Ventura basin. Durham and Yerkes (1964) defined current usage in area around Santa Ana Mountains. In Puente Hills, Fernando Formation is about 1825 m thick (Yerkes, 1972). Lower part equivalent to Repetto Formation (Woodring, 1938). In other areas it has been subdivided into two members separated by regional erosional unconformity

Tvs — **Vaqueros and Sespe Formations, undifferentiated (early Miocene, Oligocene, and late Eocene)**—Interbedded marine and nonmarine sandstone and conglomerate assigned to the Sespe and Vaqueros Formations. Occurs in northwestern corner of quadrangle and as fault and alluvium bounded blocks south of El Cerrito. Locally, marine fossil-bearing strata of Vaqueros Formation are bed-by-bed interlayered with nonmarine rocks of Sespe Formation to degree that formations cannot be mapped as separate units. Undifferentiated unit locally includes boulder conglomerate (Woodford and others, 1973)

Tvsa — **Vaqueros, Sespe, Santiago and Silverado Formations, undifferentiated (early Miocene, Oligocene, late Eocene, and Paleocene)**—Marine and nonmarine sandstone and conglomerate of Sespe, Vaqueros, and Silverado Formations. Found only on small hill between Home Gardens and El Cerrito.

Silverado Formation (Paleocene)—Nonmarine and marine sandstone, siltstone, and conglomerate. Dickerson (1914) first recognized Paleocene rocks in Santa Ana Mountains, and based on faunal similarities, correlated strata with Martinez Formation of central California. Woodring and Popenoe (1945) described unit in detail and named it Silverado Formation. Formation was deposited on deeply weathered erosional surface. Rocks underlying Silverado are characteristically saprolitic. Silverado Formation consists of basal conglomerate, locally boulder-bearing, overlain by relatively thin sequence of sandstone and siltstone. Sandstone and siltstone sequence is overlain by thick sequence of sandstone, siltstone, and conglomerate which includes two distinctive clay beds of commercial importance. In addition to clay, upper part of section contains carbonaceous shale and lignite beds. Thicker lignite beds were locally mined for fuel. Upper part of unit also contains abundant marine mollusks. Some eastern exposures of formation contain distinctive and diagnostic Paleocene *Turritella pachecoensis*

Williams and Ladd Formations, undifferentiated (Upper Cretaceous)—Sandstone, siltstone, conglomerate, and conglomeratic sandstone of Williams and Ladd Formations; all are feldspathic. Williams Formation typically conglomeratic throughout; Ladd Formation contains thick sequences of non-conglomeratic shale and siltstone. However, both formations contain rocks ranging from conglomerate to shale. Williams Formation typically resistant, cliff-forming, white to brownish-gray, massive-bedded, poorly sorted feldspathic sandstone, pebbly sandstone, and conglomeratic sandstone. Unconformity separates two formations

Kl — **Ladd Formation (Upper Cretaceous)**—Conglomerate, sandstone, siltstone, and shale. Named by Popenoe (1942) for exposures just west of mouth of Ladd Canyon, northern Santa Ana Mountains. Popenoe divided formation into older Baker Canyon Conglomerate Member and younger Holz Shale Member as follows:

Khs — **Holz Shale Member**—Interbedded marine shale, siltstone, sandstone, and localized conglomerate beds. Sandstone beds are mostly massive, but locally crossbedded. Unit contains 5 cm- to 1 m-wide calcite cemented concretions. Foraminifera are widespread and megafossils abundant in places. Except for resistant conglomerate beds, Holz Shale weathers to form smooth rounded slopes. Unit includes prominent zone of concentrated sandstone and conglomerate beds

Kbc — **Baker Canyon Conglomerate Member**—Marine and locally nonmarine(?) conglomerate. Lower part is gray conglomerate containing clasts up to 2 m across, derived mainly from granitic and volcanic rocks. Granitic clasts appear to be from Cretaceous Peninsular Ranges batholith and volcanic clasts from Cretaceous Santiago Peak Volcanics. Upper part of conglomerate is brown conglomeratic sandstone and pebble conglomerate. Sparse sandstone beds contain abundant mollusk shells. Conglomerate is similar to the Cretaceous Trabuco Formation and locally interfingers within the Trabuco Formation west of the quadrangle. Pelecypods indicate deposition in primarily shallow-water environment

Micropegmatite granite (Cretaceous)—Fine-grained, pink-tinted, leucocratic granite having distinctive micropegmatitic texture. In quadrangle, restricted to hill 1 km northwest of Home Gardens. Most of unit is in Corona North quadrangle where it forms elongate band of outcrops between Corona and Norco

Kcg — **Monzogranite of Cajalco pluton of Morton (1999) (Cretaceous)**—Mostly biotite and biotite-hornblende monzogranite ranging to granodiorite. Exposed north and east of El Cerrito; very extensive in Lake Mathews 7.5' quadrangle to east. Medium grained equigranular to subporphyritic. Informally named for exposures in Cajalco area, Lake Mathews 7.5' quadrangle (Morton, 1999). Rocks of Cajalco pluton were included within Cajalco quartz monzonite by Dudley (1935) and within Woodson Mountain granodiorite by Larsen (1948). Body is composite, shallow-level pluton emplaced by magmatic stoping within largely volcanic and volcanoclastic rocks. It was tilted eastward and eroded to progressively greater depths from west to east. East of quadrangle, upper part of pluton contains very prominent halo of highly tourmalinized rock. Zircon ages are 109.5 Ma_{id} and 112.6 Ma_{tp}. Within quadrangle unit includes:

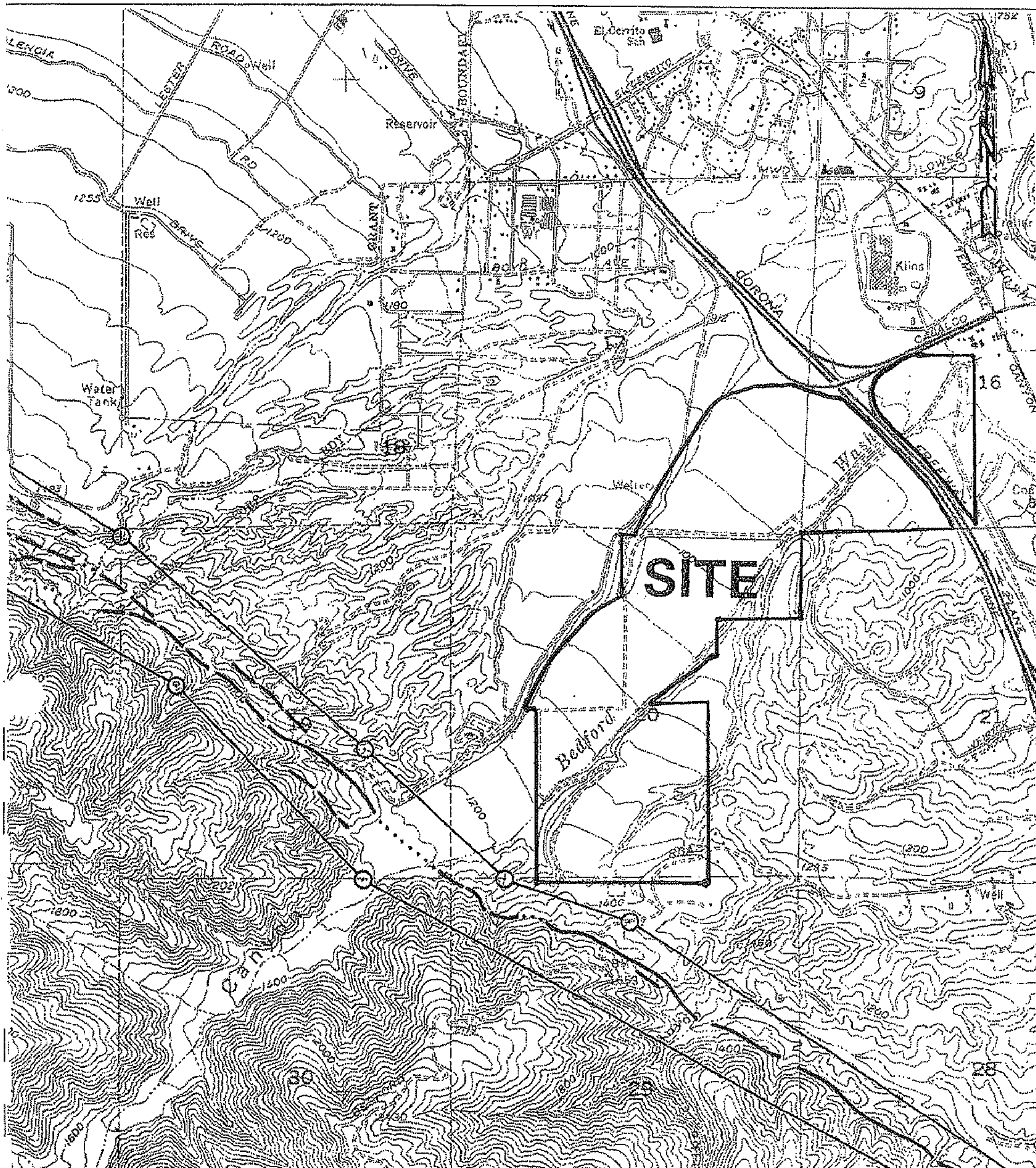
Granite, undifferentiated (Cretaceous)—Equigranular, leucocratic fine-to coarse-grained massive granite and biotite monzogranite. Consists of quartz, alkali feldspars and sparse biotite. Forms elongate dike-like mass northeast of El Cerrito

Heterogeneous granitic rocks (Cretaceous)—Heterogeneous mixture of widely diverse granitic rocks types. Assemblage includes monzogranite, granodiorite, tonalite, and gabbro. Rocks of tonalite composition are most abundant. Mapped west of Temescal Valley in southeastern part of quadrangle

Kt — **Tonalite, undifferentiated (Cretaceous)**—Gray, medium-grained biotite-hornblende tonalite, typically foliated. Restricted to small, partially fault-bounded area south of Ladd Canyon in southwestern part of quadrangle

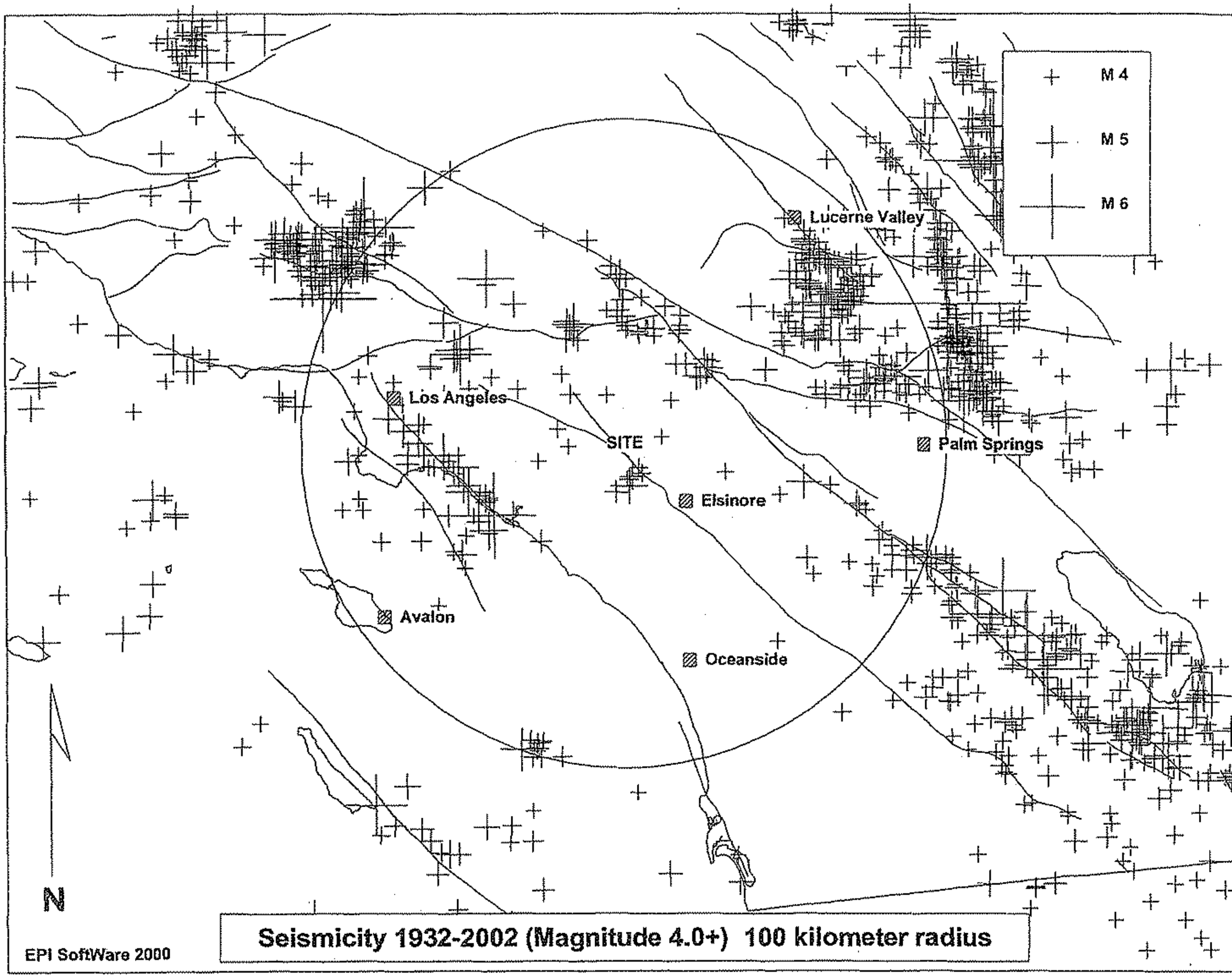
DESCRIPTION OF GEOLOGIC UNITS

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: A-3
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NOT TO SCALE



STATE OF CALIFORNIA EARTHQUAKE FAULT ZONE

ᴐJECT: 580 ± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA		PROJECT NO.:	31558.1
CLIENT:	BLUESTONE COMMUNITIES	ENCLOSURE:	A-4
LOR Geotechnical Group, Inc.		DATE:	MARCH 2002
		SCALE:	1" = 2000'



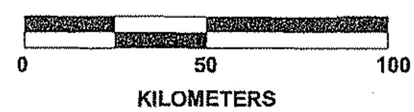
SITE LOCATION: 33.81188 LAT. -117.52499 LONG.

MINIMUM LOCATION QUALITY: C

TOTAL # OF EVENTS ON PLOT: 1345

TOTAL # OF EVENTS WITHIN SEARCH RADIUS: 474

MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS:

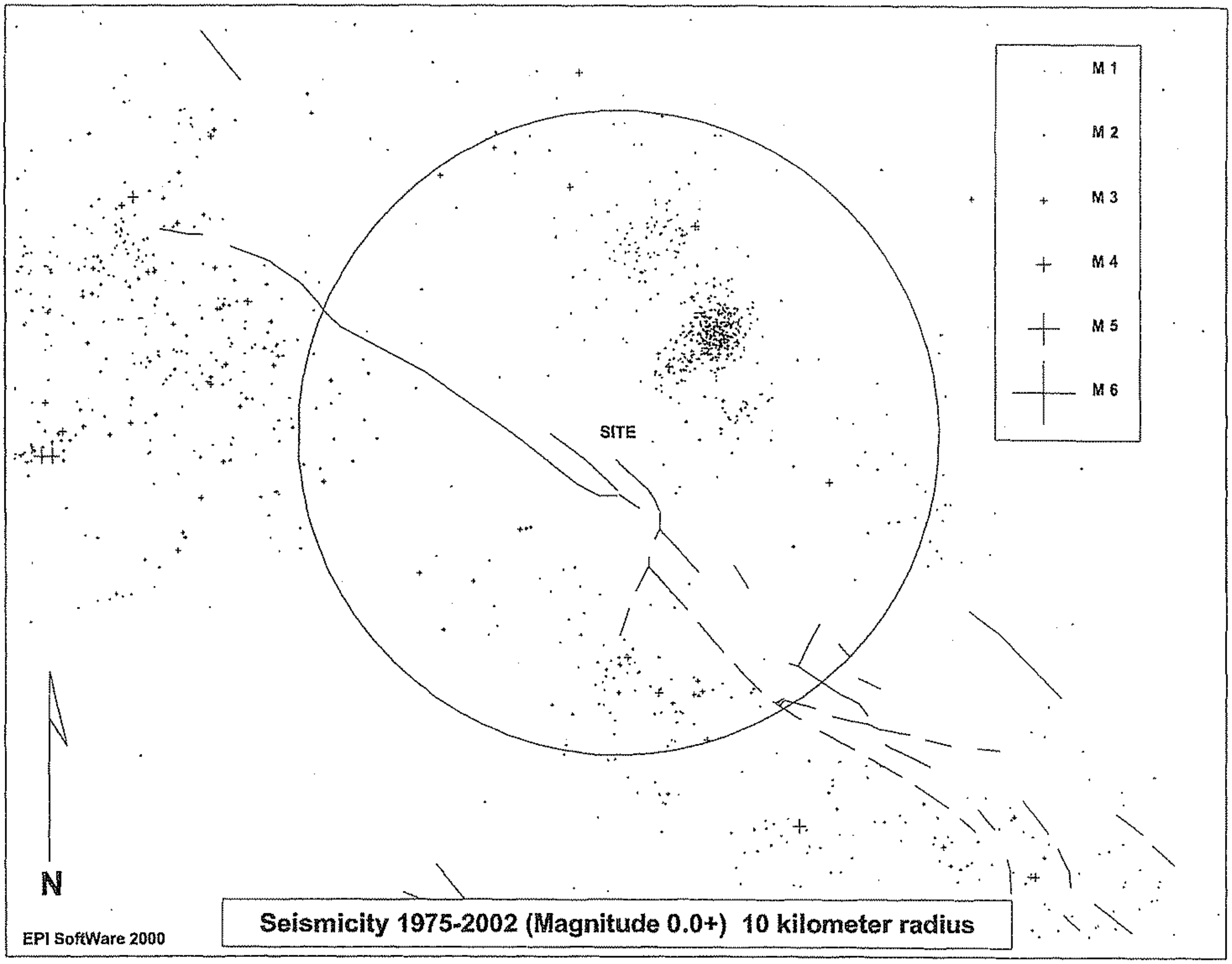


4.0- 4.9 : 433
5.0- 5.9 : 39
6.0- 6.9 : 2
7.0- 7.9 : 0
8.0- 8.9 : 0

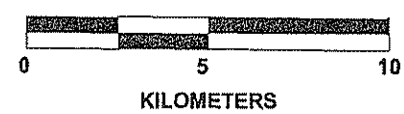
CLOSEST EVENT: 4.2 ON TUESDAY, JUNE 22, 1971 LOCATED APPROX. 8 KILOMETERS SOUTHEAST OF THE SITE

