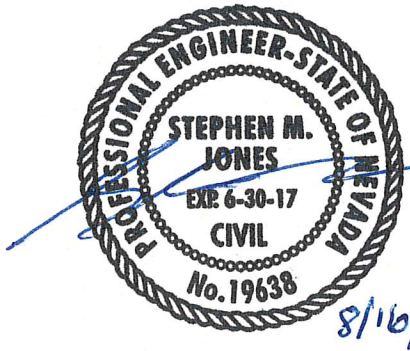
TECHNICAL DRAINAGE STUDY
UPDATE #1
(Sheep Mountain Parkway Design Considerations)

Skye Canyon
Detention Basin 1
City of Las Vegas, Nevada

Job No.: OLY1401.004
Date: August 2016

Prepared By:
Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 ▪ Fax: 702-284-5399

Prepared For:
Ninety-Five Management, LLC
11411 Southern Highlands Parkway, Suite 300
Las Vegas, NV 89141
Phone: 702-220-6565 ▪ Fax: 702-220-6566



8/16/2016

Steve Jones, P.E.
NV Professional Engineer No. 19638

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Skye Canyon Detention Basin 1 (Update #1) Date: August 2016

Location of Development:
a) Descriptive (Cross Streets): North/South: Puli Road
East/West: Grand Teton Drive
b) Section: 12 Township: 19 South Range: 59 East
7 19 South 60 East
c) APN: 126-12-000-001, 126-11-000-001, 125-07-602-005, 125-07-602-001

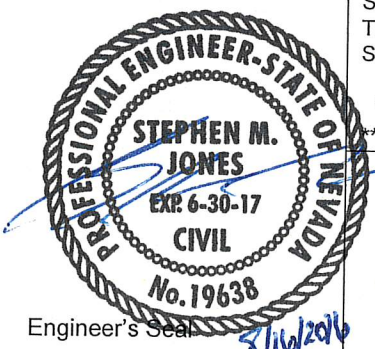
Name of Owner/Developer: Section 12, LLC & East of 95, LLC / Ninety-Five Management, LLC
Telephone No.: 702-220-6565 Fax No.: 702-220-6566 E-mail Address: mbolduc@olympiacompanies.com
Address: 11411 Southern Highlands Parkway, Suite 300; Las Vegas, NV 89141

Contact Person – Name: Steve Jones, P.E. Telephone No.: 702-284-5300
*E-mail Address: sjones@shg-inc.com Fax No.: 702-284-5399
Firm: Slater Hanifan Group
Address: 5740 S. Arville Street, Suite 216; Las Vegas, NV 89118

Type of Land Development/Land Disturbance Process:

☐	Rezoning	☐	Subdivison Map	☐	Clearing and grading Only
☐	Parcel Map	☐	Planned Unit Development	☒	Other (Please specify below)
☐	Large Parcel Map	☐	Building Permit	☐	Roadway & Storm Drain Infrastructure

1. Total Owned Land Area: At Site: 668.9 Acres Being Developed/Disturbed: 35 Acres +/-
2. Is a portion or all of the subject property located in a FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No
4. Proposed type of development (Residential, Commercial, Etc.): Detention Basin
5. Approximate upstream land area which drains to the subject site: 0.9 sq. miles
6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation:
Master Drainage Study Updates #1, 2 and 3 for Skye Canyon (SHG, DS4420)
Technical Drainage Study for Skye Canyon Detention Basin 1 (SHG, DS4698)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing Arroyo
8. Briefly describe your proposed schedule for the subject project: 1st of 2 planned detention basins at west boundary, per DS4420



Engineer's Seal 5/16/2016

Submit this form as part of the required drainage study to the local entity which has jurisdiction over The subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*Newly Required Field
**Review and concurrence of the Clark County Regional Flood Control District is required

Revision	Date

Local Entity File No.

REFERENCE: ***SHG Job No. OLY1401.004***

STANDARD FORM 1

Updated 05/01/2008

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

OLY1401.004

August 16, 2016

Peter Jackson, CFM – Senior Engineering Associate
City of Las Vegas – Department of Public Works
Flood Control Section
333 N. Rancho Drive – 7th Floor
Las Vegas, Nevada 89106

Subject: Update #1 to Technical Drainage Study for Skye Canyon Detention Basin 1 – DS #4698
(Sheep Mountain Parkway Design Considerations)

Dear Mr. Jackson:

This letter is submitted to serve as an update to the Technical Drainage Study for *Skye Canyon Detention Basin 1* to address the modified and additional grading in the future Sheep Mountain Parkway alignment that traverses in close to proximity to the previously approved design. In an effort to construct the ultimate condition embankment, emergency spillway and outlet pipe, the detention basin's design has been adjusted to include the fill portions of Sheep Mountain Parkway in the grading activity that will not change in the future. Additionally, the southern half of the collector channel is also being re-aligned to better plan for the future Sheep Mountain Parkway improvements (by others) near Grand Teton Drive and the developer's obligation to the City to construct a temporary roadway in the parkway alignment. Meeting notes detailing the concept of the updated design discussed between SHG, developer and City of Las Vegas (CLV) Public Works has been included in Appendix B.

Note that a grading permit has been obtained by the developer under the context of the previously approved design to begin excavation operations for the detention basin. Excavation is being performed to the toe of slope at the bottom of the basin that does not change between what had been previously approved and this updated design. However, because it is an early grading operation under the context that it is required for the completion of the overall detention basin, this project still shows that the entirety of the earthwork is being performed under the overall project's improvement plans. Meeting notes detailing the concept of the current grading permit discussed between SHG, developer and CLV Building Department has been included in Appendix B.

Summary of Sheep Mountain Parkway Grading:

Generally between the detention basin's emergency PMF spillway and the bounds of the southern embankment utilized for impoundment, the Sheep Mountain grading has been proposed in its ultimate manner following the *Proof of Concept Plans for Sheep Mountain Parkway* by Horrocks Engineers included in Appendix I. This ultimate condition grading includes the full width future roadway, trail, roadside swales and any other appurtenance grading within the right-of-way. South of the point where the on-ramp touches the future parkway, the grading within the Sheep Mountain reservation area slopes and connects into the grading required for the detention basin's collector channel to function. Future design of the

Grand Teton interchange by others will be required to consider the functionality of the collector channel, as discussed in the meeting with CLV Public Works.

In the alignment of the on-ramp, this project proposes grading for a future 32-ft roadway that is considered the developer's obligation for temporary traffic access through the Sheep Mountain reservation area. The ultimate elevations for the on-ramp has been considered for this area with the required grading for the roadway to reach existing ground at Grand Teton Drive, because it will be constructed prior to the interchange planned at Grand Teton. As a result of considering the grading for the future roadway, the alignment of the collector channel has been shifted further west within the existing Sheep Mountain BLM right-of-way grant as it approaches Grand Teton. Upon realignment of the collector channel, revised grading of the NV Energy access road has been performed west of the basin from Grand Teton.

The Sheep Mountain Parkway trail meanders and merges with the proposed collector channel's top bank access road in order to connect into Grand Teton to the south. The proposed trail at the top bank of the collector channel and its extension in its ultimate alignment within Sheep Mountain Parkway is intended to function for maintenance access for this project.

The grading proposed within Sheep Mountain Parkway by this project terminates just north of the emergency spillway and outlet pipe. The elevations of the parkway are similar to existing ground; therefore, no alterations occur to existing condition drainage patterns downstream.

Summary of Detention Basin Footprint Changes:

The toe of slope at the bottom of the detention basin remains the same as previously approved, along with the alignment and design of the collector channel confluence into the basin. The top of the basin's eastern slope from the PMF spillway south to the collector channel has been modified.

The fill required for Sheep Mountain allows for a reasonable elevation difference and moderate slope from the emergency spillway crest to the parkway grading. As a result, the emergency spillway no longer requires a roller compacted concrete (RCC) stepped structure to drop the PMF flow into the existing deep natural wash in this location. Further detail regarding the hydraulic criteria of the modified emergency spillway will follow in a later section of this report.

The proposed Sheep Mountain Parkway grading reduces the future developable space between the basin and the highway; therefore, the dam embankment south of the spillway has been adjusted from a soil cement lined 3:1 (H:V) slope to an earthen 4:1 (H:V) slope that meets City's minimum earthen slope standards. As a result, the volume of the detention basin changes and a new stage-storage relationship has been obtained that modifies the 100-year water surface elevation in the basin. Further detail regarding the modified stage-storage performance parameter for the basin will follow in a later section of this report.

Summary of Updated Hydrologic Models:

As detailed above, the volume has slightly changed in the detention basin due to the new 4:1 slope on the impounding embankment. The stage-storage output table from AutoCad Civil-3D has been included in Appendix C, and the HEC-1 Modified Puls routing elevation-area relationship has been updated accordingly in the proposed, ultimate and PMF condition HEC-1 models.

Additionally, after the previous approval, new soils data published by the NRCS became available. Therefore, the updated HEC-1 models utilize curve numbers that correspond to the new soils data. A custom soils report for this project's contributing watershed, published by the NRCS soils web-service, has been included in Appendix C.

As defined in the previous approved design, the ultimate condition watershed dictates the performance parameters for the detention basin. The following table summarizes the previous versus current parameters for the basin.

Summary of Detention Basin Performance Parameters			
Previous Approved Design		**Current Updated Design**	
Parameter	**Value**	**Parameter**	**Value**
100-Yr Inflow	794 cfs	100-Yr Inflow	818 cfs
100-Yr Outflow	71 cfs	100-Yr Outflow	71 cfs
Outlet Orifice	24-inch	Outlet Orifice	24-inch
Total Storage Volume	62.9 ac-ft	Total Storage Volume	65.9 ac-ft
100-Yr Volume	57 ac-ft	100-Yr Volume	60 ac-ft
Debris Volume	5.9 ac-ft	Debris Volume	5.9 ac-ft
100-Yr Water Surface	3034.9-ft	100-Yr Water Surface	3035.14-ft
PMF Inflow	6,744 cfs	PMF Inflow	6,786 cfs
PMF Outflow	5,989 cfs	PMF Outflow	6,025 cfs
PMF Spillway Crest Elevation	3037.0-ft	PMF Spillway Crest Elevation	3037.0-ft
PMF Spillway Length	87-ft	PMF Spillway Length	87-ft
PMF Water Surface Elevation	3044.93-ft	PMF Water Surface Elevation	3044.96-ft
Top of Detention Basin Elevation	3046.0-ft	Top of Detention Basin Elevation	3046.0-ft

The updated performance parameters are summarized and graphed on Sheet C-3 of the improvement plans, showing all minimum CCRFCD criteria are satisfied for regional detention basins.

Summary of Collector Channel Hydraulics:

As a result of the revised alignment, the WSPG hydraulic model for the collector channel has been updated accordingly. Hydraulic freeboard, per CCRFCD Manual criteria, and sedimentation freeboard remain provided in the channel with maintenance access provided at the flowline of the channel at the top of eastern bank of the channel. The ultimate condition drainage map, Exhibit F, has been updated with a new collector channel hydraulic summary to show all CCRFCD criteria are satisfied.

Note that the updated hydraulic model shows that the flow characteristics entering the stilling basin at the bottom of the detention basin remain the same as previously approved; therefore, the previous design of the stilling basin remains applicable.

Summary of Outlet Pipe Hydraulics:

Although the footprint at the top of the basin has changed, as described in this letter, the shape and functionality of the bottom of the detention basin remains as previously approved. Hence, the outlet structure and how the basin drains into the outlet pipe has not changed, the outlet

pipe remains a 60-inch RCP storm drain with a 24-inch diameter orifice plate necessary to control the outflow.

The scope of this project now performs grading in the natural wash that the previous design had as the outfall location of the basin's outlet pipe. The outlet pipe has been extended across the fill and now daylights into the same natural wash downstream of the fill activity for Sheep Mountain Parkway. A WSPG hydraulic model has been prepared from outlet of basin to the the outfall into the natural wash. A normal depth Flowmaster cross section in the existing wash downstream of the outfall has been prepared for the starting water surface elevation in the WSPG model. The water surface elevation at the system headworks shows the previous Flowmaster orifice calculation for the outlet pipe included in Appendix C that establishes the stage-discharge relationship in the HEC-1 model remains valid for this update.

The proposed trail for Sheep Mountain Parkway has been extended as Type II maintenance access to the pipe outfall with a turnaround at the headwall.

Additionally, the outlet pipe also provides stubs to be utilized for drainage within the Sheep Mountain Parkway graded area. A separate hydrologic and hydraulic analysis of the flows in this area has been included in Appendix G. A total of three (3) storm drain laterals have been provided in the following manner:

- A 36-inch RCP lateral at SDMH #3 allows for collection of the entirety of flows generated by Subbasins 'SM1' and 'SM2' by NDOT Type 2B drop inlets. Note that the ditches conveying the flow to the inlets dedicated to each Subbasin have capacity to contain the flow. The approach velocity in the SM1 ditch approaches 5 ft/s; however, the SM1 ditch is concrete lined as it merges with the PMF spillway to protect against erosion. The approach velocity in the SM2 ditch approaches 5 ft/s; however, it is considered temporary and only slightly above the erosion threshold until the 30-inch RCP stub provided in the parkway is utilized as described, or the ditch is landscaped typical of a parkway is utilized as described below.
- A 30-inch RCP lateral at SDMH #4 has been provided for future median drainage, as shown in the Sheep Mountain Parkway concept plans. It is proposed as capped until such a time that the Parkway roadway is constructed; therefore, reducing the amount of flow to the SM2 ditch.
- A 24-inch RCP lateral at SDMH #5 allows for collection of the entirety of flow generated by Subbasin 'SM3' by an NDOT Type 2B drop inlet. A 1-ft berm is provided to contain the flow from perpetuating north and allow for construction of an access manhole to the trunk 60-inch RCP outlet pipe at the approximate elevation of the Parkway without being in the flowline. The ditch conveys flow velocities less than 5 ft/s; therefore, erosion is not considered a concern.

Summary of Emergency Spillway Hydraulics:

The crest elevation for the emergency spillway remains 87-ft long at an elevation of 3037.0-ft for use by the PMF event, the same parameters as previously approved. Instead of an RCC stepped structure containing the PMF flow, a concrete lined slope at 3:1 (H:V) is proposed to contain the PMF flow as it exits the basin. The conveyance area for the PMF remains a consistent 87-ft in bottom width with concrete lining up to the depth of the flow. Downstream of the PMF crest, the concrete ends with a cut-off wall to protect the integrity of the embankment utilized for impoundment, and as the PMF overflow path approaches Sheep Mountain Parkway, the overflow begins to be directed north through the daylight grading for the parkway.

Inspection of the energy gradient of the incoming flow shows it is contained by the Parkway to turn the PMF north, with no adverse tailwater conditions occurring to the basin when the spillway is in use.

It is anticipated in the future upon completion of the parkway, the PMF will spill into the roadway itself. Future design considerations may be required to minimize adverse impacts to traffic, property and roadway improvements.

Drainage Easement Adjustments:

The eastern boundary of the public drainage easement for the detention basin has been modified in this update to encompass the following:

- Emergency PMF spillway from the detention basin crest to the location where proposed grading meets existing ground.
- The outlet pipe and its laterals in its entirety from detention basin to downstream outfall into the natural wash east of Sheep Mountain Parkway. The bounds of the proposed drainage easement meet minimum criteria for maintenance access of an underground facility.
- Similar to the previous easement, the boundary of the proposed drainage easement meets the existing BLM right-of-way grant N-7772. No easement is to be dedicated within the area reserved by the existing BLM right-of-way.
- The area for the maintenance staging of the detention basin has been re-located onto an appropriate area considering the new grading and is within the boundary of the new proposed drainage easement. The size remains approximately 1 acre in size which was the previous approved area size.

Conclusions:

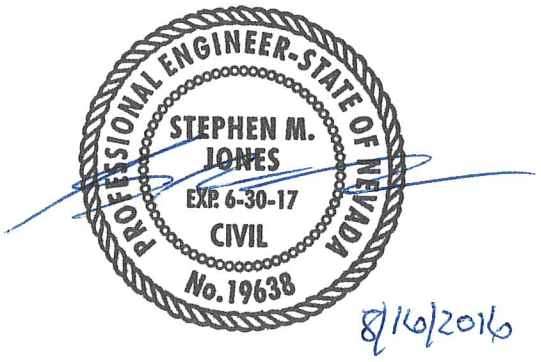
The detention basin design has been revised for inclusion of grading for the Sheep Mountain Parkway area to satisfy master developer obligations for the Skye Canyon community. The updated design allows for an ultimate condition impoundment, emergency spillway configuration and outlet pipe improvements in the vicinity of Sheep Mountain. After coordination with CLV Public Works, the updated design is considered acceptable. It is acknowledged that new approvals from CLV, CCRFCD and Nevada Dam Safety are required to construct the improvements presented in this update and on improvement plans included. If you have any questions or require additional information, please do not hesitate to contact us at 284-5300.

Respectfully Submitted,

SLATER HANIFAN GROUP

Steve Jones, P.E.
Project Manager - Flood Control Division

pc: Mark Failla, P.E., CFM – SHG
Jerry Slater, P.E. – SHG



APPENDIX

Appendix A – Previous Approval Letters

Appendix B – City of Las Vegas Correspondence Summary Notes

Appendix C – Hydrologic Data and Models
- New Soils Report
- Curve Numbers
- Standard Form 4 Lag Time Computations
- Stage-Storage Table from Civil-3D
- Outlet Pipe & Spillway Stage-Discharge Tables
- Proposed Condition HEC-1 Output
- Ultimate Condition HEC-1 Output
- PMF Condition HEC-1 Output

Appendix D – Collector Channel WSPG Hydraulic Analysis

Appendix E – Outlet Pipe WSPG Hydraulic Analysis

Appendix F – Emergency Spillway Normal Depth Computations

Appendix G – Sheep Mountain H&H Calculations
- Hydrology Data and HEC-1 Output
- Ditch Hydraulic Calculations
- Drop Inlet Calculations
- Storm Drain WSPG Hydraulic Analyses (Laterals to Trunk Outlet Pipe)

Appendix H – Updated Drainage Exhibits

Appendix I – Sheep Mountain Parkway Plans, by Horrocks Engineers

APPENDIX A

Previous Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: June 1, 2016
TO: Land Development Services Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: Skye Canyon – Detention Basin 1			COPIES TO: Slater Hanifan Group
Cross Streets:	NEC of Grand Teton Boulevard & Puli Road			Section 12 LLC/Ninety-Five Manag.
File Number:	F:\Depot\DSMemos\DS4698F.doc			Bart Anderson, P.E., DevCo
Parcel Number:	126-12-000-001			CCRFCD
Zoning Action:	Development Agreement			CCPW
FEMA Flood Zone	YES	NO X		NV Energy
Proposed Storm Drain	YES X	NO		Eddy Quaglieri, P.E., State of Nevada, Division of Water Resources - Dam Safety

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	9/16/2014	10/23/2014	Not Approved	$400.00	370355: $400
2nd Submittal	12/24/2014	2/12/2015	Not Approved	$400.00	380976: $400
3rd Submittal	5/7/2015 & 6/01/2015	6/24/2015	Not Approved	$400.00	396675: $400
4th Submittal	10/28/201, 12/17/2015 & 1/11/2016	1/13/2016	Conditional Approval	$400.00	420475: $400
CCPW & CCRFCD	2/17/2016 & 3/1/2016	3/15/2016	Concurrence Recv'd	N/C	N/C
State of Nevada – DWR and NV Energy	5/16/2016 & 6/1/2016	6/1/2016	Approval	N/C	N/C
			TOTAL FEES (LDDRS):	**$1,600.00**	----

REMARKS: Division of Water Resources and NV Energy approval has been provided.

REVISED - 4th Submittal is to address CCRFCD Comments, the added Brent Lane storm drain and updated information from State Dam Safety. Includes CCRFCD conditions of approval on Master Study – Update #2 dated January 6, 2016.

A Flood Control Master Plan Amendment (MPA) has been approved that covers the Skye Canyon Development. Flood Control understands that the Skye Canyon Master Plan is undergoing significant changes that will impact the adopted Master Plan Amendment. Any further changes to the identified Master Plan facilities shall require further review and the submittal of a new MPA for approval by the City of Las Vegas prior to submitting development plans outside of the shadow of protection from Detention Basin #1 and outside of the limits of the Phase 2 pods.

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence. Provide updated concurrence.
	is conditionally approved subject to State of Nevada, Division of Water Resources, Dam Safety concurrence.
	is conditionally approved subject to US Army Corps of Engineers, 404 Permit concurrence.