LARGEST 5 EVENTS:

6.4 ON SUNDAY, JUNE 28, 1992 LOCATED APPROX. 77 KILOMETERS NORTHEAST OF THE SITE
6.4 ON SATURDAY, MARCH 11, 1933 LOCATED APPROX. 46 KILOMETERS SOUTHWEST OF THE SITE
5.9 ON THURSDAY, OCTOBER 01, 1987 LOCATED APPROX. 58 KILOMETERS NORTHWEST OF THE SITE
5.8 ON FRIDAY, JUNE 28, 1991 LOCATED APPROX. 66 KILOMETERS NORTHWEST OF THE SITE
5.6 ON TUESDAY, JULY 08, 1986 LOCATED APPROX. 87 KILOMETERS EAST OF THE SITE



SITE LOCATION: 33.81188 LAT. -117.52499 LONG.



MINIMUM LOCATION QUALITY: A

TOTAL # OF EVENTS ON PLOT: 1704

TOTAL # OF EVENTS WITHIN SEARCH RADIUS: 1197

MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS:

0.0- .9 : 124
1.0- 1.9 : 1004
2.0- 2.9 : 63
3.0- 3.9 : 6
4.0- 4.9 : 0
5.0- 5.9 : 0
6.0- 6.9 : 0
7.0- 7.9 : 0
8.0- 8.9 : 0

CLOSEST EVENT: 1.4 ON WEDNESDAY, JULY 13, 1994 LOCATED APPROX. .2 KILOMETER OF THE SITE

LARGEST 5 EVENTS:

3.2 ON TUESDAY, JANUARY 20, 1998 LOCATED APPROX. 6 KILOMETERS NORTHEAST OF THE SITE
3.1 ON FRIDAY, OCTOBER 17, 1997 LOCATED APPROX. 2 KILOMETERS NORTHEAST OF THE SITE
3.1 ON MONDAY, NOVEMBER 20, 1989 LOCATED APPROX. 8 KILOMETERS SOUTH OF THE SITE
3.1 ON MONDAY, NOVEMBER 20, 1989 LOCATED APPROX. 8 KILOMETERS SOUTH OF THE SITE
3.1 ON TUESDAY, APRIL 18, 1978 LOCATED APPROX. 7 KILOMETERS NORTH OF THE SITE

APPENDIX B
Field Investigation Program
Boring and Trench Logs

APPENDIX B
FIELD INVESTIGATION

Subsurface Exploration

The site was investigated on January 31, February 1, 4 through 7, and 14 of 2002 and consisted of excavating a total of 31 trenches to depths between 4.5 to 15.0 feet below the existing ground surface and advancing a total of 23 borings to depths between 24.0 and 51.1 feet below the existing ground surface. The approximate locations of the trenches and borings are shown on Enclosures A-7 and A-8, within Appendix A.

The exploration was conducted using a FORD 555 E backhoe with a 24-inch bucket. The soil encountered were continuously logged by a geologist from this firm who visually observed the site, maintained detailed logs of the trenches, obtained disturbed soil samples for laboratory evaluation and testing, and classified the soils encountered by visual examination in accordance with the Unified Soil Classification System.

In-place density determinations were conducted at selected levels, within the trenches utilizing the Nuclear Gauge Method (ASTM D 2922). Disturbed soil samples were obtained at soil changes and other selected levels within the trenches. The samples were placed in sealed containers for transport to the laboratory.

The exploration was conducted using a CME-55 drill rig equipped with an 8-inch diameter hollow stem auger. The soils were continuously logged by a geologist from this firm who inspected the site, maintained detailed logs of the borings, obtained undisturbed, as well as disturbed, soil samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

Relatively undisturbed samples of the subsoils were obtained at a maximum interval of 5 feet. The samples were recovered by using a California split barrel sampler of 2.50 inch inside diameter and 3.00 inch outside diameter from the ground surface to 35 feet deep. The samplers were driven by a 140 pound automatic trip hammer dropped from a height of 30 inches. The number of hammer blows required to drive the sampler into the ground the final 12 inches were recorded and further converted to an equivalent SPT N-value. Factors such as efficiency of the automatic trip hammer used during this investigation (80%), borehole diameter (8"), and rod length at the test depth were considered for further computing of equivalent SPT N-values corrected for field procedures ($\approx N_{60}$) which are included in the boring logs, Enclosures B-1 through B-23.

The undisturbed soil samples were retained in brass sample rings of 2.42 inches in diameter and 1.00 inch in height, and placed in sealed plastic containers. Disturbed soil samples were obtained at selected levels within the borings and placed in sealed containers for transport to the laboratory.

All samples obtained were taken to our laboratory for storage and testing. Detailed logs of the trenches and borings are presented on the enclosed Trench and Boring Logs, Enclosures B-1 through B-54. A Sampling Key is presented on Enclosure B.

CONSISTENCY OF SOILS

SANDS

SPT BLOWS	CONSISTENCY
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

COHESIVE SOILS

SPT BLOWS	CONSISTENCY
0 - 2	Very soft
2 - 4	Soft
4 - 8	Medium
8 - 15	Stiff
15 - 30	Very stiff
30 - 60	Hard
Over 60	Very Hard

SAMPLING KEY

Symbol	Description
	- INDICATES CALIFORNIA SPLIT SPOON SOIL SAMPLE
	- INDICATES SAND CONE OR NUCLEAR DENSITY TEST
	- INDICATES BAG SAMPLE
	- INDICATES STANDARD PENETRATION TEST (SPT) SOIL SAMPLE

MAJOR DIVISIONS			LITHOLOGY	U.S. C.S.	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GARVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF 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)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SAND, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% 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 OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF RICH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS AND MANURE WITH HIGH ORGANIC MATERIALS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

PARTICLE SIZE LIMITS

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" | 3" | ¾" | No. 4 | No. 10 | No. 40 | 200

(U.S. STANDARD SIEVE SIZE)

SAMPLE KEY

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: B
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NO SCALE

LOG OF BORING B-1

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			5.2					SM	TOPSOIL/FERTILIZER 2 inches thick.
								SM	@ 0.2 feet TOPSOIL: SILTY SAND with gravel, approximately 15% angular gravel to 2", 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, dark brown, damp.
	16		3.7		102.0				@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 15% angular gravel to 2", 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 20% silty fines, grayish brown, damp.
5			9.2		113.1				
10	27		8.1		92.7				@ 10 feet becomes finer grained, approximately 70% fine grained sand, 30% silty fines, dark brown, damp.
15	36		2.8		121.2				@ 15 feet becomes coarser grained, approximately 20% fine gravel, 10% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 15% silty fines, brown, damp.
20	50-6"		1.6		115.8				
									END OF BORING DUE TO REFUSAL ON BOULDER
									No fill No caving No groundwater No bedrock
25									
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 904
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: January 31, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-1

LOG OF BORING B-2

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			6.3					SM	TOPSOIL/FILL: SILTY SAND, approximately 5% gravel, 5% coarse grained sand, 10% medium grained sand, 45% fine grained sand, 35% silty fines, damp, brown, loose.
	21		12.1		96.5			SM	@ 2 feet ALLUVIUM: SILTY SAND with angular gravel, approximately 20% fine angular gravel, 5% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, brown, damp.
5									
10	33		4.5		122.1				
15	27		5.0		109.8				
20	55		7.2		124.6				@ 20 feet approximately 20% medium to fine grained angular gravel, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% fines with trace clay, porous.
									@ 24 feet very difficult drilling on cobbles.
25	44		7.1		117.7				@ 2 5 feet slight amount of caliche, damp to moist.
30									
35	50-6"								END OF BORING DUE TO REFUSAL ON COBBLES
40									Fill 0-2' No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 945
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: January 31, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-2

LOG OF BORING B-3

DEPTH IN FEET	TEST DATA: EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			5.4					SM	FERTILIZER 1 inch of cattle manure. @ .1 feet TOPSOIL: SILTY SAND, approximately 5% gravel to 2", 5% coarse grained sand, 10% medium grained sand, 45% fine grained sand, 35% silty fines, brown, loose, damp.
	19		4.0		119.6			SM	@ 2 feet ALLUVIUM: SILTY SAND with gravel, approximately 20% angular gravel to 1", 10% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 20% silty fines, grayish brown, damp.
5	40		4.0		111.6				
10	21		6.1		128.7				
15	49								@ 15 feet color changes to brown, damp to moist.
									END OF BORING DUE TO REFUSAL ON COBBLES No fill No caving No groundwater No bedrock
20									
25									
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 924
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 1, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-3

LOG OF BORING B-4

DEPTH IN FEET	TEST DATA: EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			3.8					SM	FERTILIZER Cattle manure to 1 inch.
	14		5.1		105.9			SM	@ 0.1 feet TOPSOIL: SILTY SAND with angular gravel, approximately 25% angular gravel to 2", 5% coarse grained sand, 10% medium grained sand, 30% fine grained sand, 30% silty fines, brown, damp, loose.
5	22		3.3		118.4				@ 2 feet ALLUVIUM: SILTY SAND, approximately 10% fine gravel, 15% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 20% silty fines, grayish brown, damp.
10	28		7.2		118.6				
15	44		6.2		122.0				
20	22		7.2		110.4				@ 20 feet becomes finer grained, approximately 35% medium grained sand, 45% fine grained sand, 30% silty fines, grayish brown, damp to moist.
25	52		5.6		122.8				@ 25 feet becomes coarser grained with approximately 15% fine gravel, 15% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown.
30	81		9.3		123.9				
35	41		15.4		117.5				@ 35 feet approximately 1% fine gravel, 4% coarse grained sand, 5% medium grained sand, 50% fine grained sand, 40% silty fines, yellowish brown, damp.
40	51-6"		5.7		117.6				
45	51-6"		7.5		124.0			SW SM	@ 45 feet WELL GRADED SAND with silt, approximately 5% angular gravel, 15% coarse grained sand, 25% medium grained sand, 40% fine grained sand, 15% silty fines, yellowish brown. @ 46 feet SILTY SAND with gravel, approximately 10% fine gravel, 10% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 25% silty fines, brown, damp.
50	73		9.6		125.4				@ 50 feet approximately 10% medium grained sand, 55% fine grained sand, 35% fines with trace of secondary clay, strong to yellowish brown, damp, dense, may be older alluvium. END OF BORING
55									
60									No fill No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 912
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 1, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-4

LOG OF BORING B-5

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			3.1					SM	ALLUVIUM: SILTY SAND with gravel, approximately 20% fine gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 20% silty fines, grayish brown, damp, loose, caving.
	21		2.9		115.4				
5	8		3.5		106.1				@ 5 feet damp to dry.
10	18								
									@ 12 feet becomes slightly finer grained.
15	43-6"								@ 15 feet becomes coarser grained.
									@ 17 feet difficult drilling on gravel and cobbles.
20	59		3.0		118.1				@ 20 feet approximately 25% gravel, 5% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 20% silty fines, brown, damp.
									END OF BORING
25									No fill Slight caving No groundwater No bedrock
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 990
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 1, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-5

LOG OF BORING B-6

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			2.9					SM	LEVEE FILL: SILTY SAND with gravel, approximately 5% cobbles to 4", 15% gravel of angular metamorphic rocks, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 20% silty fines, light grayish brown, damp, loose.
5	35								
10	37		4.3					SM	@ 10 feet ALLUVIUM: SILTY SAND with gravel, approximately 15% gravel, 15% coarse grained sand, 20% medium grained sand, 20% fine grained sand, 30% silty fines, brown, damp to dry.
15	52		2.1		128.4				@ 15 feet becomes slightly coarser grained, approximately 20% gravel, 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines.
20	59		3.1		115.8				
25	37		3.2		115.5				
30	70		4.2						
35	51-3"								
40	51-3"		12.3		103.9				@ 40 feet BEDROCK: Vaqueros Sandstone, medium to fine grained, yellowish tan, damp, hard.
									END OF BORING
45									Fill 0-10' No caving No groundwater Bedrock 40-41.5'

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1000
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 1, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-6

LOG OF BORING B-7

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S
0			4.5					SM
	10							SM
5	23		3.7		112.3			
10	30		5.9		121.1			
15	21		5.5		119.0			
20	47		4.7		125.8			
25	43		3.8		116.5			
30	60		3.0		130.7			
35								

DESCRIPTION

FERTILIZER Cattle manure 1 inch thick.

@ 0.1 feet TOPSOIL: SILTY SAND with gravel, approximately 20% gravel, 10% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 25% silty fines, grayish brown, damp.

@ 2 feet ALLUVIUM: SILTY SAND with gravel, approximately 20% fine angular gravel, 15% coarse grained sand, 20% medium grained sand, 45% fine grained sand, 20% silty fines, grayish brown, damp to moist.

@ 20 feet slight amount of tan clay in pores.

@ 30 feet becomes finer grained with approximately 15% fine gravel, 20% medium grained sand, 40% fine grained sand, 25% silty fines, grayish brown, damp, dense.

END OF BORING

No fill
No caving
No groundwater
No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1060
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 1, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-7

LOG OF BORING B-8

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			3.9					SM	ALLUVIUM: **SILTY SAND with gravel, approximately 20% fine angular gravel, 10% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 25% silty fines, damp, loose, grayish brown.**
	20		3.4		106.0				
5	37		3.7		120.6				**@ 5 feet slightly coarser grained with approximately 20% angular gravel to 2", 10% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 20% silty fines, grayish brown.**
10	19		4.9		110.4				
15	21		5.5		121.1				
20	43-6"		5.4		108.3				**@ 20 feet slight trace of clay coating on grains and in pores.**
25	31		8.7		117.4				
30	31		4.8		108.6				**@ 30 feet becomes finer grained with approximately 5% fine gravel, 10% medium grained sand, 50% fine grained sand, 35% silty fines, brown, damp to slightly moist.**
35									**@ 38 feet slightly difficult drilling on gravel.**
40	41		2.5		124.2				
45									**END OF BORING DUE TO REFUSAL ON COBBLES** **No fill** **No caving** **No groundwater** **No bedrock**
50									
55									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1120**
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: **February 1, 2002**
	EQUIPMENT: **CME 55**
	HOLE DIA.: **8"** ENCLOSURE: **B-8**

LOG OF BORING B-9

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			2.2					SM	FILL: SILTY SAND with gravel, approximately 10% angular cobbles to 4", 20% gravel, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 15% silty fines.
	38-6"		4.2		117.3				
5	38-6"		5.3		106.7				
10	36		3.9		117.6			SM	@ 10 feet ALLUVIUM: SILTY SAND, approximately 10% fine gravel, 20% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown, damp. @ 11 feet near refusal on cobbles.
15	22		5.1		113.2				@ 16 feet difficult drilling on cobbles.
20	36		4.4		126.2				@ 20 feet approximately 5% gravel, 15% coarse grained sand, 20% medium grained sand, 30% fines with trace of brown clay in pores, damp to slightly moist.
25	59		4.8		119.8				
30	48								
									END OF BORING Fill 0-10' No caving No groundwater No bedrock
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1156
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 4, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-9

LOG OF BORING B-10

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			4.3					SM	FILL: SILTY SAND with large blocks of concrete nails and other trash.
5	12								
10	7								
15	9								
20	17								
25	12								@ 25 feet some brick and other trash.
30	14								
35									
40	15		9.3		97.0				
45									
								SM	@ 48 feet OLDER ALLUVIUM/COLLUVIUM: SILTY SAND with gravel, approximately 5% fine gravel, 10% coarse grained sand, 20% medium grained sand, 30% silty fines, grayish brown, damp.
50	31-6"		5.9		117.1				END OF BORING DUE TO REFUSAL/MAY BE TRASH WRAPPING ON AUGER
55									
60									Fill 0-48' No caving No groundwater No bedrock

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1248
	DATE DRILLED: February 4, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-10

LOG OF BORING B-11

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			7.4					SM	TOPSOIL/FILL: SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, orange brown, damp, loose.
	38-6"		7.7		116.8				
									@ 4 feet difficult drilling due to hard nest and on large gravel/small cobbles.
5	38-6"		6.0		123.2			SM	@ 5 feet OLDER ALLUVIUM: SILTY SAND with angular metamorphic gravel, approximately 25 % gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 35% silty fines, orange brown to brown, damp, dense.
10	38		9.0		120.6				@ 10 feet difficult to slow drilling due to dense material.
15	64		8.7		125.3				
20	35		8.1		117.4				@ 20 feet water added to facilitate drilling.
									@ 23 feet very difficult drilling.
25	73		8.0		119.2				
									END OF BORING DUE TO SLOW PROGRESS
									Fill 0-5'
									No caving
									No groundwater
									No bedrock
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1348
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 4, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-11

LOG OF BORING B-12

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			7.2					SM	FILL: SILTY SAND, approximately 5% medium grained sand, 60% fine grained sand, 35% silty fines, orange brown, damp, loose.
	15		8.7		119.6				@ 2 feet slight trace of small pores.
5	18		11.3		108.8			SM	@ 5 feet OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 5% coarse grained sand, 10% medium grained sand, 40% fine grained sand, 40% silty fines, trace of clay, reddish brown, damp, dense, highly weathered. @ 8 feet difficult drilling to due to dense materials.
10	36		7.7		124.4				
15	46		6.6		113.4				@ 15 feet becomes coarser grained with clayey matrix, approximately 20% highly weathered angular gravel sized clasts of metamorphic rocks, 5% coarse grained sand, 10% medium grained sand, 30% fine grained sand, 35% fines, yellowish brown, damp, very dense. @ 16 feet water added due slow progress to facilitate drilling.
20	43		9.3		117.6				END OF BORING DUE TO SLOW PROGRESS Fill 0-5' No caving No groundwater No bedrock
25									
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1380
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 4, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-12

LOG OF BORING B-13

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			6.3					SM	TOPSOIL/FILL: SILTY SAND, approximately 5% medium grained sand, 55% fine grained sand, 40% silty fines, brown, dry, loose.
	21		5.1		97.9				
5	18							SM	@ 5 feet OLDER ALLUVIUM: SILTY SAND, approximately 10% subgangular metamorphic gravel sized clasts, 15% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, reddish to grayish brown, damp, dense.
10	16		4.7		107.0				
15	17		9.3		120.3				@ 15 feet becomes finer grained, approximately 5% medium grained sand, 50% fine grained sand, 45% silty fines, damp to moist, brown.
20	33		6.8		123.1				@ 20 feet approximately 5% fine gravel, 15% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown, damp.
25	36		7.0		113.4				
30	22		5.2		115.5				
									END OF BORING Fill 0-5' No caving No groundwater No bedrock
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 924
	DATE DRILLED: February 4, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-13

LOG OF BORING B-14

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			4.6					SM	TOPSOIL/FILL: SILTY SAND with gravel, approximately 15% subrounded gravel, 5% coarse grained sand, 10% medium grained sand, 35% fine grained sand, 35% silty fines, brown, damp.
								SM	@ 2 feet ALLUVIUM: SILTY SAND, approximately 5% gravel, 20% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown, damp.
5	21		4.8		115.2				
10	48		3.2		116.7				@ 10 feet becomes slightly coarser grained, approximately 15% gravel, 15% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 25% silty fines.
15	40		3.8						
									@ 17 feet some difficulty drilling on dense gravel.
20	30								
25									@ 25 feet too gravelly to sample.
30	48-6"		3.2		115.7				
35									
									END OF BORING DUE TO REFUSAL
40									Fill 0-2' No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 856
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 4, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-14

LOG OF BORING B-15

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			7.4					SM	FILL: SILTY SAND, approximately 10% coarse grained sand, 15% medium grained sand, 50% fine grained sand, 35% silty fines, reddish brown, loose, damp.
	45		3.6		119.3			SM	@ 2 feet ALLUVIUM: SILTY SAND with gravel, approximately 5% fine cobbles of subangular metamorphic rocks, 20% gravel, 5% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 30% silty fines, brown, damp, dense.
5	23		4.5		114.5				@ 5 feet approximately 15% fine gravel, 20% coarse grained sand, 30% medium grained sand, 15% fine grained sand, 20% silty fines, brown, damp, dense. @ 6 feet slight difficulty drilling on cobbles.
								SM	@ 9 feet OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel of highly decomposed metamorphic rock, 5% coarse grained sand, 10% medium grained sand, 40% fine grained sand, 40% silty fines, strong brown, damp.
10	20		8.9		118.7				@ 10.5 feet BEDROCK: Vaqueros Formation (?), SANDSTONE, composed of approximately 40% medium grained sand, 40% fine grained sand, 20% silty fines, greenish tan, damp, moderately hard, weathered.
15	43-6"		9.5		113.2				
20	43-6"		10.1		109.0				@ 20 feet becomes coarser grained, approximately 20% coarse grained sand, 40% medium grained sand, 25% fine grained sand, 15% silty fines, less weathered. END OF BORING DUE TO DENSE BEDROCK
25									Fill 0-2' No caving No groundwater Bedrock 10.5-20.5'
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1000
	DATE DRILLED: February 14, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-15

LOG OF BORING B-16

DEPTH IN FEET	TEST DATA: EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			13.6					SM	FILL: SILTY SAND, approximately 15% medium grained sand, 45% fine grained sand, 40% silty fines, trace of clay, reddish brown, damp, loose.
	38		3.5		128.5			SM	@ 2 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 15% fine angular gravel of metamorphic rocks, 10% coarse grained sand, 10% medium grained sand, 35% fine grained sand, 30% silty fines, reddish to strong brown, damp, dense.
5	30		5.9		118.0				@ 6 feet slight difficulty drilling on gravel and/or cobbles.
10	27		6.9		122.9				@ 10 feet approximately 20% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 25% silty fines, orange brown.
15	48		50.5		91.7				
									@ 18 feet approximately 5 to 15% fine gravel, trace of clay.
20	49		9.5		121.8				
25	54		7.5		127.4				@ 25 feet slight trace of moisture in sampler.
30	61		7.4		129.4				
									END OF BORING
									Fill 0-2' No caving No groundwater No bedrock
35									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1200**
	DATE DRILLED: **February 14, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **CME 55**
	HOLE DIA.: **8"** ENCLOSURE: **B-16**

LOG OF BORING B-17

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			6.7					SM	FILL: SILTY SAND, approximately 5% gravel, 5% coarse grained sand, 10% medium grained sand, 40% fine grained sand, 40% silty fines, brown, damp.
	20		6.9		126.7				
5	55		3.8		113.3			SM	@ 5 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 15% fine gravel, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, brown to orange brown, damp, dense. @ 7 feet very difficult drilling on gravel or cobbles.
10	62		6.0		127.6				
15	58		6.2		130.1				@ 15 feet slightly coarser grained, approximately 20% subangular gravel sized clasts of weathered metamorphic rocks, 10% coarse grained sand, 20% medium grained sand, 20% fine grained sand, 30% silty fines, orange brown, damp, dense.
20	60		6.4		127.2				@ 20 feet composition varies with some thin lenses of coarse grained sand, these porous lenses are saturated with moisture.
25	72		7.3		126.1			SC	@ 25 feet CLAY with fines, moist. @ 26 feet difficult drilling on cobbles and gravel.
30									END OF BORING Fill 0-5' No caving No groundwater No bedrock
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1278
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 14, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-17

LOG OF BORING B-18

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			5.2					SM	FILL: SILTY SAND, approximately 5% fine gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 35% silty fines, brown, damp, loose.
	18		5.5		92.2				
								SM	@ 3 feet ALLUVIUM: SILTY SAND, approximately 5% fine subrounded gravel, 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 30% silty fines, dark brown, damp.
5	23		2.8		117.3				
10	7		7.3		122.6				@ 10 feet becomes finer grained, approximately 10% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 35% silty fines, brown, damp. @ 11 feet very difficult drilling on cobbles or gravel.
15	17		2.8		113.2				
20	26		5.0		121.8				@ 20 feet becomes coarser grained, approximately 10% fine gravel, 15% coarse grained sand, 30% medium grained sand, 20% fine grained sand, 25% silty fines, brown, damp. @ 22 feet very difficult drilling on gravel and/or cobbles.
									END OF BORING DUE TO SLOW PROGRESS Fill 0-3' No caving No groundwater No bedrock
25									
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 921
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 14, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-18

LOG OF BORING B-19

DEPTH IN FEET	TEST DATA: EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			5.0					SM	FILL: SILTY SAND, approximately 10% very fine gravel, 10% medium grained sand, 45% fine grained sand, 35% silty fines, brown, loose, damp.
	15		5.7		108.7				
								SM	@ 4 feet ALLUVIUM: SILTY SAND with gravel, approximately 20% gravel to 1 inch, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% silty fines, brown, damp.
5	17		3.4		112.1				
10	33		4.1		120.3				
15	25		4.8		118.9				
20	56		3.4		124.8				
25	46		3.5		127.6				
30									**END OF BORING** Fill 0-4' No caving No groundwater No bedrock
35									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **892**
	DATE DRILLED: **February 14, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **CME 55**
	HOLE DIA.: **8"** ENCLOSURE: **B-19**

LOG OF BORING B-20

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			7.2					SM	FILL: SILTY SAND, approximately 2% fine gravel, 3% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, orange brown, dry, loose.
	38-6"		6.6		86.6				
								SM	@ 3 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 15% fine gravel of subangular metamorphic rock, 20% coarse grained sand, 20% medium grained sand, 15% fine grained sand, 30% silty fines, orange brown, damp, dense.
5	27		6.3		124.1				
10	30		5.5		121.4				@ 10 feet approximately 10% gravel to 1.5 inches, 20% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 25% silty fines, orange grayish brown.
15	62		4.9		134.5				
20	73		5.6		122.4				
									@ 23 feet difficult drilling on cobbles.
									END OF BORING Fill 0-3' No caving No groundwater No bedrock
25									
30									
35									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **960**
	DATE DRILLED: **February 14, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **CME 55**
	HOLE DIA.: **8"** ENCLOSURE: **B-20**

LOG OF BORING B-21

TEST DATA

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			7.6					SM	FILL: SILTY SAND, approximately 15% medium grained sand, 50% fine grained sand, 35% silty fines, brown, dry, dense. @ 0.1 feet damp and loose.
	22		8.5		123.9				
5	12		9.5		122.5				
									@ 6.5 feet BEDROCK: Vaqueros Formation, SANDSTONE, fine to medium grained, tan to greenish tan, damp, soft.
10			10.1		107.8				@ 10 feet becomes moderately hard.
15			21.1		104.4				@ 15 feet SILTSTONE, approximately 40% fine grained sand, 60% silts, greenish gray to tan, damp, hard.
									@ 18 feet slow drilling.
20			13.0		112.2				@ 20 feet SANDSTONE, approximately 20% coarse grained sand, 30% medium grained sand, 35% fine grained sand, 15% fines, tan, damp, hard.
									END OF BORING
									Fill 0-6.5' No caving No groundwater Bedrock 6.5-21'
25									
30									
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 924
	DATE DRILLED: February 14, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-21

LOG OF BORING B-22

DEPTH IN FEET	TEST DATA: EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			2.6					SM	FILL/TOPSOIL: SILTY SAND with gravel, approximately 15% gravel, 10% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 20% silty fines, grayish brown, dry, loose.
	18		4.4		123.0				
5	24		5.1		109.4			SM	@ 5 feet ALLUVIUM: SILTY SAND with gravel, approximately 5% cobbles to 4 inches, 20% gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 15% silty fines, dark yellowish brown, damp.
10	17		8.4		113.2				
15	33		3.7		115.8				@ 15 feet becomes better sorted with approximately 30% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 15% silty fines, brown, damp.
20	57		4.2		120.5				
									@ 23 feet difficulty drilling on gravels.
25	31								
30	48-6"		9.2		118.8				@ 30 feet BEDROCK: Vaqueros Formation, SANDSTONE, approximately 5% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 25% fines, greenish tan, damp, moderately hard.
									END OF BORING
35									Fill 0-5' No caving No groundwater Bedrock 30-31.5'

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 872
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 14, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" / ENCLOSURE: B-22

LOG OF BORING B-23

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			5.2					SM	FILL: SILTY SAND, approximately 15% medium grained sand, 50% fine grained sand, 35% silty fines, orange brown, damp.
	25		3.0		127.5			SM	@ 2 feet OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 15% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 30% silty fines, orange brown, damp, dense.
5	28		3.5		118.1				@ 5 feet approximately 10% fine gravel, 20% coarse grained sand, 30% medium grained sand, 25% fine grained sand, 15% silty fines.
10									
15									@ 15 feet difficult drilling on cobbles.
20	71		9.2		127.5				
25									
30	48-2"								
									END OF BORING Fill 0-2' No caving No groundwater No bedrock
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 848
LOR GEOTECHNICAL GROUP INC.	DATE DRILLED: February 14, 2002
	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-23

LOG OF TRENCH T-1

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				6.0				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 30% medium grained sand, 30% fine grained sand, 25% silty fines, dark brown, moist, loose.
			81	12.6	106.6			SM	@ 1 foot ALLUVIUM: SILTY SAND, trace gravel to 1/2", approximately 5% coarse grained sand, 10% medium grained sand, 50% fine grained sand, 35% silty fines, dark brown, moist, roots.
			85	4.8	111.6				@ 3 feet approximately 20% gravel to 1", 20% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 15% silty fines, dark brown, moist. @ 3.5 feet trace cobbles to 10".
5								ML	@ 5 feet SANDY SILT, trace gravel to 1", trace coarse grained sand, approximately 5% medium grained sand, 40% fine grained sand, 55% silty fines with trace clay of low plasticity, dark brown, moist.
10									
									@ 11 feet occasional cobble to 5".
								SM	@ 13 feet SILTY SAND, approximately 20% gravel to 2", 20% coarse grained sand, 30% medium grained sand, 10% fine grained sand, 20% silty fines, red brown, moist.
15									**END OF TRENCH** Fill 0-1' No caving No groundwater No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **916**
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: **February 4, 2002**
	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** / ENCLOSURE: **B-24**

LOG OF TRENCH T-2

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				4.4				SM	FILL: SILTY SAND with gravel, approximately 10% gravel to 1", 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 30% silty fines, brown, moist, loose.
								SW	@ 1 foot ALLUVIUM: WELL GRADED SAND with gravel, approximately 15% gravel to 6", 20% coarse grained sand, 30% medium grained sand, 5% silty fines, brown, moist.
			89	3.3	116.1				
			84	5.8	109.7				@ 4 feet approximately 5% gravel to 1", 35% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 55% silty fines, brown, moist.
5									@ 5 feet occasional cobble to 10".
10									
15									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 914
	DATE EXCAVATED: February 4, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-25

LOG OF TRENCH T-3

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				18.3				SM	FILL: SILTY SAND with trace clay, approximately 5% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 35% silty fines with trace clay of low plasticity, brown, moist, loose.
			80	10.7	104.8				
								SW	@ 1.5 feet ALLUVIUM: WELL GRADED SAND with silt, approximately 10% gravel to 1", 30% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 10% silty fines, brown, moist.
			90	4.9	118.7				
5									@ 5 feet occasional cobble to 10".
									@ 7 feet approximately 30% gravel to 10", 25% coarse grained sand, 25% medium grained sand, 20% fine grained sand, 5% silty fines, brown, moist.
10									
15									END OF TRENCH Fill 0-1.5' No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 896
	DATE EXCAVATED: February 4, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-26

LOG OF TRENCH T-4

DEPTH IN FEET		ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			2.4				SM	FILL: SILTY SAND, trace gravel to 1/2", approximately 5% coarse grained sand, 15% medium grained sand, 55% fine grained sand, 25% silty fines, red brown, dry.
							SM	@ 0.5 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 40% gravel to 12", 15% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 15% silty fines, red brown, damp.
		90	4.6	118.6				
		91	5.5	120.7				
5								@ 5 feet becomes yellowish red brown.
							GM	@ 6 feet SANDY GRAVEL with silt, approximately 60% gravel to 12", 10% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 10% silty fines, difficult to excavate.
10								
								END OF TRENCH Fill 0-0.5' No caving No groundwater No bedrock
15								

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 948
	DATE EXCAVATED: February 4, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-27