1. The ***Skye Canyon Master Drainage Study*** must be fully approved and shall include the location of the Ultimate Facility conveyance to the downstream MPU facilities prior to the substantial completion of the *Skye Canyon Detention Basin 1.*

2. No further Building Permits will be issued for the downstream residential developments within ***Skye Canyon*** beyond ***Phase 1, Parcels 1.1*** *through* ***1.4***. The Building Permits will be released upon substantial completion of the *Skye Canyon Detention Basin 1* drainage facility improvements.

3. Flood Control has received the *State of Nevada, Division of Water Resources Dam Safety (DWR)* concurrence. The plans are in approvable form for permitting based upon the DWR approval. Project shall comply with all DWR requirements.

4. The connectivity of the outfall from Skye Canyon DB1 to a downstream Regional facility shall be addressed for the Ultimate Condition based upon the Overall Skye Canyon Master Plan. The City understands the concept of the proposed interim solution with the included storm drain plans for Brent Lane that collect and route the long term discharge from DB1 into the existing storm drain at Brent & Skye Canyon; however the overall Master Plan facility connectivity needs to be finalized with the overall ***Skye Canyon Master Drainage Study*** and approved by the City of Las Vegas and CCRFCD prior to the substantial completion of the DB1 improvements.

5. The Clark County Regional Flood Control District's concurrence of the Update #2 for Skye Canyon Master Drainage Study included conditions that shall require modifications to the interim outfall facility. The facility is required to be extended west to US 95 and incorporate a sediment basin. The proposed storm drain extension at Brent Lane west to US 95 to convey the 70 cfs discharge from DB1 is an acceptable concept. The Brent Lane storm drain extension has been included as a part of the Skye Canyon Detention Basin #1 Improvement Plan package and an updated estimate has been provided to include this storm drain and sediment basin as a part of the improvement bond.

6. The included Dam Failure Hazard Evaluation shall be expanded as a part of the required Emergency Action Plan (EAP) submittal. The flows used in Section 3 were shown as 2,989 versus the flow rate of 5,989. Review and revise accordingly. Flood Control recommends a review meeting to go over the EAP requirements and format prior to moving forward with the EAP process.

7. The subject ***Skye Canyon Detention Basin #1*** is a facility proposed in the approved MPA that covers the Skye Canyon Development. Future changes to the identified Master Plan facilities shall require further review and/or the submittal of an MPA based upon CCRFCD requirements.

8. *NV Energy*'s concurrence and approval of the proposed drainage facilities for *Detention Basin 1* within their existing 48-foot easements has been provided.

9. A copy of the approved 404 Permit from the Army Corps of Engineers has been provided.

10. This proposed Detention Basin identifies a 10-foot buffer adjacent to the Red Rock Canyon National Conservation Area (RRCA), a critical area of no disturbance. No grading impacts are allowed to the RRCA and an appropriate buffer with block and cable fencing has been provided.

11. The current design has identified the limits of the Proposed Drainage Easement and Future Detention Basin Dedication as Flood Control Right-of-Way. A copy of the Recorded Drainage Easement necessary for the Detention Basin has been provided. The Detention Basin shall be dedicated to the City of Las Vegas as Drainage Right-of-Way prior to acceptance of the facility for City Maintenance.

12. The intent of the Master Developer is to construct the Detention Basins with associated collection facilities as CCRFCD Master Plan facilities and to then dedicate them to the City of Las Vegas. The Detention Basins shall be dedicated to the City as *Flood Control Right-of-Way*. The proposed dedication should exclude the City's existing BLM Grant N-77772 area. The total area of the

dedication shall be of sufficient size to meet the public operational needs and address expansion of the facility. The dedication needs to include the entire impact area of the dam construction as well as incorporate access and maintenance activities. The maintenance activities include staging for equipment and a temporary storage area for sediment removal.

13. The City understands that the limits of the Detention Basin Easement/Dedication may be reduced by a future Vacation request based upon future development grading impacts. The actual limits of any future vacation request shall be set based upon the City's approval of a Technical Drainage Study that addresses the impacts to the Detention Basin.

14. The westerly 76-feet of the site is encumbered with existing Nevada Power Grants and fiber optic Grants (N-57071, N-78122, and N-75351). This project proposes a 10-foot buffer from the Red Rock Canyon National Conservation Area boundary and provides for a new access road within the existing Power and fiber optic Grants.

15. The westerly access is being provided to service the existing Grants and is not the Flood Control access road. This area is however proposed to be included within the future dedication of the regional basin and therefore the responsibility for this maintenance by *NV Energy* and the owner of the fiber optic shall be provided.

16. The Detention Basin design includes the soil cement lining of the proposed 3:1 slopes in lieu of the City requested 4:1 slopes.

17. This project is considered as a *Capital Improvement Project* (CIP) with developer funding. Structural plans for the proposed storm drain improvements and pertinent flood control facilities have been submitted for Building Department review. Flood Control has received Structural review and approval from the Building Department.

18. All proposed improvements associated with *Detention Basin 1* shall be bonded and inspected. This project shall require Special Inspection. Coordinate the requirements of and the Agreements needed for Special Inspection with the Building Department.

19. The project proposes to build a temporary drainage facility. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements and post a minimum maintenance bond of $100,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facility and an 8.5-inch by 11-inch exhibit that adequately shows the location and limit of the drainage facility to Flood Control for approval. Once the drainage study is conditionally approved, the engineer should contact the *City's Land Development Section* (229-6371) to begin the agreement process.

20. Prior to the adoption and acceptance of the detention basin as a regional facility by the *City of Las Vegas, Department of Public Works*, the proposed *Detention Basin 1* shall remain a private facility owned and maintained by the master developer.

21. Provide the legal description with an exhibit of the proposed detention basin to *City Right-of-Way Section* for the dedication as Flood Control Right-of-Way to the *City of Las Vegas* after final acceptance of the basin by the *City of Las Vegas, Department of Public Works.*

22. *Streets & Sanitation Department's* approval of the DB1 improvements has been provided.

23. The detention basin will require the submittal and approval of an *Emergency Action Plan* (EAP) for this regional facility. The EAP format shall meet the City of Las Vegas submittal requirements for inclusion with our overall EAP. Contact Flood Control for sample format requirements. The EAP must be approved by the *City of Las Vegas* and then submitted and approved by the *State of Nevada, Division of Water Resources - Dam Safety* prior to the release of any improvement bonds for the

related detention basin improvements. The bonded improvements shall include a line item for the EAP in the amount of $50,000.

24. The approved plans shall include the complete Specifications approved by DWR and the Building Department.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section.* Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
AYS/PBJ

T/R/S: T19S/R59E/12
AREA F-12

REGIONAL FLOOD CONTROL DISTRICT

February 26, 2016

Mr. Oh Sang Kwon, P.E.
City of Las Vegas
333 North Rancho Drive
Las Vegas, NV 89106

DISTRICT CONCURRENCE: **SKYE CANYON - DETENTION BASIN 1 (DS4698D) (RFCD No. 15-9550)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated September 10, 2014, Addendum No. 1 dated December 24, 2014, Addendum No. 2 dated May 7, 2015, Addendum No. 3 dated October 28, 2015, Supplement No. 1 dated August 3, 2015, Supplement No. 2 dated December 17, 2015 and Supplement No. 3 dated February 4, 2016 for above-mentioned project as submitted by SLATER HANIFAN GROUP. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas dated February 8, 2016.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas with the following condition(s):

> Per District's Uniform Regulations for the Control of Drainage, Section VIII.D.13, the Lead Entity shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by SLATER HANIFAN GROUP may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

STEVEN C. PARRISH, P.E.
General Manager/Chief Engineer

BY: _____
Abigail Mayrena, P.E., CFM
Principal Civil Engineer

AM:fv

c: Steve Jones, P.E. Slater Hanifan Group

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2015\L-15-9550asbuilt.doc

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 685-0000 • FAX: (702) 685-0001
Website: *http://www.regionalflood.org*

BRIAN SANDOVAL
Governor

STATE OF NEVADA

LEO DROZDOFF
Director

JASON KING, P.E.
State Engineer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
901 South Stewart Street, Suite 2002
Carson City, Nevada 89701-5250
(775) 684-2800 • Fax (775) 684-2811
http://water.nv.gov

May 9, 2016

Section 12, LLC
c/o Olympia Companies, LLC
11411 Southern Highlands Pkwy., Suite 300
Las Vegas, NV 89141

Re: Skye Canyon Detention Basin #1 Dam, J-716, NV10895

Dear Ladies and Gentlemen:

Please find enclosed approved application J-716 for the construction of Skye Canyon Detention Basin #1 Dam with supporting documents bearing the endorsement of the State Engineer. Please review attachment "A" of the authorization for due dates and "as-built" submittal items with particular attention to items (3) through (8). Please also note noticing requirements for the construction of the outlet and related structures outlined in item (13) as well.

You are responsible for period inspection of the embankment and impoundment during and after construction. Any proposed alterations to the plans and specifications as approved must be submitted to the State Engineer for review prior to initiating said change. Please report any slumps, sloughs, seeps or unusual observations to the State Engineer immediately.

Should you have any questions, please call the undersigned at (775) 684-2844.

Sincerely,

Eddy Quaglieri, P.E.
Manager II

EQ/ac
Enclosure
Cc: Steve Jones, P.E.
Peter Jackson, P.E., City of Las Vegas
Abigail Mayrena, P.E., Clark Co. Regional Flood Control District

ATTACHMENT "A"

Permit terms for the construction of Skye Canyon Detention Basin #1 Dam.