LOG OF TRENCH T-5

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				12.1				SM	FILL: SILTY SAND, approximately 10% medium grained sand, 60% fine grained sand, 30% silty fines, dark brown, moist, loose, roots.
			86	19.5	100.6			CL	@ 1 foot OLDER ALLUVIUM: SANDY CLAY, approximately 5% medium grained sand, 30% fine grained sand, 65% clayey fines of medium plasticity, red brown, moist.
									@ 2.5 feet BEDROCK: Vaqueros Formation, silty sandstone, fine grained, greenish gray with iron oxide staining, damp.
									@ 4 feet no iron oxide staining, relatively easy to excavate.
5									
10									END OF TRENCH Fill 0-1' No caving No groundwater Bedrock 2.5-10'
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 944
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 5, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-28

LOG OF TRENCH T-6

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				10.9				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 10% medium grained sand, 50% fine grained sand, 35% silty fines, red brown, moist, loose, roots.
			91	14.0	105.9			CL	@ 1 foot OLDER ALLUVIUM: SANDY CLAY, approximately 10% gravel to 3/4", 10% medium grained sand, 20% fine grained sand, 60% clayey fines of medium plasticity, moist, red brown.
			86	7.6	114.0			GM	@ 3 feet SANDY GRAVEL with silt, approximately 55% gravel to 4" of which 10% cobbles and 5% boulders to 14", 15% coarse grained sand, 10% medium grained sand, 5% fine grained sand, 15% silty fines, red brown, moist.
5									
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 996
	DATE EXCAVATED: February 5, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-29

LOG OF TRENCH T-7

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				5.7				SM	FILL: SILTY SAND, trace gravel to 1", approximately 5% coarse grained sand, 30% medium grained sand, 45% fine grained sand, 20% silty fines, dark brown, damp, loose.
			85	5.5	111.3			SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 20% gravel to 3", 15% coarse grained sand, 25% medium grained sand, 35% fine grained sand, 15% silty fines, dark brown, moist.
			84	6.2	109.7				
									@ 4 feet occasional cobble to 8".
5									
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **934**
	DATE EXCAVATED: **February 5, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-30**

LOG OF TRENCH T-8

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				7.7				SM	FILL: SILTY SAND, approximately 5% gravel to 1", 10% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 15% silty fines, brown, damp, loose, roots.
								SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 35% gravel to 3", 20% coarse grained sand, 15% medium grained sand, 10% fine grained sand, 15% silty fines, brown gray, damp.
			75	3.0	101.8				@ 2 feet occasional cobble to 10".
			84	3.3	113.7				
5									
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **870**
	DATE EXCAVATED: **February 5, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-31**

LOG OF TRENCH T-9

DEPTH IN FEET	TEST DATA		ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				2.6		I		GM	FILL: SANDY GRAVEL with silt, approximately 60% gravel to 3", 10% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 10% silty fines, brown, dry, loose. @ 1 foot barbed wire fence, some boulders to 16". @ 2 feet steel debris, occasional boulder to 16" to total depth.
5									@ 6 feet barbed wire fence, difficult to excavate.
								GM	@ 8 feet ALLUVIUM: SANDY GRAVEL with silt, approximately 40% gravel to 3", 15% cobbles, 5% boulders to 18", 10% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 10% silty fines, gray brown.
10									
									END OF TRENCH Fill 0-8' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 874
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 5, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-32

LOG OF TRENCH T-10

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				10.9				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 15% medium grained sand, 55% fine grained sand, 25% silty fines, dark brown, damp, loose, roots.
			72	9.9	93.3			SM	@ 1 foot OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel to 2", trace coarse grained sand, 20% medium grained sand, 45% fine grained sand, 30% silty fines, dark brown, moist, roots.
			92	6.1	119.2			SM	@ 3 feet SILTY SAND with gravel and cobbles, approximately 10% subangular cobbles to 8", 15% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 20% silty fines, red brown, moist.
5									
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 862
	DATE EXCAVATED: February 5, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-33

LOG OF TRENCH T-11

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				14.7				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 15% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 20% silty fines, dark brown, moist, loose.
								SM	@ 1 foot OLDER ALLUVIUM: SILTY SAND with gravel, approximately 20% gravel to 1/2", 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines, brown, moist.
			84	5.5	111.2				
									@ 3 feet occasional cobble to 8".
			84	9.6	111.4				
5									
10									
									END OF TRENCH **Fill 0-1'** **No caving** **No groundwater** **No bedrock**
15									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **834**
	DATE EXCAVATED: **February 5, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-34**

LOG OF TRENCH T-12

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				8.6				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 15% medium grained sand, 55% fine grained sand, 15% silty fines, brown, damp, loose.
			79	12.8	101.3			SM	@ 1 foot OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 30% silty fines, brown, moist, trace pinhole porosity.
			92	6.9	118.5			SM	@ 3 feet SILTY SAND with gravel, approximately 30% gravel to 3", 5% angular cobbles to 6", 15% coarse grained sand, 10% medium grained sand, 25% fine grained sand, 15% silty fines, red brown, moist.
5									
10									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 898
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 5, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-35

LOG OF TRENCH T-13

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				4.5				SM	FILL: SILTY SAND with gravel, approximately 15% gravel to 1/2", 15% coarse grained sand, 25% medium grained sand, 15% fine grained sand, 30% silty fines, dark brown, damp, loose, roots.
			78	4.1	102.7			SM	@ 2 feet ALLUVIUM: SILTY SAND with gravel, approximately 30% gravel to 3" of which 5% cobbles to 8", 10% coarse grained sand, 20% medium grained sand, 20% fine grained sand, 20% silty fines, gray brown, moist.
			89	3.4	116.6				@ 4 feet occasional boulder to 14" to total depth.
5									
10									
									END OF TRENCH Fill 0-2' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 932
	DATE EXCAVATED: February 5, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-36

LOG OF TRENCH T-14

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				5.4				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 15% silty fines, dark brown, damp, loose, roots.
			79	8.8	103.6			SM	@ 1 foot ALLUVIUM: SILTY SAND, trace medium grained sand, 70% fine grained sand, 30% silty fines, brown, moist, some pinhole porosity.
			86	3.4	112.9			GW	@ 2.5 feet WELL GRADED GRAVEL, approximately 60% gravel to 3", trace cobbles to 8", 15% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 5% silty fines, gray brown, damp.
5									
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 954
	DATE EXCAVATED: February 6, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-37

LOG OF TRENCH T-15

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				10.7				SM	FILL: SILTY SAND, approximately 10% gravel to 2", 10% coarse grained sand, 30% medium grained sand, 35% fine grained sand, 15% silty fines, dark brown, moist, loose, roots.
								SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 10% gravel to 3", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 15% silty fines, brown, moist, caving.
			78	5.1	101.9			SW	@ 2 feet WELL GRADED SAND, approximately 35% coarse grained sand, 35% medium grained sand, 30% fine grained sand, brown, damp.
			74	11.2	97.5			SM	@ 4 feet SILTY SAND with gravel, approximately 5% gravel to 1", 5% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 35% silty fines, dark brown, moist, trace pinhole porosity.
5									@ 5 feet approximately 35% gravel to 3" with some cobbles to 8", 15% coarse grained sand, 15% medium grained sand, 20% fine grained sand, 15% silty fines, brown, moist.
10									END OF TRENCH DUE TO CAVING FROM 0-5' Fill 0-1' Caving 0-5' No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 980
	DATE EXCAVATED: February 6, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-38

LOG OF TRENCH T-16

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				9.1				SM	FILL: SILTY SAND, approximately 5% gravel to 3", 10% coarse grained sand, 40% medium grained sand, 30% fine grained sand, 15% silty fines, dark brown, moist, loose.
			77	8.5	100.6			SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 30% gravel to 2", 10% coarse grained sand, 25% medium grained sand, 20% fine grained sand, 15% silty fines, brown, moist.
			85	3.8	110.8			GW	@ 3 feet WELL GRADED GRAVEL with cobbles, approximately 5% cobbles to 8", 60% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 10% fine grained sand, trace silt, brown.
5									
									@ 8 feet some minor sloughing.
10									
									END OF TRENCH Fill 0-1' Minor caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1022
	DATE EXCAVATED: February 6, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" / ENCLOSURE: B-39

LOG OF TRENCH T-17

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				5.7				SM	FILL: SILTY SAND, approximately 10% medium grained sand, 60% fine grained sand, 30% silty fines, brown, dry, loose.
			81	2.3	105.8			SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 40% gravel to 3", 15% coarse grained sand, 10% medium grained sand, 20% fine grained sand, 15% silty fines, brownish gray, dry.
			87	2.4	113.7			GW	@ 4 feet WELL GRADED GRAVEL, approximately 10% cobbles to 3", 40% gravel to 3", 15% coarse grained sand, 25% medium grained sand, 10% fine grained sand, brown, calcite cementation, trace pinhole porosity.
5									
									@ 8 feet becomes difficult to excavate due to cobbles.
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1040
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 6, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-40

LOG OF TRENCH T-18

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				2.8				SM	FILL: SILTY SAND with gravel, approximately 30% gravel to 1", 20% coarse grained sand, 20% medium grained sand, 15% fine grained sand, 15% silty fines, brown gray, dry, loose.
			80	5.6	104.1			GP GM	@ 1 foot ALLUVIUM: POORLY GRADED GRAVEL with silt and sand, approximately 50% gravel to 2", 10% coarse grained sand, 20% medium grained sand, 10% fine grained sand, 10% silty fines, brown, moist.
			82	6.2	106.9				@ 3 feet occasional cobble to 6".
5									
10								SM	@ 10 feet SILTY SAND, approximately 10% gravel to 1/2", 15% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 25% silty fines, trace of clay of low plasticity, red brown, damp.
15									**END OF TRENCH** Fill 0-1' No caving No groundwater No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1084**
	DATE EXCAVATED: **February 6, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-41**

LOG OF TRENCH T-19

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				4.1				SM	FILL: SILTY SAND with gravel, approximately 40% gravel to 2", 15% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 15% silty fines, brown, moist, loose.
			86	6.4	112.9			GW	@ 2 feet ALLUVIUM: WELL GRADED GRAVEL with silt, approximately 5% cobbles to 6", 40% gravel to 3", 30% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 5% silty fines, moist, brown.
			85	5.6	111.7				
5									
10									
15									END OF TRENCH Fill 0-2' No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1096
	DATE EXCAVATED: February 6, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-42

LOG OF TRENCH T-20

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				3.8				GW	FILL: WELL GRADED GRAVEL with silt, approximately 5% cobbles to 6", 55% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 10% fine grained sand, brown, moist, loose.
			78	11.0	101.9			GW	@ 1 foot ALLUVIUM: WELL GRADED GRAVEL with sand and silt, approximately 5% cobbles to 8", 55% gravel to 3", 15% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 5% silty fines, brown gray, moist.
			92	5.2	120.1				
5									
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1160
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 6, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-43

LOG OF TRENCH T-21

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				6.5				SM	FILL: SILTY SAND with gravel, approximately 15% gravel to 1", 20% coarse grained sand, 20% medium grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines, damp, loose.
								SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, trace cobbles to 6", approximately 40% gravel to 3", 15% coarse grained sand, 20% medium grained sand, 10% fine grained sand, 15% silty fines, gray brown, damp.
			85	2.2	111.5				
			90	2.9	118.1				
5									
10									
									END OF TRENCH
15									Fill 0-1' No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1020
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 6, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-44

LOG OF TRENCH T-22

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				8.0				SM	FILL: SILTY SAND, trace gravel to 1/2", 5% coarse grained sand, 15% medium grained sand, 60% fine grained sand, 20% silty fines, brown, moist, loose.
			85	12.8	109.0			SM	@ 0.5 feet OLDER ALLUVIUM: SILTY SAND, trace gravel to 1/2", approximately 10% coarse grained sand, 10% medium grained sand, 55% fine grained sand, 25% silty fines, brown, moist, trace pinhole porosity.
									@ 2.5 feet becomes reddish brown.
			81	8.0	104.2				
5									
								GW	@ 6 feet WELL GRADED GRAVEL, approximately 5% cobbles to 8", 50% gravel to 3", 10% coarse grained sand, 15% medium grained sand, 10% fine grained sand, 5% silty fines, red brown, moist.
10									
									END OF TRENCH
									Fill 0-0.5' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1300
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 7, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-45

LOG OF TRENCH T-23

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				10.8				SM	FILL: SILTY SAND, approximately 20% coarse grained sand, 20% medium grained sand, 40% fine grained sand, 20% silty fines, brown, moist, loose.
			75	11.7	96.6			ML	@ 1 foot OLDER ALLUVIUM: SANDY SILT with gravel, approximately 15% gravel to 3", 5% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 50% silty fines, brown, moist.
			84	7.7	108.7			SM	@ 3.5 feet SILTY SAND with gravel, approximately 5% angular cobbles to 6", 40% gravel to 3", 10% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 15% silty fines, red brown, moist.
5									
10									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1324
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 7, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-46

LOG OF TRENCH T-24

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				15.1				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, dark brown, moist, loose.
			73	6.9	96.0				
								SM	@ 2 feet OLDER ALLUVIUM: SILTY SAND, approximately 5% coarse grained sand, 10% medium grained sand, 55% fine grained sand, 30% silty fines, red brown, damp, trace pinhole porosity. @ 3 feet becomes hard.
			89	7.2	114.3				
5									
								GW	@ 7 feet WELL GRADED GRAVEL, approximately 10% angular cobbles, 45% gravel to 3", 10% coarse grained sand, 15% medium grained sand, 10% fine grained sand, 5% silty fines, red brown, damp, slightly difficult to excavate.
10									END OF TRENCH Fill 0-2' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1324
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 7, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24"	ENCLOSURE: B-47

LOG OF TRENCH T-25

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				14.1				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 60% fine grained sand, 30% silty fines, brown, moist, loose.
								GW	@ 1 foot OLDER ALLUVIUM: WELL GRADED GRAVEL, approximately 5% angular cobbles to 10", 55% gravel to 3", 10% coarse grained sand, 10% medium grained sand, 5% fine grained sand, 5% silty fines, red brown, moist.
			85	8.6	112.9				
			91	7.4	120.1				
5									
									END OF TRENCH DUE TO UPPER 4 FEET CAVING Fill 0-1' Caving 0-4' No groundwater No bedrock
10									
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1254
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 7, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-48

LOG OF TRENCH T-26

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				8.3				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 10% medium grained sand, 60% fine grained sand, 25% silty fines, dark brown, moist, loose, roots.
			72	10.2	94.6				
								SM	@ 2.5 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 5% angular cobbles to 6", 25% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 15% silty fines, red brown, moist.
			84	6.3	111.6				
5									
10									@ 10 feet fines become clayey, soft.
15									END OF TRENCH Fill 0-2.5' No caving No groundwater No bedrock

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1236
	DATE EXCAVATED: February 7, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-49

LOG OF TRENCH T-27

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				12.3				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 65% fine grained sand, 25% silty fines, dark brown, moist.
			76	9.3	97.6			SM	@ 1 foot OLDER ALLUVIUM: SILTY SAND, trace coarse grained sand, 5% medium grained sand, 65% fine grained sand, 30% silty fines, brown, moist, trace pinhole porosity.
			90	8.4	119.4			SM	@ 3 feet SILTY SAND with gravel, approximately 5% angular cobbles to 10", 35% gravel to 3", 15% coarse grained sand, 10% medium grained sand, 20% fine grained sand, 15% silty fines with trace clay, red brown, moist.
5									
									@ 8 feet minor caving to total depth of 13'.
10									
									END OF TRENCH Fill 0-3' Minor caving from 8-13' No groundwater No bedrock
15									

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1204
	DATE EXCAVATED: February 7, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-50

LOG OF TRENCH T-28

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0								SM	FILL: SILTY SAND with trash consisting primarily of brick and concrete debris with steel and other trash. In southeast end of trench fill is approximately 1.5 feet thick and in northwest end of trench fill is approximately 4.5 feet and getting thicker steeply.
									END OF TRENCH Fill 0-4.5' No caving No groundwater No bedrock
5									
10									
15									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1244**
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: **February 7, 2002**
	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-51**

LOG OF TRENCH T-29

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				10.7				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 25% medium grained sand, 20% silty fines, dark brown, moist, loose.
			82	10.2	106.9			SW	@ 1 foot ALLUVIUM: WELL GRADED SAND with gravel, trace cobbles, 40% gravel to 2", 20% coarse grained sand, 20% medium grained sand, 15% fine grained sand, 5% silty fines, gray brown, moist.
			86	4.3	113.3				
5									@ 5 feet minor caving to total depth.
10									
									END OF TRENCH Fill 0-1' Minor caving 5-11' No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1132
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 7, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-52

LOG OF TRENCH T-30

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				2.4				GW	FILL: WELL GRADED GRAVEL with sand, approximately 55% gravel to 2", 20% coarse grained sand, 15% medium grained sand, 5% fine grained sand, 5% silty fines, brown, dry, loose.
			83	1.4	108.5			SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 30% gravel to 2 1/2", 15% coarse grained sand, 25% medium grained sand, 15% fine grained sand, 15% silty fines, gray brown, dry.
			84	1.3	109.8				
5									
10									
									END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1056
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: February 7, 2002
	EQUIPMENT: Ford 555E
	BUCKET W.: 24" — ENCLOSURE: B-53

LOG OF TRENCH T-31

DEPTH IN FEET			ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0				3.7				SM	TOPSOIL: SILTY SAND, trace gravel to 1/2", 5% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, red brown, dry, loose.
			81	4.7	104.3			SM	@ 0.5 feet OLDER ALLUVIUM: SILTY SAND, approximately 10% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 30% silty fines, red brown, slightly massive, abundant pinhole and larger pores.
			88	4.1	113.8				@ 3 feet approximately 10% angular cobbles to 10", 10% gravel to 3", 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines, red brown, some pinhole porosity.
5									
									END OF TRENCH Fill 0-0.5' No caving No groundwater No bedrock
10									
15									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1070**
	DATE EXCAVATED: **February 7, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-54**

APPENDIX C
Laboratory Testing Program and Results

APPENDIX C
LABORATORY TESTING

General

Selected soil samples obtained from the trenches and borings were tested in our laboratory to evaluate the physical properties of the soils affecting foundation design and construction procedures. The laboratory testing program performed in conjunction with our investigation included moisture content, dry density, laboratory compaction, direct shear, sieve analysis, sand equivalent, R-value, percent passing No. 200 sieve, expansion index, and chemical analysis. The chemical analysis testing was performed by E.S. Babock & Sons, Inc. and are attached as Enclosures C-3 through C-27. Descriptions of the laboratory tests are presented in the following paragraphs.

Moisture-Density Tests

The moisture content and dry density information provides an indirect measure of soil consistency for each stratum, and can also provide a correlation between soils on this site. The dry unit weight and field moisture content were determined for selected undisturbed samples, and the results are shown on the boring logs, Enclosures B-1 through B-54, for convenient correlation with the soil profile.

Direct Shear Tests

Shear tests are performed with a direct shear machine at a constant rate-of-strain (usually 0.05 inches/minute). The machine is designed to test a sample partially extruded from a sample ring in single shear. Samples are tested at varying normal loads in order to evaluate the shear strength parameters, angle of internal friction and cohesion. Samples are tested in a remolded condition (90% relative compaction per ASTM 1557) at field moisture content and soaked, according to conditions existing or expected in the field.

The results of the shear tests are presented in the following table:

DIRECT SHEAR TESTS				
Trench Number	**Sample Depth (feet)**	**Soil Description**	**Angle of Internal Friction (degrees)**	**Apparent Cohesion (psf)**
T-4	4	(SM) Silty Sand w/ gravel	36	200
T-5	2	(SC) Clayey Sand	26	1,000
T-22	3	(SM) Silty Sand	31	200

Sieve Analysis

A quantitative determination of the grain size distribution was performed for selected samples in accordance with the ASTM D 422 laboratory test procedure. The determination is performed by passing the soil through a series of sieves, and recording the weights of retained particles on each screen. The results of the sieve analyses are presented graphically on Enclosures C-1 through C- 2.

Percent Passing No. 200 Sieve Tests

A quantitative determination of the percentage of soil passing the No. 200 sieve was performed for selected samples. The results indicate the percentage of fines in the soil. The results are presented in the following table:

PERCENT PASSING NO. 200 SIEVE TESTS			
Boring Number	**Sample Depth (feet)**	**Soil Description**	**Percent by Weight Passing No. 200 Sieve (%)**
1	11	(SM) Silty Sand w/ gravel	16
4	38	(SM) Silty Sand	49
11	6	(SM) Silty Sand w/ gravel	25

Expansion Index Tests

Remolded samples are tested to determine their expansion potential in accordance with the Expansion Index (EI) test. The test is performed in accordance with the Uniform Building Code Standard 18-2. The test results are presented in the following table:

EXPANSION INDEX TESTS				
Trench Number	**Sample Depth (feet)**	**Soil Description**	**Expansion Index (EI)**	**Expansion Potential**
5	2	(CL) Sandy Clay	80	Medium

Expansion Index:	0-20	21-50	51-90	91-130
Expansion Potential:	Very low	Low	Medium	High

R-Value Test

Soil samples were obtained at probable pavement subgrade level and sieve analysis and sand equivalent tests were conducted. Based on these indicator tests, a selected soil sample was tested to determine its R-value using the California R-Value Test Method, Caltrans Number 301. The results of the sieve analysis, sand equivalent, and R-value tests are presented on Enclosures C-1 and C-2.

Soluble Sulfate Content Tests

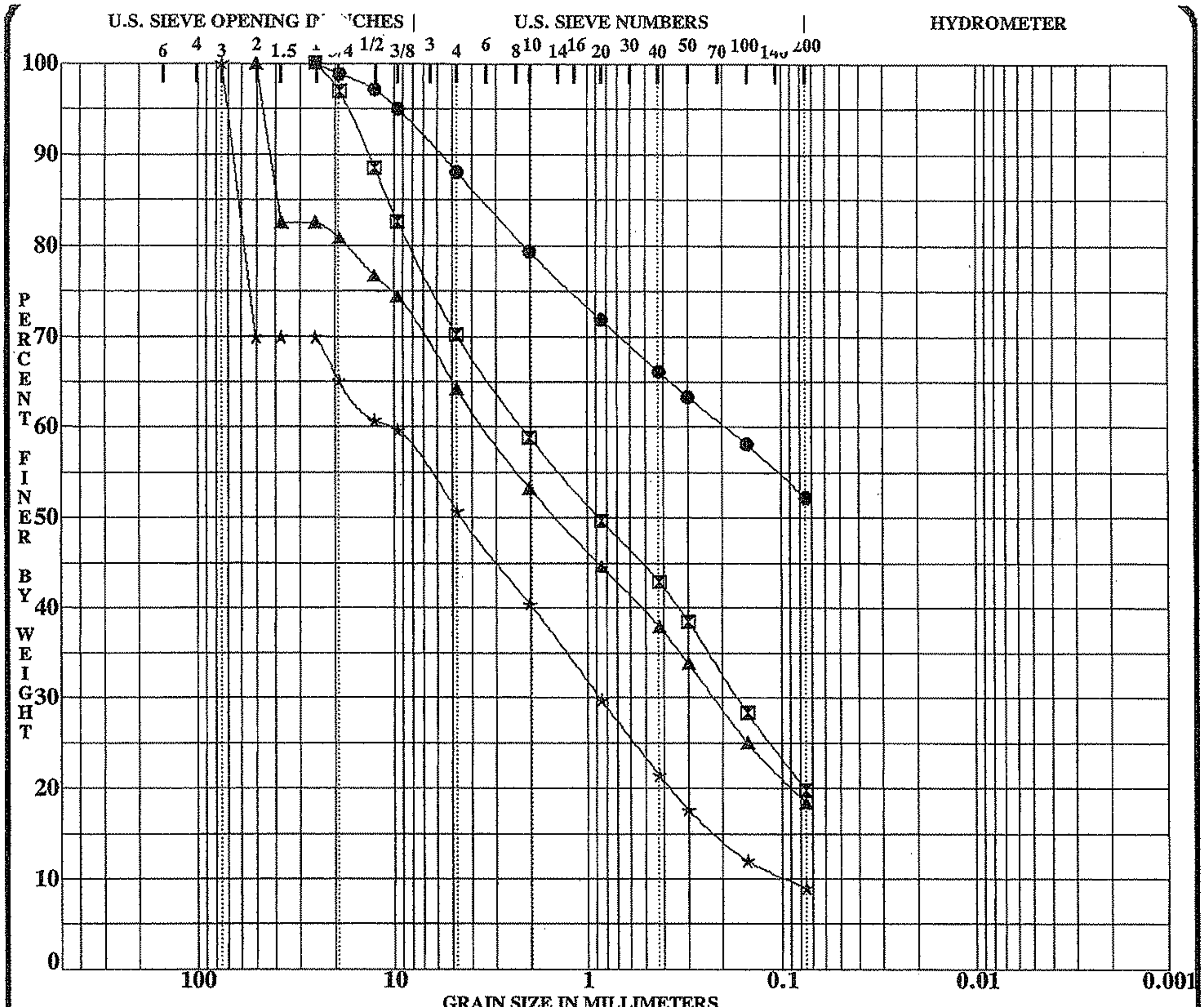
The soluble sulfate content of selected subgrade soils were evaluated. The concentration of soluble sulfates in the soils was determined by measuring the optical density of a barium sulfate precipitate. The precipitate results from a reaction of barium chloride with water extractions from the soil samples. The measured optical density is correlated with readings on precipitates of known sulfate concentrations. The test results are presented on the attached sheets by E.S. Babcock & Sons, Enclosures C-3 through C-27 and on the following table:

SOLUBLE SULFATE CONTENT TESTS			
Boring Number	Sample Depth (feet)	Soil Description	Sulfate Content (ppm)
B-16	surface	(SM) Silty Sand	<150
B-17	surface	(SM) Silty Sand	<75

Laboratory Compaction

Selected soil samples were tested in the laboratory to determine compaction characteristics using the ASTM D 1557-91 compaction test method. The results are presented in the following table:

LABORATORY COMPACTION				
Boring/ Trench Number	Sample Depth (feet)	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture Content (percent)
B-4	38	(SM) Silty Sand	132.5	8.5
B-15	12	Sandstone	132.0	8.5
T-1	1	(SM) Silty Sand	131.0	8.5
T-4	4	(SM) Silty Sand w/ gravel	132.5	8.5
T-5	2	(CL) Sandy Clay	116.5	15.0
T-8	2	(SM) Silty Sand w/ gravel	136.0	7.0
T-22	3	(SM) Silty Sand	129.0	9.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	SE	RV			Cc	Cu
●	T-06	@ 1-3 ft	(SC) Sandy Clay	10	--				
⊠	T-07	@ 1-3 ft	(SM) Silty Sand w/ gravel	19	74				
▲	T-13	@ 1-3 ft	(SM) Silty Sand w/ gravel	19	--				
★	T-18	@ 1-3 ft	(GM) Poorly Graded Gravel w/ silt and sand	25	--			0.76	111.1

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	T-06	@ 1-3 ft	25.00	0.19			12.0	35.8	52.2	
⊠	T-07	@ 1-3 ft	25.00	2.19	0.168		29.9	50.3	19.8	
▲	T-13	@ 1-3 ft	50.00	3.41	0.222		35.8	45.8	18.4	
★	T-18	@ 1-3 ft	75.00	10.50	0.871	0.0945	49.3	41.7	9.0	

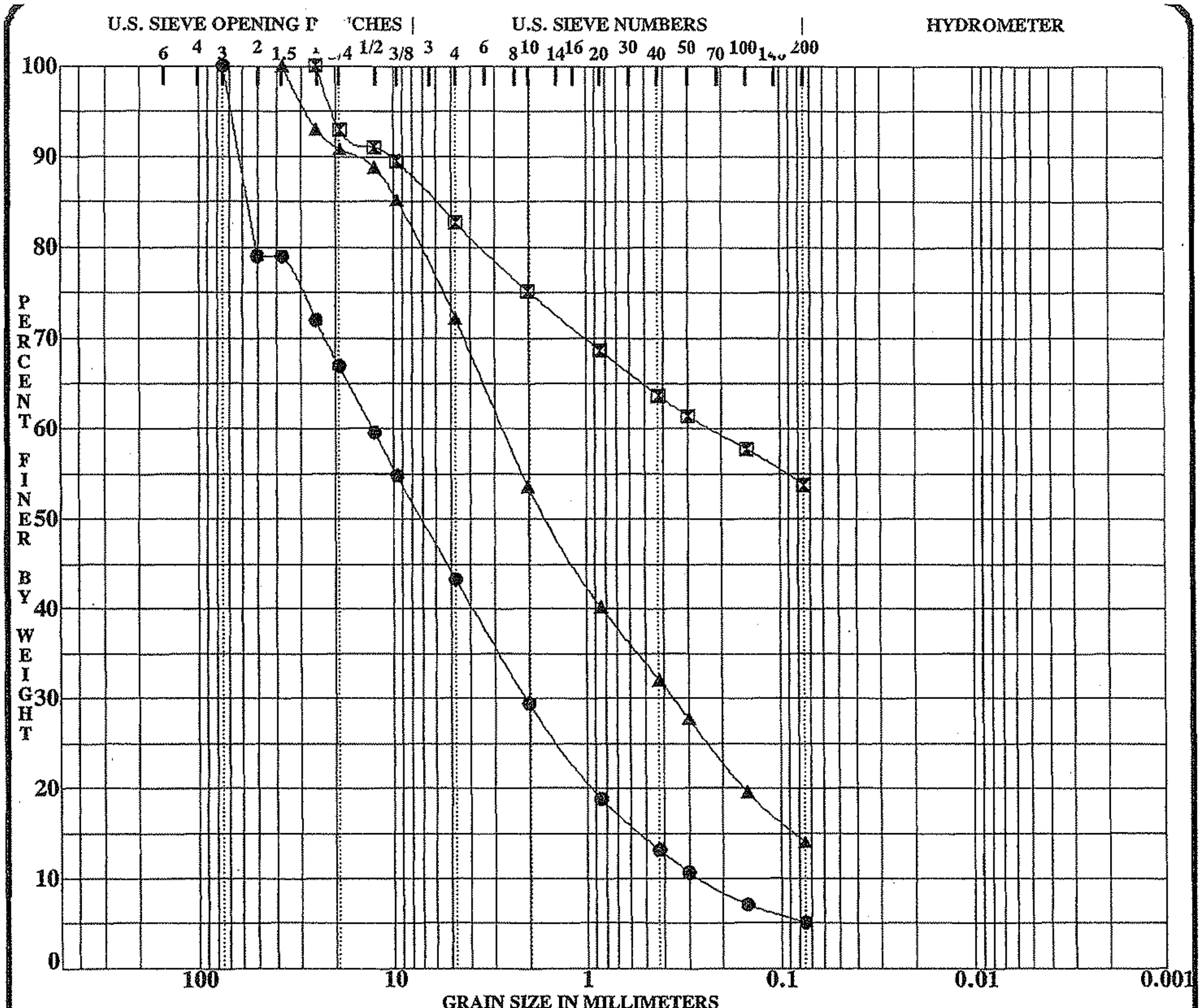
PROJECT 580 ACRES, BEDFORD CANYON - CORONA AREA, CALIFORNIA

PROJECT NO. 31558.1
DATE 3/26/02

GRADATION CURVES

LOR Geotechnical Group, Inc.
Riverside, California

Enclosure C-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	SE	RV			Cc	Cu
●	T-20	@ 1-3 ft	(GW) Well Graded Gravel w/ silt and sand	33	--			1.27	48.0
⊠	T-23	@ 1-3 ft	(ML) Sandy Silt w/ gravel	8	21				
▲	T-30	@ 1-3 ft	(SM) Silty Sand w/ gravel	25	65				

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	T-20	@ 1-3 ft	75.00	12.79	2.076	0.2664	56.7	38.2	5.1	
⊠	T-23	@ 1-3 ft	25.00	0.23			17.3	28.9	53.8	
▲	T-30	@ 1-3 ft	37.50	2.70	0.361		27.9	58.1	14.0	

PROJECT 580 ACRES, BEDFORD CANYON - CORONA AREA, CALIFORNIA
PROJECT NO. 31558.1
DATE 3/26/02

GRADATION CURVES
LOR Geotechnical Group, Inc.
Riverside, California

Enclosure C-2

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

Envir[illegible]ental Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96342-001

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: TB-4
Site: T-4 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	380	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-3

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Laboratory Results

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Client:
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Riverside, CA 92507

Lab No.: L96342-002

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: TB-11
Site: T-11 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	79.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-4

E.S. BABCOCK & SONS, INC.
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
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Riverside,CA 92507

Page: 1 of 1
Lab No.: L96342-003

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: TB-13
Site: T-13 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	61.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-5

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Laboratory Results

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Client:
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Riverside,CA 92507

Lab No.: L96342-004

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: TB-15
Site: T-15 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	75.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-6

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Laboratory Results

221
Client:
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Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-24
Site: T-24 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-005

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	660	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-7

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Laboratory Results

Lab No.: L96342-006

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-27
Site: T-27 @ 0
Description: Project #31558.1

Matrix: soil-ag

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	34.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-8

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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96342-007

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: TB-29
Site: T-30 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	18.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-9

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Laboratory Results

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Client:
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Kevin Osmun
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Riverside,CA 92507

Lab No.: L96342-008

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: D-3
Site: T-2 @ 2
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	23.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-10

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Laboratory Results

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Riverside,CA 92507

Lab No.: L96342-009

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: D-17
Site: T-10 @ 1
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	230	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-11

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Laboratory Results

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Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96342-010

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: D-33
Site: T-18 @ 1
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	14.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-12

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Laboratory Results

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Client:
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6121 Quail Valley Ct.

Riverside, CA 92507

Lab No.: L96342-011

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: D-47
Site: T-25 @ 2
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	61.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-13

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

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Laboratory Results

221

Lab No.: L96342-012

Client:
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Kevin Osmun
6121 Quail Valley Ct.