1) If construction has not commenced within one (1) year of this approval, the permit will become void and a new application must be made prior to initiating construction.
2) A Nevada licensed civil engineer shall make periodic inspections during construction to ensure conformance to the approved plans and specifications.
3) Results of RCC test section must be conveyed to the State Engineer as soon as practical.
4) Should a design change be made, notice must be provided to the State Engineer sufficiently in advance of implementation and with adequate detail to allow review of the change.
5) Upon completion of construction but no later than May 9, 2017, the engineer shall submit to the State Engineer a Report of Completion of Work (Report). An Extension of Time is to be filed if Report is not filed by May 9, 2017.
6) The Report must include the statutory filing fee, signed verification from the engineer that the structure was completed in substantial conformance to the plans and specifications as approved, and a summary of the results of any gradation, earth compaction, concrete strength or other tests. Actions taken in response to any failed tests shall be described in the Report.
7) Report must be accompanied by a full-size "wet stamped" set of record drawings ("as-built"), and/or full sized "wet stamped" electronic as-built drawings, clearly delineating all deviations from the plans as approved.
8) An Emergency Action Plan for this dam must accompany the Report.
9) Upon satisfactory review of the Report, the State Engineer will issue an Approval to Impound. Water may not be impounded until an approval to impound has been issued.
10) Property improvements below or in the vicinity of the structure may alter its hazard classification. The owner is responsible for making any alterations that such a revision may necessitate.
11) This office, its officials or employees assume no liability for the information, data or conclusions presented by the consulting engineer. Therefore no warranty, either expressed or implied, has been made in conduct of this review.
12) This approval does not waive the necessity of obtaining other required permits from any applicable Federal, State or local agencies.

13) Please notify this office two weeks before construction begins on the primary outlet structure and 60" diameter outlet conduit.

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES

Filed _____

J- 716
NV 10895

APPLICANT MUST NOT FILL IN ABOVE BLANKS

APPLICATION FOR APPROVAL OF THE PLANS AND SPECIFICATIONS FOR THE CONSTRUCTION, RECONSTRUCTION OR ALTERATION OF A DAM

This Application Involves in No Way the Right to Appropriate Water
To secure the right to appropriate water, application should be made to the State Engineer on forms which will be furnished upon request.

I, Stephen M. Jones, P.E. (Name of applicant) of 5740 S. Arville Street, #216 (Address)
Las Vegas, NV 89118, hereby make application for the approval of

Plans and Specifications for the Construction (Construction, reconstruction, alteration) of Skye Canyon Detention Basin 1 (Name of dam) dam.

The owner of the proposed dam is Section 12, LLC c/o Olympia Companies, LLC (Name of owner)
of 11411 Southern Highlands Pkwy, Suite 300; Las Vegas (Address) State of Nevada 89141

If the owner is a corporation, give name and address of president and secretary:
Garry V. Goett, Manager; Amanda Graham, Office Manager
11411 Southern Highlands Parkway, Suite 300; Las Vegas, NV 89141

The applicant is acting for the owner in the legal capacity of Agent (Agent, Lessee, Trustee, etc.)

Location of Dam

1. The source of water to be stored is N/A which is a tributary of N/A,
and the proposed dam to be located within the SW ¼, SW ¼, Sec. 12
T. 19S, R. 59E E., M.D.B.&M. in Clark County, Nevada further described as
being at Latitude 36 deg, 18' N. Longitude 115 deg, 20' W. (at a point pursuant to NAC 535.210(6b).

Description and Dimensions of Dam

(If for an alteration, the data given below is for the altered dam)

2. Type of dam Earth (Concrete arch or gravity, earth, rockfill, etc.) 3. Length of crest 1,400 ft.
4. Height stream bed to spillway crest 12 ft. 5. Height foundation to spillway crest 14 ft.
6. Freeboard 11 (Spillway crest to top) ft. 7. Thickness at top 16 ft. 8. Thickness at bottom 235 ft.
9. Slope upstream* 4% 10. Slope downstream* 3% 11. Upstream facing Soil cement (Concrete or rock paving, etc.)
*This information to be supplied for earth or rockfill dams.
12. Amount of material in dam 16,780 cu. yds. 13. Estimated Cost $5,322,805.00
14. Spillway data RCC Stepped Spillway, Design PMF 5,989 cfs (Type, capacity, etc.)
15. Outlet data 60-inch RCP with 24-inch orifice plat, Design 100-yr Flow Rate 71 cfs (Type, capacity, etc.)

$1,200 filing fee must accompany this application

16. Elevation of crest of dam 3046 above NAVD-88 datum
Approximate elevation to be given if true elevation not available

17. Area of reservoir at spillway level 7.46 acres. 18. Capacity of reservoir 72.5 ac. ft.

General Information

19. State the **purpose** of the dam 100-year flood storage, debris storage, flood control
Diversion only; storage only; storage and diversion; debris storage, flood control, etc.

20. State the **use** that is to be made of water none
municipal, domestic, irrigation, power, mining and milling, recreation, stockwatering or none

21. Engineers
Slater Hanifan Group
5740 S. Arville Street, #216
Las Vegas, NV 89118

Name and address of Engineers preparing plans

22. If the proposed dam is to be built under Federal supervision, state what department has jurisdiction.
N/A

23. The maps, plans and specifications accompanying this application are a part thereof.

[Signed] _____

this 6 day of August, 20 15

APPROVAL OF APPLICATION NO. _____, INCLUDING PLANS AND SPECIFICATIONS

This Is to Certify That Application No. _____, including plans and specifications for the _____ dam has been examined and the same is hereby approved, subject to the following conditions:

RECEIVED
AUG 18 2015
STATE ENGINEER'S OFFICE

Witness my hand and seal this _____ day of _____, 20____

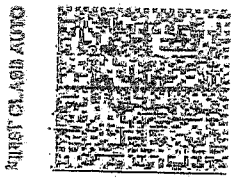
P.E.
State Engineer

FILE IN TRIPLICATE

Revised 07/13 - dam_plans

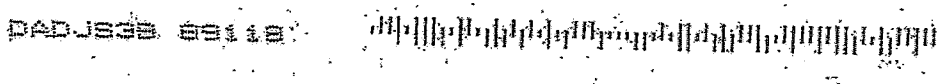
4171
STATE OF NEVADA
DIVISION OF WATER RESOURCES
901 S. Stewart Street, Suite 2002
Carson City, Nevada 89701

Return Service Requested



Steve Jones, P.E.
Slater Hanifan Group
5740 S. Arville Street #216
Las Vegas, NV 89118

MAY 12 2016



BRIAN SANDOVAL
Governor

STATE OF NEVADA

LEO DROZDOFF
Director

JASON KING, P.E.
State Engineer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
901 South Stewart Street, Suite 2002
Carson City, Nevada 89701-5250
(775) 684-2800 • Fax (775) 684-2811
http://water.nv.gov

July 20, 2016

Peter Jackson, CFM
City of Las Vegas | Dept. of Public Works
City Engineering Division, Flood Control Section
Development Service Center (DSC) 7th Floor
333 North Rancho Drive | Las Vegas, Nevada 89106

Steve Jones, P.E.
Slater Hanifan Group
5740 S. Arville Street, #216
Las Vegas, NV 89118

Re: Skye Canyon Detention Basin #1 Dam, J-716, NV10895

To whom it may concern:

On July 6th, 2016, this office spoke with the City of Las Vegas concerning the Sky Canyon Detention Basin #1 (dam) and the developer's recent request to be granted a rough grading permit from the City of Las Vegas. A month ago, this office was contacted by Steve Jones P.E., the design engineer with Slater Hanifan Group, concerning a new roadway to be located on the down-stream slope of the embankment. Mr. Jones and I spoke about this major design change that was not a part of the original State Engineer approved plans and specifications under J-716. Therefore, there is still a need to submit new plans and specifications and obtain a new dam permit from this office due to the roadway placement.

This office is in agreement that a rough grading/excavating permit at the site is reasonable; however, the construction of any part of the embankment or any of the facilities in and around the embankment is **not allowed** due to the upcoming re-submittal of the design plans and specifications.

Please submit a monthly progress report, including inspection information and photos, to this office once grading has begun. Please also submit advance notification before construction begins on any and all parts of the embankment, spillway and water conveyance structures so that appropriate dam safety construction inspections can occur. Should you have any questions, please call the undersigned at (775) 684-2844.

Sincerely,

Eddy Quaglieri, P.E.
Manager II

EQ/PLO/ac
Cc: Steve Jones, P.E.
Peter Jackson, P.E., City of Las Vegas
Jason King, P.E. (email)
Kelvin Hickenbottom (email)
Luke Opperman, P.E. (email)
Abigail Mayrena, P.E., Clark Co. Regional Flood Control District

Department of Public Works

500 S Grand Central Pky • Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

Denis Cederburg, P.E., Director • E-Mail: dlc@ClarkCountyNV.gov

Drainage Study Concurrence Letter

Date: February 17, 2016
Firm: SHG
Engineer: Steve Jones, P.E.
Address: 5740 S. Arivlle Street, Suite 216, Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5399
E-mail: sjones@shg-inc.com

Subject: Technical Drainage Study Update for Skye Canyon - Detention Basin 1
Location: NEC of Grand Teton Drive and Puli Road
APN: 126-12-000-001
Sec, Township, Range: S12, T19S, R59E
Flood Zone & Panel: Zone X, 1750F, November 16, 2011
Application Tracking #: 16-6205UP

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Concurrence	02/10/2016	02/17/2016	WG	original application 15-32969

The above-referenced project is located within the **City of Las Vegas** adjacent to Clark County unincorporated areas. The Drainage Study Update was submitted to the County for concurrence on February 10, 2016. In addition, the County has received the City of Las Vegas acceptance letter dated January 14, 2016 for the Technical Drainage Study (DS4698D).

The County concurs with the acceptance of this Drainage Study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.