Riverside, CA 92507

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: B-1
Site: B-1 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	130	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-14

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

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Laboratory Results

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Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96342-013

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: B-4
Site: B-4 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	17.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-15

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

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Laboratory Results

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Client:
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Kevin Osmun
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Riverside,CA 92507

Client I.D.: B-8
Site: B-8 @ 0
Description: Project #31558.1

Matrix: soil-ag

Page: 1 of 1
Lab No.: L96342-014

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	ND	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-16

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

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e-mail: esbsales@aol.com
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96342-015

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: B-12
Site: B-12 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	350	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-17

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

Enviro ntal Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside, CA 92507

Page: 1 of 1
Lab No.: L96342-016

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: B-13
Site: B-13 @ 0
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	57.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-18

E.S. BABCOCK
& SONS, INC.
ESTABLISHED 1906

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6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: B-14
Site: B-14 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-017

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	66.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-19

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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-8
Site: T-4 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-001

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.1	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	340	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	620	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-20

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

Envir… ental Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221

Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96343-002

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: D-20
Site: T-11 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.5	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	340	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	1200	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-21

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

Envir( )ntal Laboratory Certification #1156
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P.O. Box 432 Riverside, CA 92502-0432
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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:

LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside, CA 92507

Page: 1 of 1
Lab No.: L96343-003

Date Reported: 02/22/02

Client I.D.: D-28
Site: T-15 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.5	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	320	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	1900	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-22

E.S. BABCOCK & SONS, INC.
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside, CA 92507

Client I.D.: D-44
Site: T-23 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-004

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.3	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	320	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	2100	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-23

E.S. BABCOCK & SONS, INC.
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Envir ntal Laboratory Certification #1156
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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96343-005

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: R-2
Site: B-1 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.6	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	320	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	1300	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-24

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

Environmental Laboratory Certification #1156
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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96343-006

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: R-54
Site: B-9 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.6	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	290	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	5500	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-25

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Envir ental Laboratory Certification #1156
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e-mail: esbsales@aol.com
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside, CA 92507

Lab No.: L96343-008

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: R-69
Site: B-12 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.1	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	270	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	2100	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-26

E.S. BABCOCK & SONS, INC.
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Envir- ental Laboratory Certification #1156
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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221

Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Lab No.: L96343-007

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Client I.D.: R-86
Site: B-14 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.6	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	250	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	4200	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

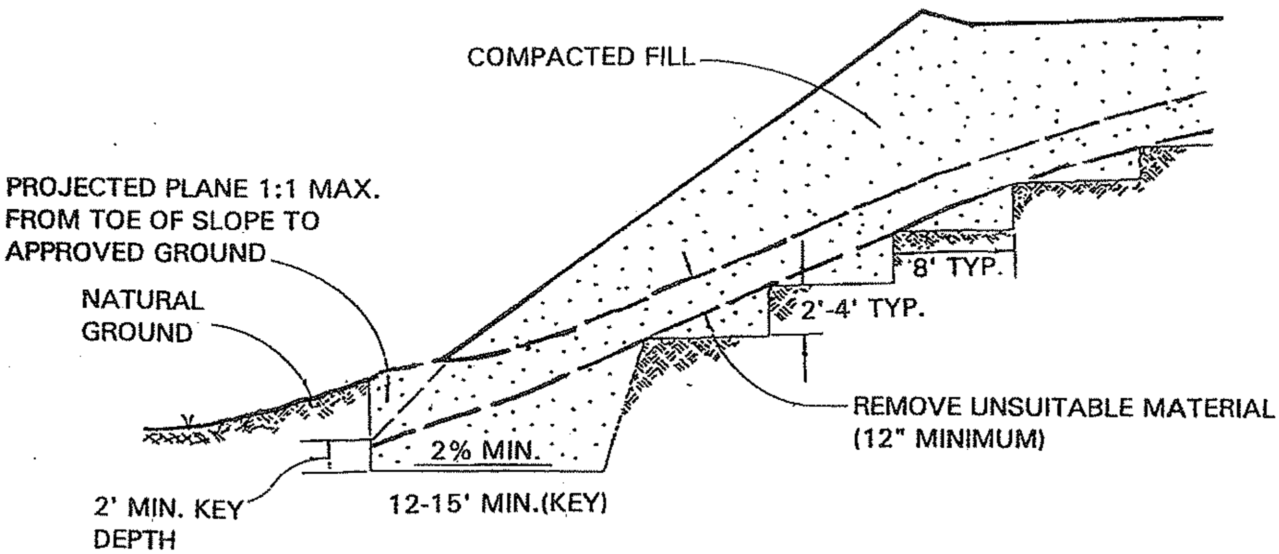
cc:

ESB Project Reviewer

Enclosure C-27

APPENDIX D
Geotechnical Sketches

TYPICAL KEYING AND BENCHING DETAIL



FILL SLOPE

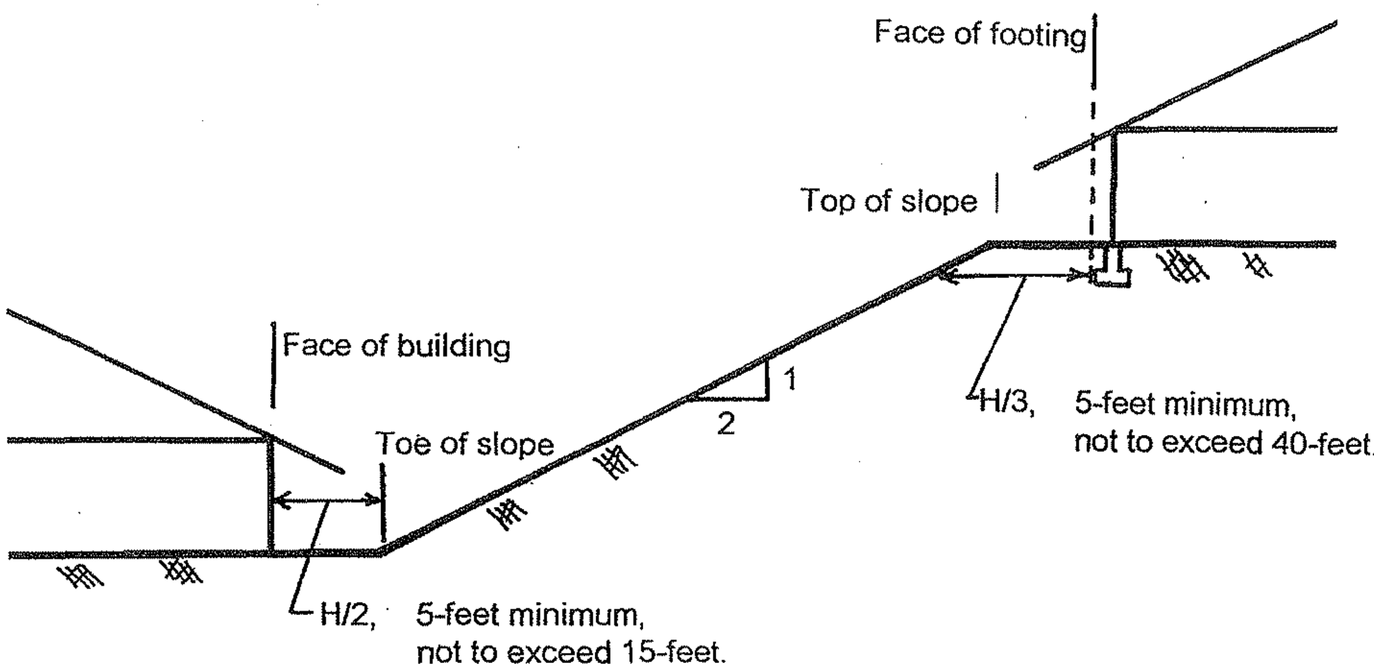
NOTES: 1) DIMENSIONS SHOWN SUBJECT TO FIELD CHANGE BASED ON ENGINEER'S JUDGEMENT

2) BENCHING REQUIRED WHEN FILLING OVER NATURAL GROUND STEEPER THAN 5H:1V

GEOTECHNICAL SKETCH

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: D-1
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NOT TO SCALE

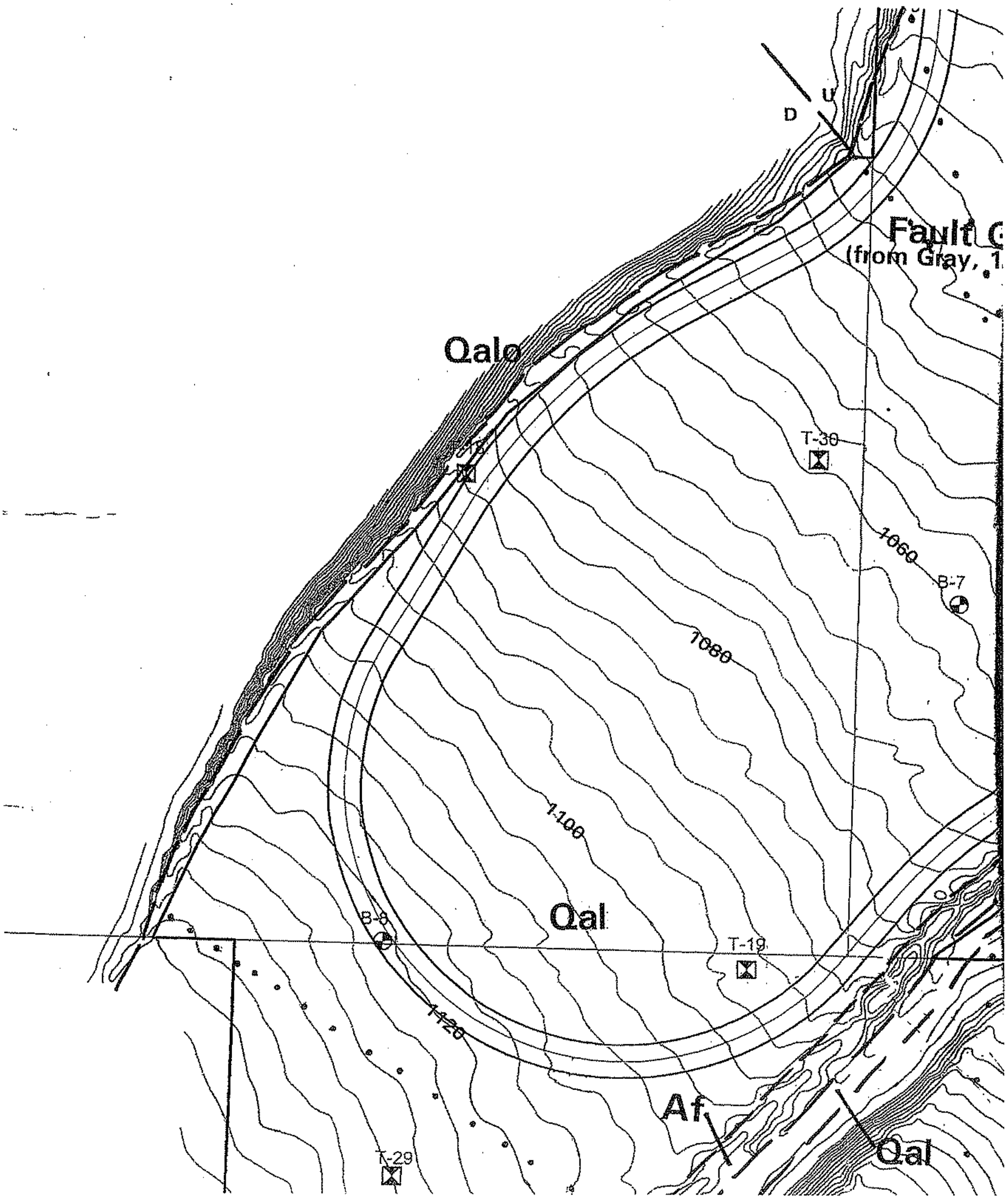
BUILDING SET-BACK REQUIREMENTS



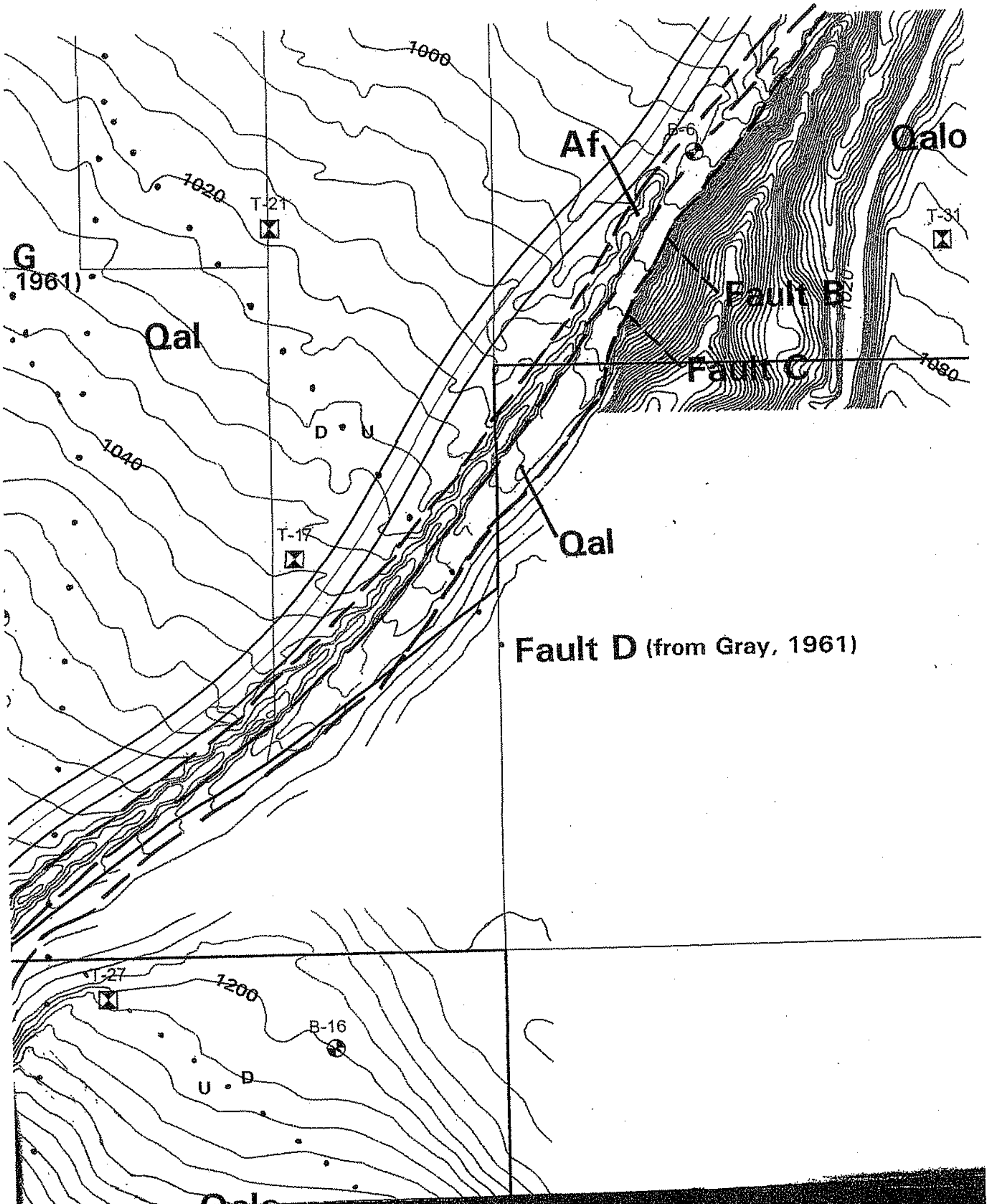
GEOTECHNICAL SKETCH

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: D-2
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NOT TO SCALE

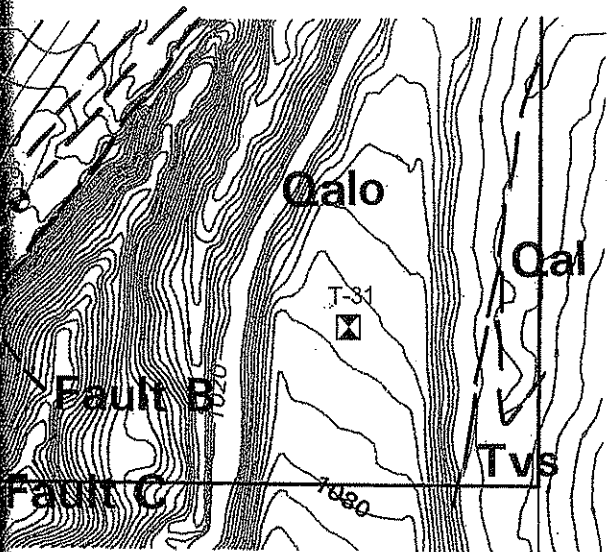
Piece 1 Top


D
U
Fault
(from Gray,
Qalo
T-18
T-30
1060
B-7
1080
1100
Qal
B-9
T-19
1120
Af
Qal
T-29