Wade Gerstenkorn
Associate
Development Review
wade@ClarkCountyNV.gov

W. Layne Weber, P.E., CFM
Principal Engineer
Development Review
wlweber@ClarkCountyNV.gov

cc: Albert Sung, P.E., City of Las Vegas

APPENDIX B

City of Las Vegas Correspondence Summary Notes

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

MEETING NOTES

Project Number: OLY1401.004
Project Name: Skye Canyon Detention Basin 1 (DB1)
Meeting Date: 6/23/2016
Meeting Location: CLV Public Works 9th Floor – Gravel Pit Room
Meeting Topic: Sheep Mountain Parkway Grading Coordination with Approved DB1 Design

Attendees:	*Company Name:*
Oh Sang Kwon	CLV
Peter Jackson	CLV
David Bowers	CLV
Jeremy Leavitt	CLV
Mike Janssen	CLV
Bart Anderson	CLV
Greg McDermott	CLV
Jerry Slater	SHG
Steve Jones	SHG
Marc Bolduc	Olympia
Bobby Williamson	Olympia

Meeting Notes:

Item:	*Discussion:*
1	***Overview*** – SHG and Olympia discussed that the improvement plans for Detention Basin 1 (DB1) were approved and only needed Olympia to post the bond to gain the permit and begin construction on the project. It was discussed that the current approved design tied into existing ground along all edges of grading, because the project started 2+ years ago before any agreements with regard to Sheep Mountain Parkway were made in the Development Agreement. Considering the obligations of the developer with Sheep Mountain Parkway, SHG and Olympia discussed that the best design moving forward would be to consider Sheep Mountain grading impacts to DB1, and revise the DB1 plans accordingly.
2	***Engineering Impacts*** – SHG demonstrated that it would propose the Sheep Mountain grading and trail (per Horrocks grading design) in proximity of the emergency spillway and the southern embankment, resulting in a gradual fill of approx. 10-ft of elevation difference between top elevation of DB1 and the Parkway, rather than having an approx. 30-ft tall embankment to the natural washes like the current DB1 design shows, and a separate 20-ft to 30-ft fill for the Parkway in short proximity to the east. SHG will also adjust the affected embankment slope to an earthen 4:1 (H:V) design. South of the southern embankment, approaching the Grand Teton interchange area, SHG will grade the future access road/ramp from Grand Teton and meander the trail and DB1 collector channel to avoid any conflicts with NV Energy. CLV wants to make sure the trail upstream of the access road is adequate to convey the runoff from these newly filled areas. It was noted that the trail and collector channel crossing the Parkway right-of-way as it meanders south toward Grand Teton are temporary (similar to the current DB1 design) and a revised design may have to be considered when design begins on the Grand Teton interchange. All parties in attendance agreed that the concept of the revised design moving forward was more desire-able for functionality, dam risk, and maintenance. Exhibits from meeting to support the engineering discussion above have been emailed to all attendees listed above.
3	***Processing Design Change*** – Olympia discussed that since CLV has conditioned that DB1 is required for the developers to receive permits to build homes in Phase 2 that DB1 construction needs to be started in fall to be able to have it completed within his current schedules for Phase 2. Olympia voiced concern regarding the timing of receiving approval on the updated design for DB1 fitting into his schedule. SHG noted that it spoke to Dam Safety and it is understood that a new Dam Safety permit would be required, but also noted that Dam Safety spoke to that excavation would be acceptable based on the current obtained Dam Safety Permit. However, in order to complete the required inspections, testing and proper certifications that placement of fill and construction of the embankment changing due to the updated design needs to be held up until the new approvals are obtained and CLV concurred

Prepared By: Steve Jones, SHG

Please notify the preparer if you have any questions, concerns or additions to these minutes within 2 days. After 2 days the content of this document will be considered accurate and accepted as the final recordation.

Item:	Discussion:
	upon Dam Safety opinion. It was discussed that an early grading permit, allowed for in the development agreement, based on the current approved design could help expedite the schedule while the changes to the design discussed above were under review. CLV agreed that Public Works would support the developer request to obtain an early grading permit since the shape of the interior basin remained the same and allow for the duration of excavation required in the basin and items expected to remain unchanged with the updated design; however, Olympia is required to consult with Chris Knight and Land Development staff to procedurally ensure it has all items required to obtain the early grading permit.

Action Items:

Item:	Discussion:
	SHG will provide an exhibit or plans upon request for an early grading permit that demonstrate areas that remain the same as the current approved design to be completed with the early grading permit and areas subject to change based on updated design that will be withheld until review of the new design is complete.
	SHG will setup meeting with Land Development to discuss the scope of the early grading permit. It was suggested that a representative from Public Works (likely Bart Anderson for his familiarity with the Development Agreement) be also invited to the meeting as support for SHG and the developer's request.

Prepared By: Steve Jones, SHG

Please notify the preparer if you have any questions, concerns or additions to these minutes within 2 days. After 2 days the content of this document will be considered accurate and accepted as the final recordation.

Item:	Discussion:
	and all parties agreed.

Action Items:

Item:	Discussion:
	Early grading through a stockpile permit will be obtained prior to submittal of the TDS Update for the formal design change affected by Sheep Mountain Parkway.
	SHG will prepare and submit a TDS Update for the improvement plan changes affected by Sheep Mountain Parkway.

Prepared By: Steve Jones, SHG

Please notify the preparer if you have any questions, concerns or additions to these minutes within 2 days. After 2 days the content of this document will be considered accurate and accepted as the final recordation.

APPENDIX C

Hydrologic Data & Models

New Soils Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Las Vegas Valley Area, Nevada, Part of Clark County

Skye Canyon Detention Basin 1

August 9, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

N

0 1500 3000

SCALE – 1"=1500' FEET

KYLE CANYON ROAD

"155"

"400"

"155"

"400"

"400"

"155"

"155"

"400"

"400"

"155"

"155"

"400"

"191"

"155"

"400"

DETENTION BASIN #1

OFF6

OFF5

OFF4

OFF3

OFF2

OFF7

OFF1

ON1

GRAND TETON

HUALAPAI WAY

GRAND CANYON DRIVE

FARM ROAD

j:\oly1401-004 db1\drainage\update study\sheep mountain\figures\oly1401.004 db1 sa exh d soils map.dwg 8/10/2016 2:10 PM Steve Jones

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

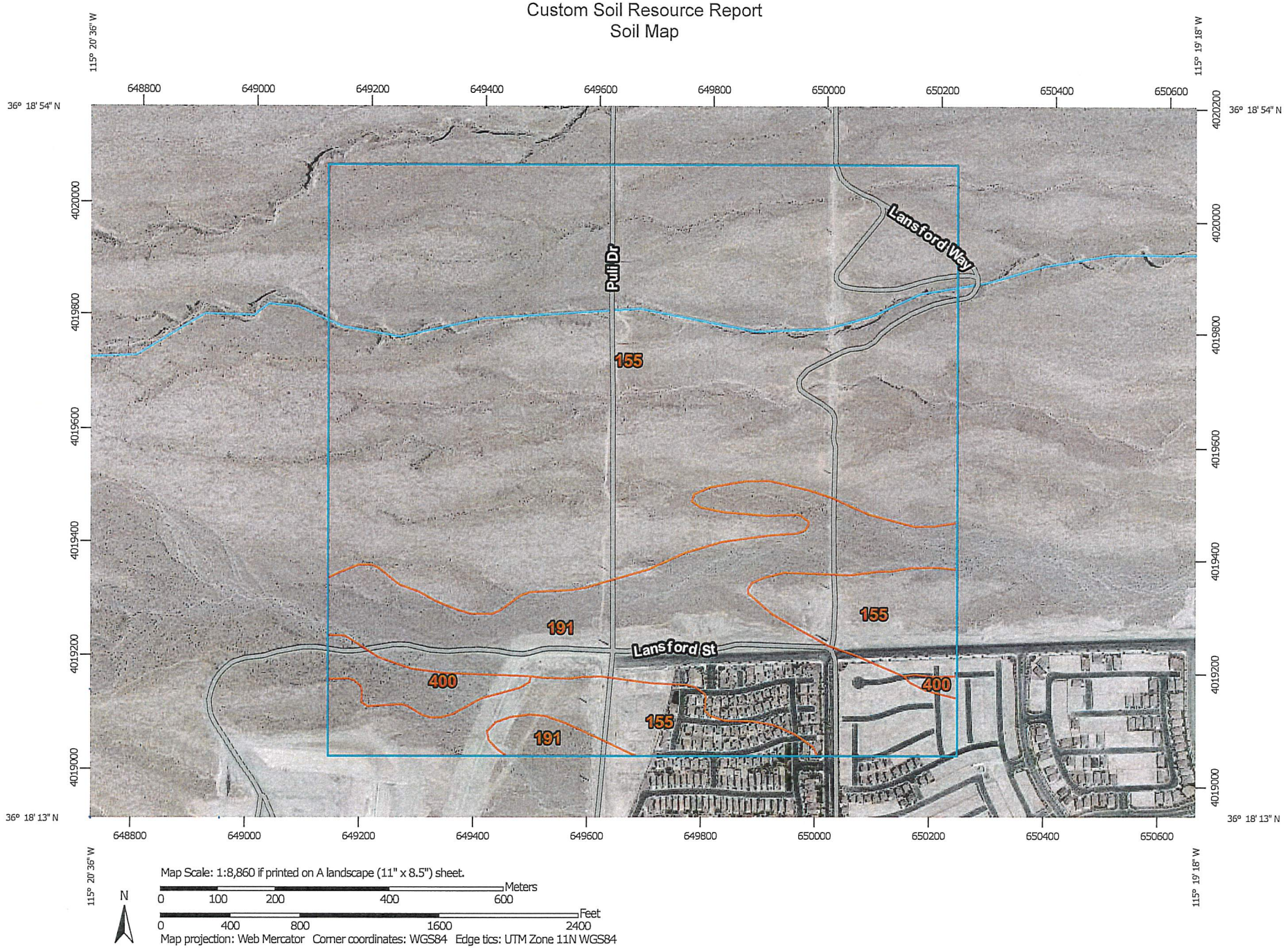
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 10, Aug 22, 2014

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

Date(s) aerial images were photographed: May 7, 2011—Jun 2, 2011

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

Map Unit Legend

Las Vegas Valley Area, Nevada, Part of Clark County (NV788)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	219.3	76.7%
191	Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	60.5	21.2%
400	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	6.2	2.2%
Totals for Area of Interest		286.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments

on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Las Vegas Valley Area, Nevada, Part of Clark County

155—Cave gravelly fine sandy loam, 4 to 15 percent slopes

Map Unit Setting

National map unit symbol: hr9w
Elevation: 2,000 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 15 inches: gravelly fine sandy loam
H2 - 15 to 60 inches: indurated

Properties and qualities

Slope: 4 to 15 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrb4
Elevation: 2,200 to 3,400 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 61 to 66 degrees F
Frost-free period: 210 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Dalian and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dalian

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolostone

Typical profile

H1 - 0 to 5 inches: very cobbly fine sandy loam
H2 - 5 to 60 inches: very gravelly fine sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A

400—Tencee very gravelly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrc1
Elevation: 2,400 to 5,700 feet
Mean annual precipitation: 4 to 10 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 180 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Tencee and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tencee

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium derived from limestone and dolomite

Typical profile

H1 - 0 to 9 inches: very gravelly fine sandy loam
H2 - 9 to 15 inches: very gravelly sandy loam
H3 - 15 to 19 inches: indurated

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Las Vegas Valley Area, Nevada, Part of Clark County			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
155—Cave gravelly fine sandy loam, 4 to 15 percent slopes			
Cave	100	Very high	D
191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes			
Dalian	100	Low	A
400—Tencee very gravelly fine sandy loam, 2 to 8 percent slopes			
Tencee	100	Very high	D

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Curve Numbers Calculations

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Soil Data & Curve Number Computation

Project Name: Skye Canyon - Detention Basin 1
Date: 8/9/2016
File Name: OLY1401-004 UP1 DB1 CNs.xlsx
By: JSR

Data:

Reference: Exhibit D SCS Soil Data

Soil Type	Soil Survey Area & Version	Soil Description	A	B	C	D
155	Las Vegas Valley 2014	Cave gravelly fine sandy loam, 4 to 15 percent slopes	0%	0%	0%	100%
191	Las Vegas Valley 2014	Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	100%	0%	0%	0%
400	Las Vegas Valley 2014	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	0%	0%	0%	100%

Land Use	A	B	C	D
Desert Shrub (poor)	63	77	85	88
Newly Graded	77	86	91	94

PROPOSED CONDITION

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF1	400	51.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	140.07	44.89
	155	44.2%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	121.46	38.92
	191	4.8%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	13.07	3.00
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									274.60	86.81

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF2	155	75.1%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	20.12	66.09
	191	24.9%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	6.67	15.69
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									26.79	81.78

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF3	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	16.58	88.00
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									16.58	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF4	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	37.19	88.00
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									37.19	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF5	155	63.9%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	105.09	56.25
	400	36.1%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	59.32	31.75
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									164.41	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF6	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	25.54	88.00
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									25.54	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
ON1	155	100.0%	Newly Graded	0%	0%	0%	100%	77	86	91	94	16.72	94.00
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									16.72	94.00

ULTIMATE CONDITION

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF1	400	51.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	129.73	44.85
	155	47.4%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	120.71	41.73
	191	1.6%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	4.11	1.02
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									254.55	87.60

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CURVE NUMBER
OFF2	155	86.2%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	19.60	75.85
	191	13.8%	Desert Shrub (poor)	100%	0%	0%	0%	63	77	85	88	3.14	8.70
TOTAL PERCENT		100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									22.74	84.55

OFF7 Curve Number referenced from CCRFCD MPU.

5740 S. Arville St., Suite 216 - Las Vegas, NV 89118
Ph. 702-284-5300 - Fx. 702-284-5399

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1]Average runoff condition, and $I_a = 0.2S$.

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3]Curve numbers for group A have been developed only for desert shrub.

Revision	Date

WRC ENGINEERING

REFERENCE: SCS TR-55, USDA, June 1986.

TABLE 602
4 of 4

Standard Form 4 Lag Time Computations

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Project Name: Skye Canyon - DB1
Description: Standard Form 4
File Name: OLY1401-004 UP1 SF4.xls
By: JSR
Date: 8/9/2016

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
PROPOSED CONDITION																	
OFF1	E	86.8	0.756	274.60	0.4291	261.6	7.60	5.10	11804	3.59	2.80	5.57	36.79	41.89			0.419
OFF2	E	81.8	0.689	26.79	0.0419	171.3	4.10	6.04	2754	3.85	2.90	5.77	9.38	15.42			0.154
OFF3	E	88.0	0.772	16.58	0.0259	150.9	13.90	3.02	2647	4.95	3.29	6.54	6.00	11.02			0.110
OFF4	E	88.0	0.772	37.19	0.0581	155.9	13.50	3.10	3522	4.91	3.28	6.51	10.27	13.37			0.134
OFF5	E	88.0	0.772	164.41	0.2569	199.1	10.50	3.81	12337	3.70	2.85	5.66	37.81	41.62			0.416
OFF6	E	88.0	0.772	25.54	0.0399	141.6	4.94	4.13	2341	4.44	3.12	6.19	7.63	11.76			0.118
ON1	D	94.0	0.851	16.72	0.0261	124	36.00	1.51	2233	1.83	2.73	4.14	10.03	11.54	2357	23.094	0.115
ULTIMATE CONDITION																	
OFF1	E	87.6	0.766	260.66	0.4073	261.6	7.60	4.94	9751	3.64	2.82	5.61	30.44	35.38			0.354
OFF2	E	84.6	0.726	22.74	0.0355	171.3	4.10	5.50	2754	3.85	2.90	5.77	9.38	14.89			0.149
OFF7	D	96.0	0.877	17.98	0.0281	100	1.00	4.01	2600	4.00	4.04	6.12	7.78	11.79	2700	25.000	0.118

[1] K = 0.0132 (CN) - 0.39
[2] A = Area/640
[3] Ti = (1.8 (1.1-K) L^0.5)/S^0.33
[4] For Existing Conditions: V1 = 14.8 * (S/100)^0.5
For Developed Conditions: V1 = 20.2 * (S/100)^0.5
[5] For Existing Conditions: V2 = 29.4 * (S/100)^0.5
For Developed Conditions: V2 = 30.6 * (S/100)^0.5
[6] Tt = L/(60*V)
[7] Tc = Ti + Tt
[8] Total L = Initial L + Travel L
[9] Tc = (L/180) + 10
[10] Tlag = (0.6*Tc)/60
[11] Min Tlag =0.05

Note: For Travel Time Calcs: V1 applies to first 500 feet and V2 applies to remaining distance.

REFERENCE :

Stage-Storage Table from Civil-3D

STAGE STORAGE TABLE						
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)	CONIC INC. VOL. (cu. ft.)	CONIC TOTAL VOL. (cu. ft.)
3,024.00	74,982.51	N/A	N/A	0.00	N/A	0.00
3,025.00	170,154.76	1.00	122568.64	122568.64	119363.79	119363.79
3,026.00	228,998.19	1.00	199576.48	322145.11	198849.61	318213.40
3,027.00	245,049.48	1.00	237023.83	559168.94	236978.53	555191.93
3,028.00	253,122.58	1.00	249086.03	808254.97	249075.12	804267.06
3,029.00	261,333.21	1.00	257227.90	1065482.87	257216.98	1061484.03
3,030.00	269,696.08	1.00	265514.64	1330997.51	265503.67	1326987.70
3,031.00	278,138.02	1.00	273917.05	1604914.56	273906.21	1600893.91
3,032.00	286,530.56	1.00	282334.29	1887248.85	282323.89	1883217.80
3,033.00	295,026.99	1.00	290778.78	2178027.62	290768.43	2173986.23
3,034.00	303,609.93	1.00	299318.46	2477346.09	299308.21	2473294.44
3,035.00	312,269.76	1.00	307939.85	2785285.93	307929.70	2781224.14
3,036.00	320,992.02	1.00	316630.89	3101916.82	316620.88	3097845.01
3,037.00	331,479.47	1.00	326235.74	3428152.57	326221.70	3424066.71
3,038.00	342,512.74	1.00	336996.11	3765148.67	336981.05	3761047.76
3,039.00	352,259.74	1.00	347386.24	4112534.91	347374.85	4108422.61
3,040.00	362,058.02	1.00	357158.88	4469693.80	357147.68	4465570.29
3,041.00	371,872.50	1.00	366965.26	4836659.06	366954.32	4832524.61
3,042.00	381,857.32	1.00	376864.91	5213523.96	376853.88	5209378.50
3,043.00	391,872.49	1.00	386864.90	5600388.87	386854.10	5596232.60
3,044.00	402,046.69	1.00	396959.59	5997348.45	396948.72	5993181.32
3,045.00	412,166.77	1.00	407106.73	6404455.18	407096.25	6400277.56
3,046.00	422,288.06	1.00	417227.41	6821682.60	417217.18	6817494.75

Outlet Pipe & Emergency Spillway Stage-Discharge Tables

(Unchanged from Previous Approved Design)

DB1 - Stage-Discharge Summary

Stage (elevation)	24" Orifice Outlet Pipe Flow (cfs)	Spillway Flow (cfs)	Total Flow (cfs)
3013.8	0.00	0.00	0
3014	0.00	0.00	0
3015	0.00	0.00	0
3016	0.00	0.00	0
3017	13.71	0.00	13.7
3018	21.36	0.00	21.4
3019	26.92	0.00	26.9
3020	31.51	0.00	31.5
3021	35.51	0.00	35.5
3022	39.11	0.00	39.1
3023	42.40	0.00	42.4
3024	45.45	0.00	45.5
3025	48.32	0.00	48.3
3026	51.02	0.00	51.0
3027	53.58	0.00	53.6
3028	56.03	0.00	56.0
3029	58.38	0.00	58.4
3030	60.63	0.00	60.6
3031	62.80	0.00	62.8
3032	64.91	0.00	64.9
3033	66.94	0.00	66.9
3034	68.92	0.00	68.9
3035	70.84	0.00	70.8
3036	72.70	0.00	72.7
3037	74.53	0.00	74.5
3038	76.31	261.00	337.3
3039	78.04	738.22	816.3
3040	79.75	1356.20	1436.0
3041	81.41	2088.00	2169.4
3042	83.04	2918.07	3001.1
3043	84.64	3835.90	3920.5
3044	86.21	4833.79	4920.0
3045	87.75	5905.76	5993.5
3046	89.27	7047.00	7136.3

24-inch Orifice Discharge Curve
Rating Table for Circular Orifice

Project Description	
Worksheet	Outfall
Type	Circular Orifice
Solve For	Discharge

Input Data	
Centroid Elevation	3,014.80 ft
Tailwater Elevation	3,016.30 ft
Discharge Coefficient	0.65
Diameter	24.0 in

→ CONSIDERS 2.5' DEPTH IN 60"RCP OUTLET

WSPG MODEL FOR OUTLET PIPE CONFIRMS TAILWATER IN 60"RCP

Attribute	Minimum	Maximum	Increment
Headwater Elevation (ft)	3,014.00	3,046.00	1.00

Headwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
3,014.00	N/A	N/A
3,015.00	N/A	N/A
3,016.00	N/A	N/A
3,017.00	13.71	4.36
3,018.00	21.36	6.80
3,019.00	26.92	8.57
3,020.00	31.51	10.03
3,021.00	35.51	11.30
3,022.00	39.11	12.45
3,023.00	42.40	13.50
3,024.00	45.45	14.47
3,025.00	48.32	15.38
3,026.00	51.02	16.24
3,027.00	53.58	17.06
3,028.00	56.03	17.84
3,029.00	58.38	18.58
3,030.00	60.63	19.30
3,031.00	62.80	19.99
3,032.00	64.91	20.66
3,033.00	66.94	21.31
3,034.00	68.92	21.94
3,035.00	70.84	22.55
3,036.00	72.70	23.14
3,037.00	74.53	23.72
3,038.00	76.31	24.29
3,039.00	78.04	24.84
3,040.00	79.75	25.38
3,041.00	81.41	25.91
3,042.00	83.04	26.43
3,043.00	84.64	26.94
3,044.00	86.21	27.44
3,045.00	87.75	27.93
3,046.00	89.27	28.42

PMF Overflow Spillway Discharge Curve
Rating Table for Generic Weir

Project Description	
Worksheet	PMF Spillway - Weir
Type	Generic Weir
Solve For	Discharge

Input Data		
Crest Elevation	3,037.00	ft
Discharge Coefficient	3.00	US
Crest Length	87.00	ft

Attribute	Minimum	Maximum	Increment
Headwater Elevation (ft)	3,037.00	3,046.00	1.00

Headwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
3,037.00	N/A	N/A
3,038.00	261.00	3.00
3,039.00	738.22	4.24
3,040.00	1,356.20	5.20
3,041.00	2,088.00	6.00
3,042.00	2,918.07	6.71
3,043.00	3,835.90	7.35
3,044.00	4,833.79	7.94
3,045.00	5,905.76	8.49
3,046.00	7,047.00	9.00

Proposed Condition HEC-1 Output

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*         JUN  1998                    *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE   09AUG16  TIME  15:57:58  *
*                                      *
****************************************
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*         609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X    X  XXXXXXX   XXXXX          X
X    X  X        X     X        XX
X    X  X        X              X
XXXXXXX  XXXX    X        XXXXX  X
X    X  X        X              X
X    X  X        X     X        X
X    X  XXXXXXX  XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                    *DIAGRAM
              1     ID     SLATER HANIFAN GROUP
              2     ID     NINETY-FIVE MANAGEMENT, LLC.
              3     ID     SKYE CANYON - DETENTION BASIN #1
              4     ID     UPDATE (SHEEP MOUNTAIN)
              5     ID     PROPOSED DRAINAGE CONDITION
              6     ID
              7     ID     RETURN PERIOD ------- 100-YEAR
              8     ID     DISTRIBUTION -------- 6-HOUR SDN3
              9     ID     PROJECT NO. --------- OLY1401.004
             10     ID     FILENAME ------------ PRO1.H1
             11     ID     DATE ---------------- 7/25/2016
             12     ID     MODELED BY ---------- SMJ
             13     ID
             14     ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
             15     ID        DRAINAGE AREA (MIA2)    RATIO
             16     ID        0.0-0.49                1.00
             17     ID        0.5-0.99                0.98
             18     ID
             19     IT      5       0       0     300
             20     IO      5       0       0
             21     IN      5       0       0
             22     JR    PREC    1.00    0.98
                    *

             23     KK    OFF1
             24     KM    EXISTING OFFSITE DRAINAGE BASIN
             25     KM    DISCHARGES INTO DETENTION BASIN "DB1"
             26     KO       3
             27     PB    3.00
             28     PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
             29     PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
             30     PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
             31     PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
             32     PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
             33     PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
             34     PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
             35     PC   0.998   0.999       1
             36     BA   .4291
             37     LS       0    86.8
             38     UD   0.420
                    *

             39     KK    OFF2
             40     KM    EXISTING OFFSITE DRAINAGE BASIN
             41     KM    DISCHARGES INTO DETENTION BASIN "DB1"
             42     KO       3
             43     BA    .0419
             44     LS       0    81.8
             45     UD   0.150
                    *
```

1 HEC-1 INPUT PAGE 2

```
          LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

             46     KK    OFF3
             47     KM    EXISTING OFFSITE DRAINAGE BASIN
             48     KM    DISCHARGES INTO DETENTION BASIN "DB1"
             49     KO       3
             50     BA    .0259
             51     LS       0    88.0
             52     UD   0.112
                    *

             53     KK     CP1
             54     KM    COMBINE OFF1, OFF2, AND OFF3
             55     HC       3
                    *

             56     KK    OFF4
             57     KM    EXISTING OFFSITE DRAINAGE BASIN
             58     KM    DISCHARGES INTO DETENTION BASIN "DB1"
             59     KO       3
             60     BA    .0581
             61     LS       0    88.0
             62     UD   0.136
                    *

             63     KK    OFF5
             64     KM    EXISTING OFFSITE DRAINAGE BASIN
             65     KM    DISCHARGES INTO DETENTION BASIN "DB1"
             66     KO       3
             67     BA    .2569
             68     LS       0    88.0
             69     UD   0.419
                    *

             70     KK    OFF6
             71     KM    EXISTING OFFSITE DRAINAGE BASIN
             72     KM    DISCHARGES INTO DETENTION BASIN "DB1"
```

```
            73          KO       3
            74          BA   .0399
            75          LS       0    88.0
            76          UD   0.121
                        *

            77          KK     ON1
            78          KM   PROPOSED ONSITE DRAINAGE BASIN
            79          BA   .0261
            80          LS       0    94.0
            81          UD   0.116
                        *

            82          KK     DB1
            83          KM   COMBINE CP1, OFF4, OFF5, OFF6 AND ON1
            84          HC       5
                        *
1                                                HEC-1 INPUT                                                PAGE  3

         LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            85          KK    RDB1
            86          KM   OUTLET = 24" ORIFICE @ INVERT ELEVATION = 3013.8-FT
            87          RS       1    ELEV  3025.5
            88          SA    4.58    5.63    5.81    6.00    6.19    7.17    7.61    8.31    9.00    9.69
            89          SE  3025.5    3027    3028    3029    3030    3035    3037    3040    3043    3046
            90          SQ    49.7    60.6    70.8    74.5  1436.0  3920.5  7136.3
            91          SE  3025.5    3030    3035    3037    3040    3043    3046
                        *
            92          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

    23        OFF1
                .
                .
    39          .         OFF2
                .           .
                .           .
    46          .           .         OFF3
                .           .           .
                .           .           .
    53        CP1.......................
                .
                .
    56          .         OFF4
                .           .
                .           .
    63          .           .         OFF5
                .           .           .
                .           .           .
    70          .           .           .         OFF6
                .           .           .           .
                .           .           .           .
    77          .           .           .           .         ON1
                .           .           .           .           .
                .           .           .           .           .
    82        DB1.....................................................
                V
                V
    85        RDB1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                  ****************************************
*                                      *                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
*             JUN   1998               *                                  *   HYDROLOGIC ENGINEERING CENTER      *
*          VERSION 4.1                 *                                  *        609 SECOND STREET             *
*                                      *                                  *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   09AUG16  TIME  15:57:58  *                                  *          (916) 756-1104              *
*                                      *                                  *                                      *
****************************************                                  ****************************************


                          SLATER HANIFAN GROUP
                          NINETY-FIVE MANAGEMENT, LLC.
                          SKYE CANYON - DETENTION BASIN #1
                          UPDATE (SHEEP MOUNTAIN)
                          PROPOSED DRAINAGE CONDITION

                          RETURN PERIOD -------- 100-YEAR
                          DISTRIBUTION -------- 6-HOUR SDN3
                          PROJECT NO. --------- OLY1401.004
                          FILENAME ------------ PRO1.H1
                          DATE ---------------- 7/25/2016
                          MODELED BY ---------- SMJ

                             SIX HOUR DEPTH-AREA REDUCTION FACTORS
                             DRAINAGE AREA (MI^2)    RATIO
                             0.0-0.49                1.00
                             0.5-0.99                0.98


   20 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE       1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      2    0  ENDING DATE
                       NDTIME       0055  ENDING TIME
                       ICENT          19  CENTURY MARK

                     COMPUTATION INTERVAL      .08 HOURS
                          TOTAL TIME BASE   24.92 HOURS

            ENGLISH UNITS
                 DRAINAGE AREA         SQUARE MILES
                 PRECIPITATION DEPTH   INCHES
                 LENGTH, ELEVATION     FEET
                 FLOW                  CUBIC FEET PER SECOND
                 STORAGE VOLUME        ACRE-FEET
                 SURFACE AREA          ACRES
                 TEMPERATURE           DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS
```

```
   JR          MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
               1.00       .98


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   23 KK    *      OFF1  *
            *            *
            **************

   26 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

   21 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN          5  TIME INTERVAL IN MINUTES
                       JXDATE         1  0  STARTING DATE
                       JXTIME         0  STARTING TIME

                SUBBASIN RUNOFF DATA

   36 BA          SUBBASIN CHARACTERISTICS
                       TAREA        .43  SUBBASIN AREA

                  PRECIPITATION DATA

   27 PB               STORM       3.00  BASIN TOTAL PRECIPITATION

   28 PI            INCREMENTAL PRECIPITATION PATTERN
                      .02      .04      .01      .02      .02      .02      .01      .00      .00      .00
                      .00      .00      .00      .01      .00      .01      .01      .01      .01      .01
                      .01      .00      .00      .00      .00      .01      .02      .01      .01      .00
                      .01      .01      .01      .00      .00      .01      .03      .03      .06      .09
                      .09      .12      .03      .04      .03      .01      .02      .02      .00      .00
                      .01      .01      .01      .02      .02      .01      .01      .02      .01      .01
                      .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                      .00      .00

   37 LS          SCS LOSS RATE
                       STRTL        .30  INITIAL ABSTRACTION
                       CRVNBR     86.80  CURVE NUMBER
                       RTIMP        .00  PERCENT IMPERVIOUS AREA

   38 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG         .42  LAG

                                                  ***

                                                UNIT HYDROGRAPH
                                            27 END-OF-PERIOD ORDINATES
                    39.      118.      246.      379.      444.      445.      397.      330.      240.      174.
                   129.       98.       73.       55.       41.       30.       22.       17.       12.        9.
                     7.        5.        4.        3.        2.        1.        1.

      TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.28, TOTAL EXCESS =    1.72

    PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     24.92-HR
+     (CFS)       (HR)
                    (CFS)
+       399.      3.83          79.         20.         19.         19.
                 (INCHES)     1.721       1.724       1.724       1.724
                  (AC-FT)      39.         39.         39.         39.