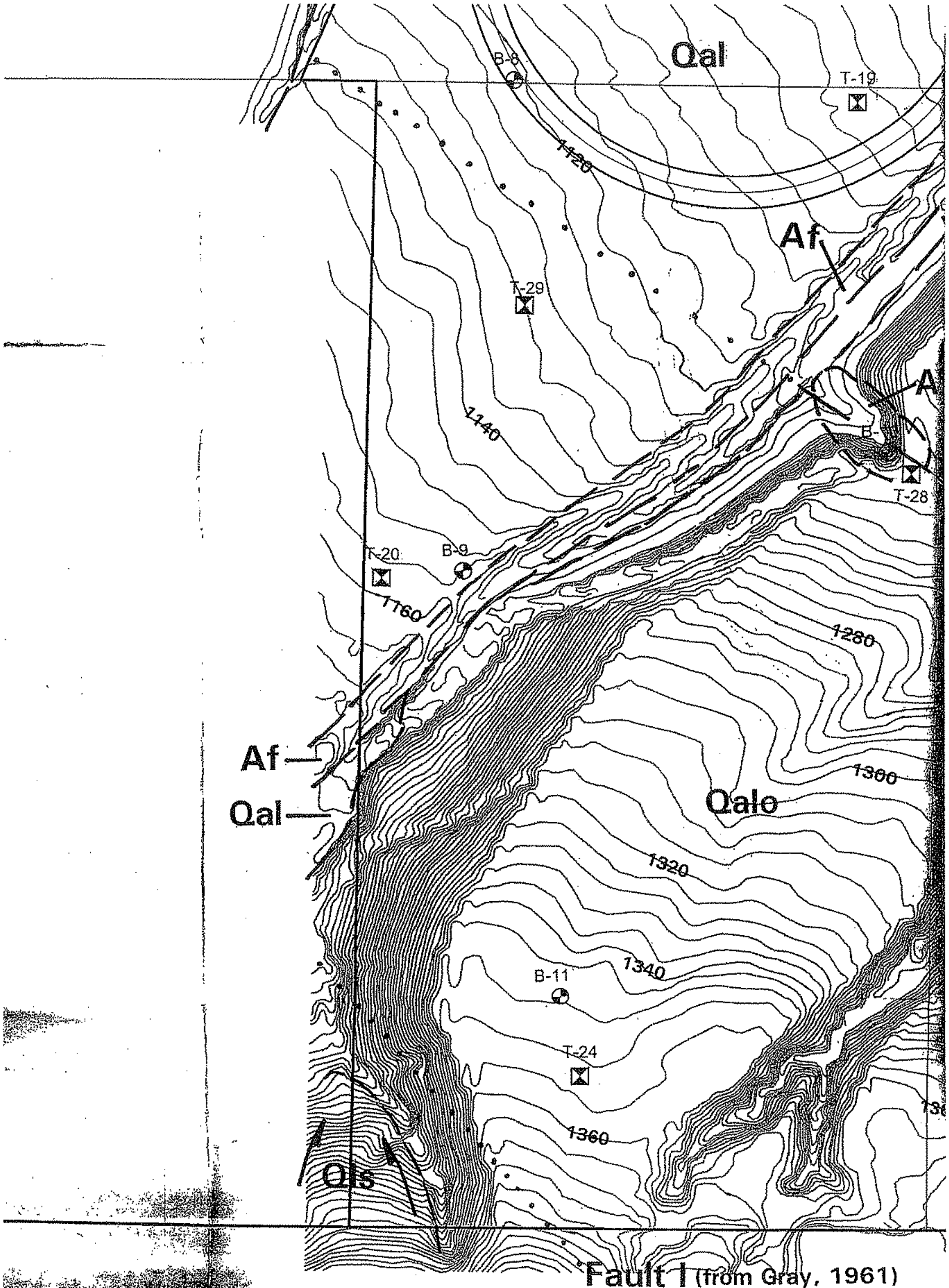
Piece 2 Top


1000
Af
B-6
Qalo
1020
T-21
T-31
G
1961)
Fault B
Qal
Fault C
1080
D
U
1040
T-17
Qal
Fault D (from Gray, 1961)
T-27
1200
B-16
U
D

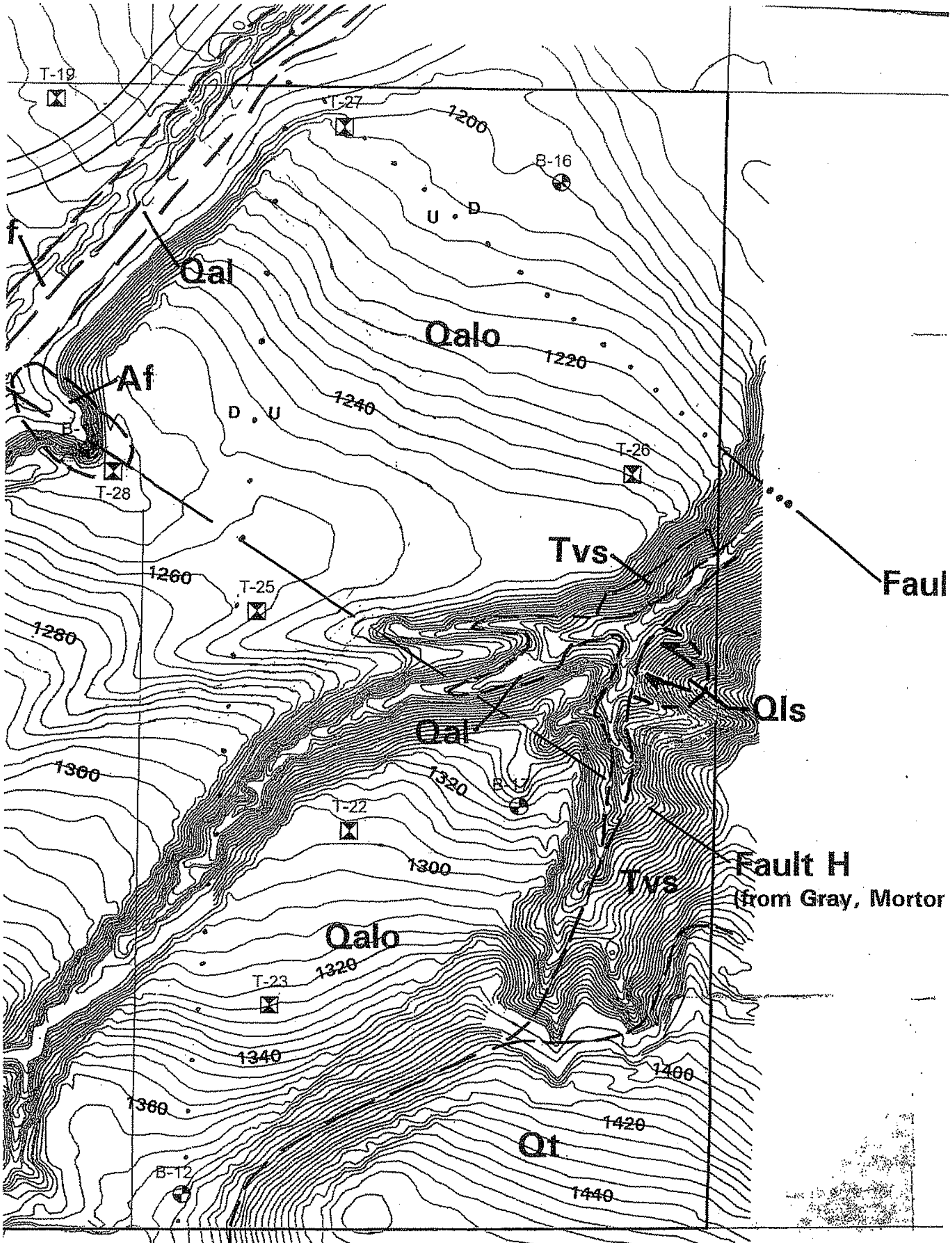
Piece 3 Top



n Gray, 1961)

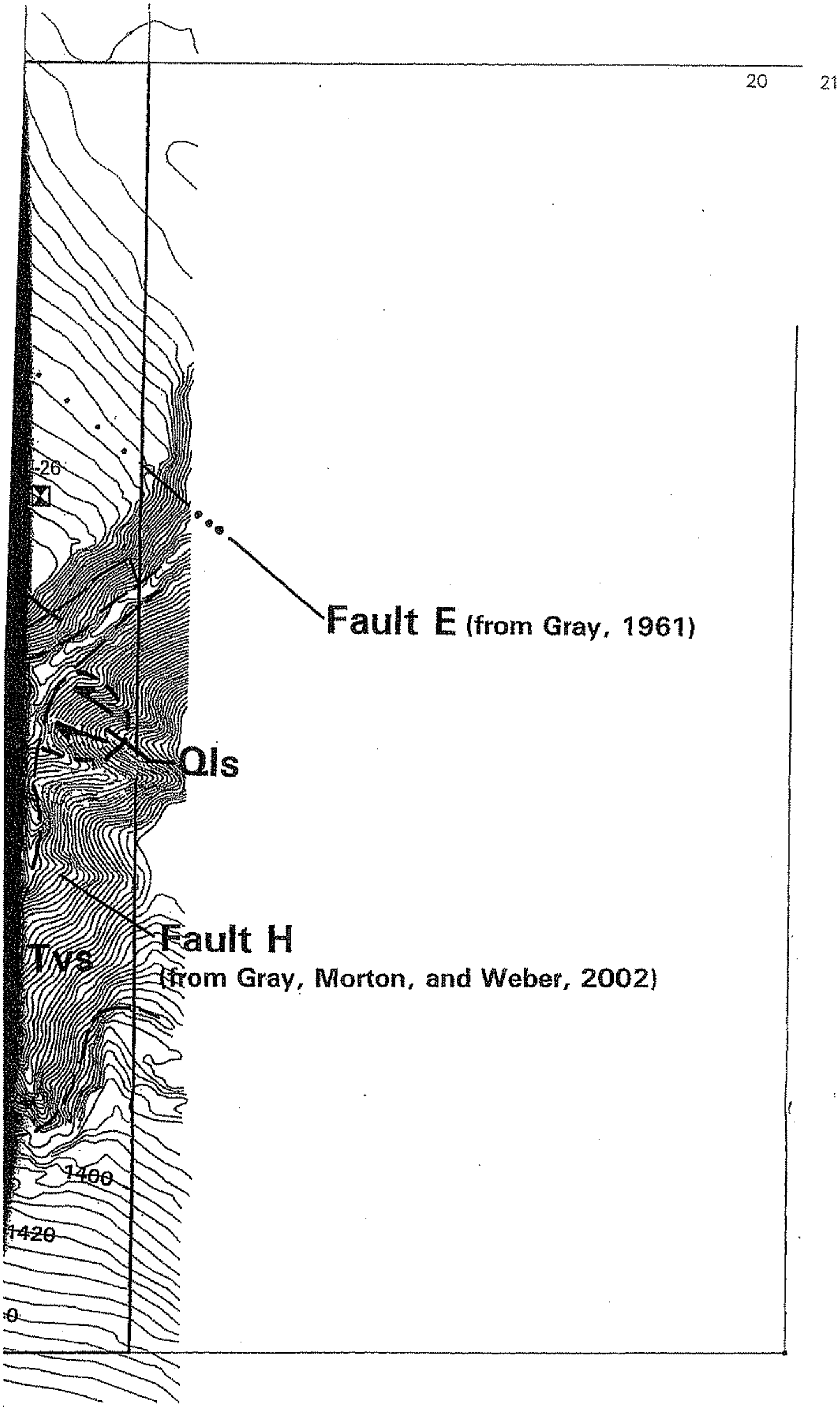


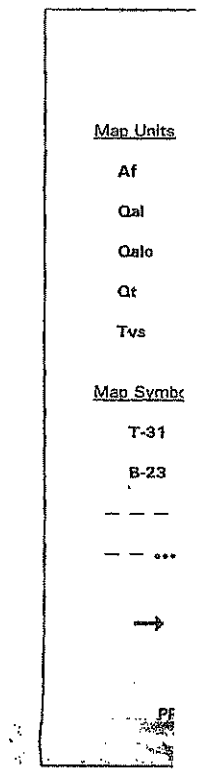
Piece 1 Bottom



y, 1961) Fault F (from Gray, 1961)

Piece 2 Bottom





Piece 3 Bottom

Appendix F

Treatment Control BMP Sizing Calculations and Design Details

AEI·CASC
ENGINEERING
PLANNING • ENGINEERING • SURVEYING
937 South Via Lata, Suite 500
Colton, CA 92324
(909) 783-0101
Fax (909) 783-0108

SHEET ____ OF ____

ENGINEERING ____ DATE 12/07/10 JOB # 337-11A CALC. BY ____

SUBJECT INFILTRATION BASIN, WQMP CHECKED BY ____

NO PERC TEST PROVIDED AT THIS TIME.

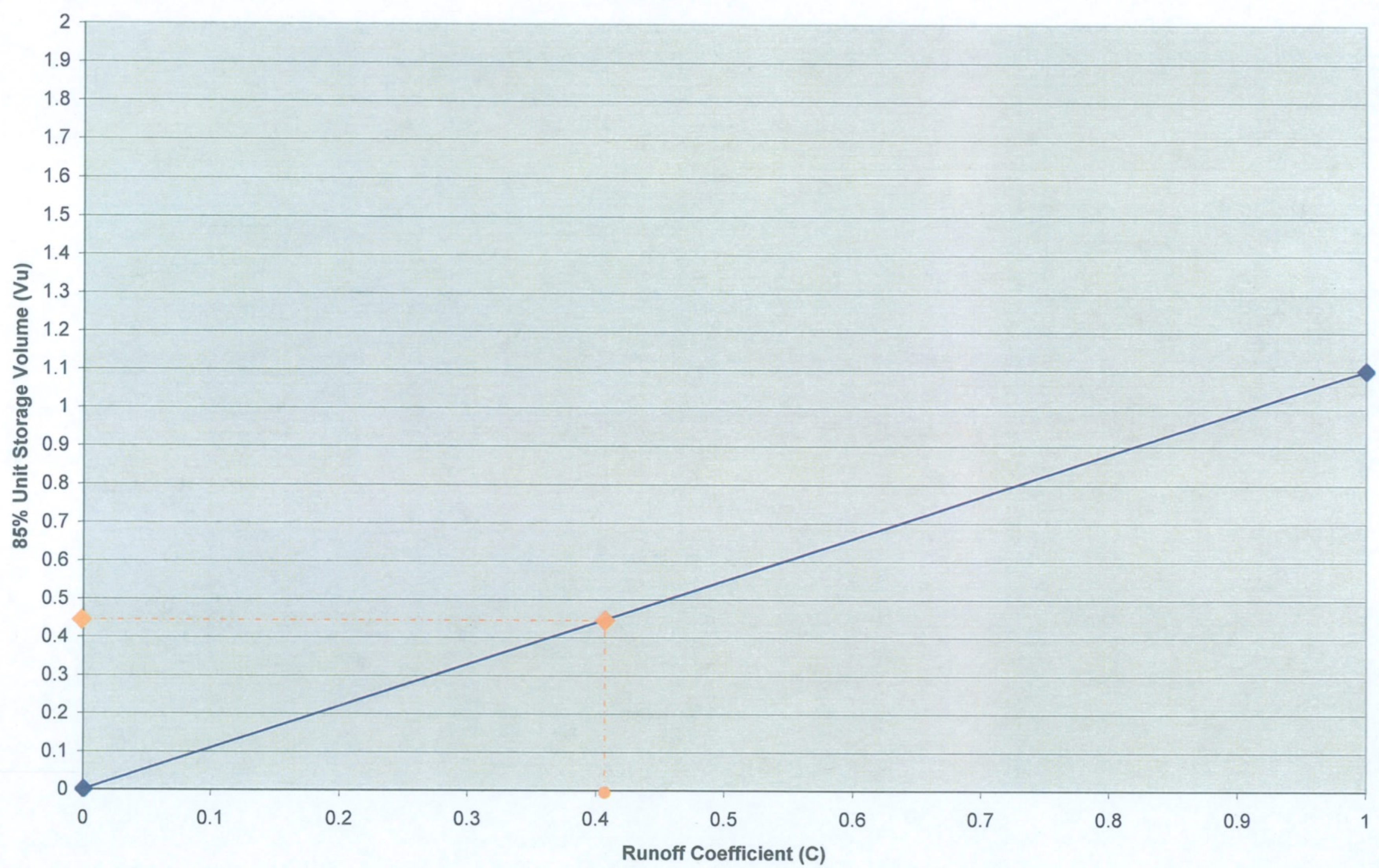
PER GEOTECHNICAL INVESTIGATIONS, THE SOILS IN THE AREA OF BASIN "A" ARE CLASSIFIED BY THE USDA AS CORTINA COBBLY LOAMY SAND WITH A DEPTH OF APPROXIMATELY 60 INCHES AND A PERMEABILITY OF 6.3 TO 20 INCHES / HR.

THE SOILS SOUTH OF THE DRAINAGE AT HIGHER ELEVATIONS, BASIN "B" ARE CLASSIFIED BY THE USDA AS SOPER COBBLY LOAM WITH A DEPTH OF ABOUT 14" AND A PERMEABILITY OF 0.63 TO 2.0 INCHES/HOUR. AN AVERAGE INFILTRATION RATE OF 1.3 INCH/HR WAS USED FOR THE WATER QUALITY VOLUME SIZING.

Design Procedure for BMP Design Volume 85th percentile runoff event			
Preliminary WQMP		**Data:Tributary Area 1**	
Designer:	Barb Sherman, P.E.	Slope =	1.10
Company:	AEI-CASC Consulting	$A_{impervious}$ =	143.19
Date:	9/20/2010	A_{total} =	238.65
Project:	**Arantine Hills**		
Location:	Corona, California		

1. Create Unit Storarge Volume Graph	
a. Site location (Township, Range, and Section).	T4S, R6W SECTION 16, 17, and 20 <1>
b. Slope value from the Design Volume Curve in **Appendix A**.	Slope = 1.10 <2>
c. Plot this value on the Unit Storage Volume Graph shown on **Figure 2**.	
d. Draw a straight line from this point to the graph.	Is this graph attached? Yes X No__
2. Determine Runoff Coefficient	
a. Determine total impervious area	$A_{impervious}$ = 143.19 acres <5>
b. Determine total tributary area	A_{total} = 238.65 acres <6>
c. Determine Impervious fraction i =**<5>** / **<6>**	i = 0.60 <7>
d. Use **<7>** in **Figure 1** to find Runoff OR $C=0.858i^3 -0.78i^2 +0.774i + .04$	C = 0.41 <8>
3. Determine 85% Unit Storage Volume	
a. Use **<8>** in **Figure 2** Draw a Vertical line from **<8>** to the graph, then a Horizontal line to the desired V_u value.	V_u = 0.45 in-acre/acre <9>
4. Determine Design Storage Volume	
a. V_{BMP} =**<9>** x **<6>** [in-acres]	V_{BMP} = 107.35 in-acre <10>
b. V_{BMP} =**<10>** / 12 [ft-acres]	V_{BMP} = 8.946 ft-acre <11>
c. V_{BMP} =**<11>** x 43560 [ft^3]	**V_{BMP} = 389680 ft^3** <12>

Figure 2 Unit Storage Volume Graph
Tributary Area 1



Design Procedure Form for Infiltration Basin				
Preliminary WQMP		**Data:Tributary Area 1**		
Designer:	Barb Sherman, P.E.	A_{total} =	238.65	
Company:	AEI-CASC Consulting	V_{BMP} =	389680	
Date:	9/20/2010	I =	0.46	
Project:	**Arantine Hills**	t =	48	
Location:	Corona, California	s =	6	

1. Determine Design Storage Volume			
(Use Worksheet 1)			
a. Total Tributary Area (maximum 10)	A_{total} =	238.65	acres
b. Design Storage Volume, V_{BMP}	V_{BMP} =	389680	ft^3
2. Maximum Allowable Depth (D_m)			
a. Site Infiltration rate (I)	I =	6.3	in/hr
b. Minimum drawdown time (48 hrs) (t)	t =	48	hrs
c. Safety factor (s)	s =	6	
d. $D_m = [(t) X (I)] / 12s$	D_m =	4.20	ft
3. Trench Bottom Surface Area			
$A_m = V_{BMP} / D_m$	**A_m =**	**92781.0**	**ft^2**

Notes: Basin "A" as currently shown on the Site Plan has an approximate bottom area of 102,700 sf. This is larger than the minimum required area indicated above. Utilizing a Dm of 4.2ft, the water quality volume of the basin is 102,700sf x 4.2ft= 431,340 cf which is greater than the Vbmp of 389,680 required.

Design Procedure for BMP Design Volume 85th percentile runoff event		
Preliminary WQMP	**Data:Tributary Area 2**	
Designer: Barb Sherman, P.E.	Slope =	1.10
Company: AEI-CASC Consulting	$A_{impervious}$ =	14
Date: 9/20/2010	A_{total} =	23.33
Project: **Arantine Hills**		
Location: Corona, California		

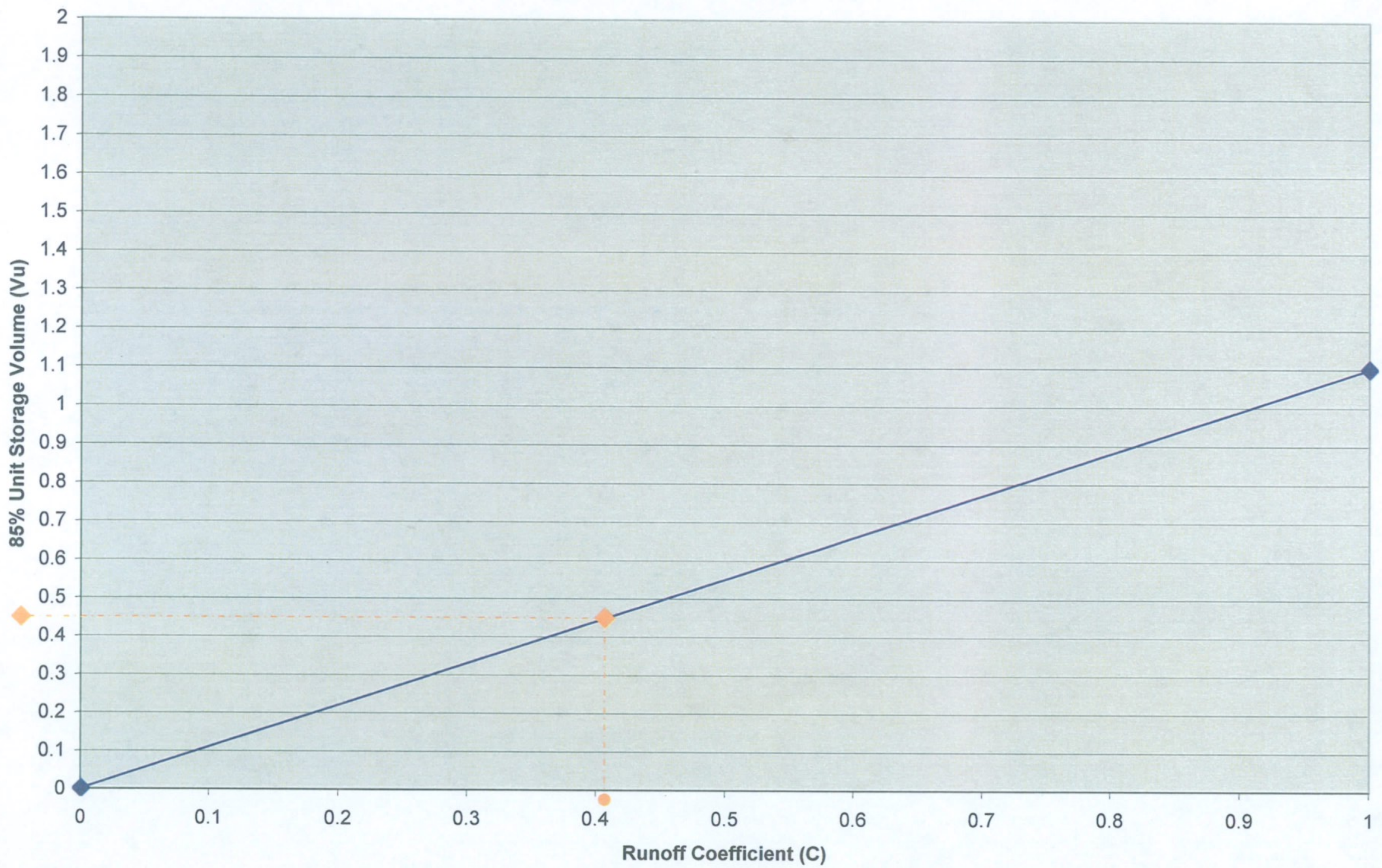
1. Create Unit Storarge Volume Graph			
a. Site location (Township, Range, and Section).	T4S, R6W SECTION 16, 17, and 20		**<1>**
b. Slope value from the Design Volume Curve in **Appendix A**.	Slope =	1.10	**<2>**
c. Plot this value on the Unit Storage Volume Graph shown on **Figure 2**.			
d. Draw a straight line from this point to the graph.	Is this graph attached?	Yes X	No__

2. Determine Runoff Coefficient			
a. Determine total impervious area	$A_{impervious}$ =	14	acres **<5>**
b. Determine total tributary area	A_{total} =	23.33	acres **<6>**
c. Determine Impervious fraction i =**<5>** / **<6>**	i =	0.60	**<7>**
d. Use **<7>** in **Figure 1** to find Runoff OR $C=0.858i^3 -0.78i^2 +0.774i + .04$	C =	0.41	**<8>**

3. Determine 85% Unit Storage Volume			
a. Use **<8>** in **Figure 2** Draw a Vertical line from **<8>** to the graph, then a Horizontal line to the desired V_u value.	V_u =	0.45	in-acre / acre **<9>**

4. Determine Design Storage Volume			
a. V_{BMP} =**<9>** x **<6>** [in-acres]	V_{BMP} =	10.50	in-acre **<10>**
b. V_{BMP} =**<10>** / 12 [ft-acres]	V_{BMP} =	0.875	ft-acre **<11>**
c. V_{BMP} =**<11>** x 43560 [ft^3]	**V_{BMP} =**	**38100**	**ft^3 <12>**

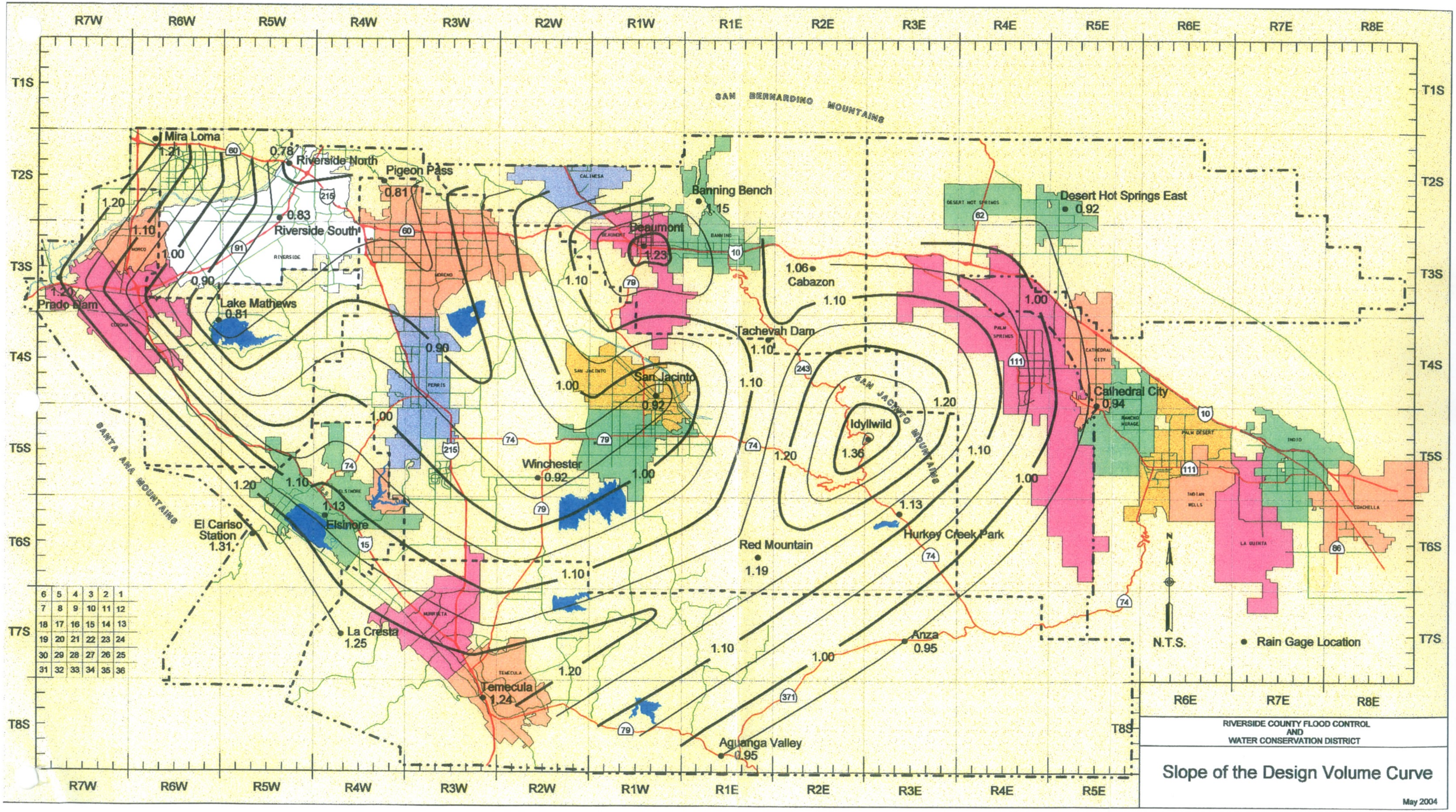
Figure 2 Unit Storage Volume Graph
Tributary Area 2



Design Procedure Form for Infiltration Basin	
Preliminary WQMP	**Data:Tributary Area 2**
Designer: Barb Sherman, P.E.	A_{total} = 23.33
Company: AEI-CASC Consulting	V_{BMP} = 38100
Date: 9/20/2010	I = 0.63
Project: **Arantine Hills**	t = 48
Location: Corona, California	s = 6

1. Determine Design Storage Volume			
(Use Worksheet 1)			
a. Total Tributary Area (maximum 10)	A_{total} =	23.33	acres
b. Design Storage Volume, V_{BMP}	V_{BMP} =	38100	ft^3
2. Maximum Allowable Depth (D_m)			
a. Site Infiltration rate (I)	I =	1.3	in/hr
b. Minimum drawdown time (48 hrs) (t)	t =	48	hrs
c. Safety factor (s)	s =	6	
d. $D_m = [(t) X (I)] / 12s$	D_m =	0.87	ft
3. Trench Bottom Surface Area			
$A_m = V_{BMP} / D_m$	**A_m =**	**43961.5**	**ft^2**

Notes: Basin "B" as currently shown on the Site Plan has an approximate bottom area of 45,000 sf. This is larger than the minimum required area indicated above. Utilizing a Dm of 0.87ft, the water quality volume of the basin is 45,000sf x .87ft= 39,150cf which is greater than the Vbmp of 38,100 required.



R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
SAN BERNARDINO MOUNTAINS
SANTA ANA MOUNTAINS
SAN JACINTO MOUNTAINS
Mira Loma
1.21
0.78
Riverside North
Pigeon Pass
0.81
1.20
0.83
Riverside South
1.10
1.00
0.90
Lake Mathews
0.81
1.20
Prado Dam
Banning Bench
1.15
Beaumont
1.23
1.06
Cabazon
1.10
Desert Hot Springs East
0.92
1.00
Tachevah Dam
1.10
San Jacinto
0.92
1.00
1.10
1.20
Idyllwild
1.36
1.20
1.10
Cathedral City
0.94
1.00
Winchester
0.92
1.00
1.00
1.20
1.10
1.13
Elsinore
El Cariso Station
1.31
1.13
Hurkey Creek Park
Red Mountain
1.19
1.10
La Cresta
1.25
1.10
1.00
Anza
0.95
Temecula
1.24
1.20
Aguanga Valley
0.95
N
N.T.S.
Rain Gage Location
6 5 4 3 2 1
7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Slope of the Design Volume Curve
May 2004

Appendix G

Agreements – To Be Provided In Final WQMP

Appendix H

Phase I Environmental Site Assessment

(Summary Sheet Provided)

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

PHASE I ENVIRONMENTAL SITE ASSESSMENT UPDATE ARANTINE HILLS CORONA, CALIFORNIA

PROJECT NO. 31558.21
SEPTEMBER 16, 2009

Prepared For:

Bluestone Communities
1300 N. Bristol Street, Suite 214
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Attention: Mr. Bentley Kerr

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1.0 SUMMARY

A Phase I Environmental Site Assessment Update was conducted by this firm for the Arantine Hills. The 274± acre site of former citrus grove is generally located southwest of Interstate 15 freeway, and south of Eagle Glen Parkway, in the City of Corona, Riverside County, California. The present and past site usage has been citrus groves and/or vacant land.

The subject site has undergone significant changes since our previous visit in 2002, when the site was predominately covered with citrus groves. The site has now been cleared of citrus trees. Structures presently on the site include, water wells, power lines, a workshop, and mobile home. The workshop was left to store and maintain two tractors used for cutting of weeds for periodic weed control.

There are no sites listed with the regulatory agencies within a one-mile radius which appear to pose an adverse environmental impact to the subject site.

This Phase I Environmental Site Assessment Update has revealed no evidence of RECs indicative of releases or threatened releases of hazardous substances on, at, in, or to the subject site, and no further environmental assessment is necessary. The former diesel aboveground storage tank, other hazardous materials containers, and remnant hazardous materials, from the former citrus grove operations should be removed from the site and properly disposed of or recycled. The recommendation provided in the Phase I ESA report, with respect to the testing of export dirt from the site for OCPs, is still valid and applicable.

2.0 INTRODUCTION

During August of 2009, a Phase I Environmental Site Assessment (ESA) Update was conducted by this firm for the Arantine Hills project, a 274± acre former citrus grove, generally located southwest of Interstate 15 freeway, and south of Eagle Glen Parkway, in the City of Corona, Riverside County, California. This update was based upon the following environmental report prepared for the subject site:

> *Phase I Environmental Site Assessment and Limited Site Characterization, McMillan Farm Properties, dated March 21, 2002, Project No. 31558.2*