                  CUMULATIVE AREA =     .43 SQ MI

        ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION     OFF1
                      FOR PLAN 1, RATIO = 1.00

      TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.28, TOTAL EXCESS =    1.72

    PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     24.92-HR
+     (CFS)       (HR)
                    (CFS)
+       399.      3.83          79.         20.         19.         19.
                 (INCHES)     1.721       1.724       1.724       1.724
                  (AC-FT)      39.         39.         39.         39.

                  CUMULATIVE AREA =     .43 SQ MI

        ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION     OFF1
                      FOR PLAN 1, RATIO =  .98

      TOTAL RAINFALL =    2.94, TOTAL LOSS =    1.27, TOTAL EXCESS =    1.67

    PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     24.92-HR
+     (CFS)       (HR)
                    (CFS)
+       387.      3.83          77.         19.         19.         19.
                 (INCHES)     1.669       1.671       1.671       1.671
                  (AC-FT)      38.         38.         38.         38.

                  CUMULATIVE AREA =     .43 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   39 KK    *      OFF2  *
            *            *
            **************

   42 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

   43 BA          SUBBASIN CHARACTERISTICS
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                TAREA          .04  SUBBASIN AREA

              PRECIPITATION DATA

27 PB              STORM        3.00  BASIN TOTAL PRECIPITATION

28 PI        INCREMENTAL PRECIPITATION PATTERN
                .02       .04       .01       .02       .02       .02       .01       .00       .00       .00
                .00       .00       .00       .01       .00       .01       .01       .01       .01       .01
                .01       .00       .00       .00       .00       .01       .02       .01       .01       .00
                .01       .01       .01       .00       .00       .01       .03       .03       .06       .09
                .09       .12       .03       .04       .03       .01       .02       .02       .00       .00
                .01       .01       .01       .02       .02       .01       .01       .02       .01       .01
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00

44 LS          SCS LOSS RATE
                    STRTL          .44  INITIAL ABSTRACTION
                   CRVNBR        81.80  CURVE NUMBER
                    RTIMP          .00  PERCENT IMPERVIOUS AREA

45 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG          .15  LAG

                                                ***

                                                UNIT HYDROGRAPH
                                            11 END-OF-PERIOD ORDINATES
              39.       103.       91.       46.       23.       11.        6.        3.        1.        1.
               0.

   TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.63, TOTAL EXCESS =    1.37

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                  (CFS)
+     49.       3.58                 6.          2.          1.          1.
                (INCHES)        1.366       1.366       1.366       1.366
                (AC-FT)           3.          3.          3.          3.

                CUMULATIVE AREA =     .04 SQ MI

     ***            ***             ***             ***             ***

                  HYDROGRAPH AT STATION     OFF2
                    FOR PLAN 1, RATIO = 1.00

   TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.63, TOTAL EXCESS =    1.37

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                  (CFS)
+     49.       3.58                 6.          2.          1.          1.
                (INCHES)        1.366       1.366       1.366       1.366
                (AC-FT)           3.          3.          3.          3.

                CUMULATIVE AREA =     .04 SQ MI

     ***            ***             ***             ***             ***

                  HYDROGRAPH AT STATION     OFF2
                    FOR PLAN 1, RATIO =  .98

   TOTAL RAINFALL =    2.94, TOTAL LOSS =    1.62, TOTAL EXCESS =    1.32

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                  (CFS)
+     48.       3.58                 6.          1.          1.          1.
                (INCHES)        1.319       1.319       1.319       1.319
                (AC-FT)           3.          3.          3.          3.

                CUMULATIVE AREA =     .04 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          ***************
          *             *
46 KK     *      OFF3   *
          *             *
          ***************

49 KO          OUTPUT CONTROL VARIABLES
                   IPRNT          3  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

50 BA          SUBBASIN CHARACTERISTICS
                   TAREA          .03  SUBBASIN AREA

               PRECIPITATION DATA

27 PB              STORM        3.00  BASIN TOTAL PRECIPITATION

28 PI        INCREMENTAL PRECIPITATION PATTERN
                .02       .04       .01       .02       .02       .02       .01       .00       .00       .00
                .00       .00       .00       .01       .00       .01       .01       .01       .01       .01
                .01       .00       .00       .00       .00       .01       .02       .01       .01       .00
                .01       .01       .01       .00       .00       .01       .03       .03       .06       .09
                .09       .12       .03       .04       .03       .01       .02       .02       .00       .00
                .01       .01       .01       .02       .02       .01       .01       .02       .01       .01
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00

51 LS          SCS LOSS RATE
                    STRTL          .27  INITIAL ABSTRACTION
                   CRVNBR        88.00  CURVE NUMBER
                    RTIMP          .00  PERCENT IMPERVIOUS AREA

52 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG          .11  LAG

                                                ***

                                                UNIT HYDROGRAPH
                                             9 END-OF-PERIOD ORDINATES
              45.       81.       44.       18.        7.        3.        1.        1.        0.
```

```
     TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.18, TOTAL EXCESS =    1.82

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                              6-HR        24-HR        72-HR     24.92-HR
+   (CFS)       (HR)
                (CFS)
+      40.      3.58             5.           1.           1.           1.
               (INCHES)      1.818        1.818        1.818        1.818
                (AC-FT)         3.           3.           3.           3.

                CUMULATIVE AREA =     .03 SQ MI

       ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION     OFF3
                    FOR PLAN 1, RATIO = 1.00

     TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.18, TOTAL EXCESS =    1.82

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                              6-HR        24-HR        72-HR     24.92-HR
+   (CFS)       (HR)
                (CFS)
+      40.      3.58             5.           1.           1.           1.
               (INCHES)      1.818        1.818        1.818        1.818
                (AC-FT)         3.           3.           3.           3.

                CUMULATIVE AREA =     .03 SQ MI

       ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION     OFF3
                    FOR PLAN 1, RATIO =  .98

     TOTAL RAINFALL =    2.94, TOTAL LOSS =    1.18, TOTAL EXCESS =    1.76

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                              6-HR        24-HR        72-HR     24.92-HR
+   (CFS)       (HR)
                (CFS)
+      39.      3.58             5.           1.           1.           1.
               (INCHES)      1.765        1.765        1.765        1.765
                (AC-FT)         2.           2.           2.           2.

                CUMULATIVE AREA =     .03 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
   56 KK    *      OFF4  *
            *            *
            **************

   59 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

   60 BA          SUBBASIN CHARACTERISTICS
                       TAREA        .06  SUBBASIN AREA

                  PRECIPITATION DATA

   27 PB               STORM        3.00  BASIN TOTAL PRECIPITATION

   28 PI            INCREMENTAL PRECIPITATION PATTERN
                      .02       .04       .01       .02       .02       .02       .01       .00       .00       .00
                      .00       .00       .00       .01       .00       .01       .01       .01       .01       .01
                      .01       .00       .00       .00       .00       .01       .02       .01       .01       .00
                      .01       .01       .01       .00       .00       .01       .03       .03       .06       .09
                      .09       .12       .03       .04       .03       .01       .02       .02       .00       .00
                      .01       .01       .01       .02       .02       .01       .01       .02       .01       .01
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00

   61 LS          SCS LOSS RATE
                       STRTL        .27  INITIAL ABSTRACTION
                      CRVNBR       88.00  CURVE NUMBER
                       RTIMP        .00  PERCENT IMPERVIOUS AREA

   62 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG         .14  LAG

                                                    ***

                                                UNIT HYDROGRAPH
                                            10 END-OF-PERIOD ORDINATES
                    67.      158.      123.       55.       26.       12.        6.        3.        1.        0.

     TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.18, TOTAL EXCESS =    1.82

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                              6-HR        24-HR        72-HR     24.92-HR
+   (CFS)       (HR)
                (CFS)
+      90.      3.58            11.           3.           3.           3.
               (INCHES)      1.818        1.818        1.818        1.818
                (AC-FT)         6.           6.           6.           6.

                CUMULATIVE AREA =     .06 SQ MI

       ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION     OFF4
                    FOR PLAN 1, RATIO = 1.00

     TOTAL RAINFALL =    3.00, TOTAL LOSS =    1.18, TOTAL EXCESS =    1.82

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                              6-HR        24-HR        72-HR     24.92-HR
+   (CFS)       (HR)
                (CFS)
+      90.      3.58            11.           3.           3.           3.
               (INCHES)      1.818        1.818        1.818        1.818
                (AC-FT)         6.           6.           6.           6.

                CUMULATIVE AREA =     .06 SQ MI
```

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

                       HYDROGRAPH AT STATION      OFF4
                         FOR PLAN 1, RATIO =  .98

     TOTAL RAINFALL =     2.94, TOTAL LOSS =     1.18, TOTAL EXCESS =     1.76

   PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR         24-HR        72-HR      24.92-HR
+    (CFS)       (HR)
                           (CFS)
+      87.       3.58                 11.           3.           3.           3.
                         (INCHES)   1.765        1.765        1.765        1.765
                          (AC-FT)      5.           5.           5.           5.

                      CUMULATIVE AREA =      .06 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
  63 KK    *     OFF5   *
           *            *
           **************

  66 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3   PRINT CONTROL
                      IPLOT          0   PLOT CONTROL
                      QSCAL         0.   HYDROGRAPH PLOT SCALE

                 SUBBASIN RUNOFF DATA

  67 BA          SUBBASIN CHARACTERISTICS
                      TAREA        .26   SUBBASIN AREA

                 PRECIPITATION DATA

  27 PB               STORM       3.00   BASIN TOTAL PRECIPITATION

  28 PI            INCREMENTAL PRECIPITATION PATTERN
                      .02        .04        .01        .02        .02        .02        .01        .00        .00        .00
                      .00        .00        .00        .01        .00        .01        .01        .01        .01        .01
                      .01        .00        .00        .00        .00        .01        .02        .01        .01        .00
                      .01        .01        .01        .00        .00        .01        .03        .03        .06        .09
                      .09        .12        .03        .04        .03        .01        .02        .02        .00        .00
                      .01        .01        .01        .02        .02        .01        .01        .02        .01        .01
                      .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                      .00        .00

  68 LS          SCS LOSS RATE
                      STRTL        .27   INITIAL ABSTRACTION
                     CRVNBR      88.00   CURVE NUMBER
                      RTIMP        .00   PERCENT IMPERVIOUS AREA

  69 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        .42   LAG

                                                                ***

                                                         UNIT HYDROGRAPH
                                                    27 END-OF-PERIOD ORDINATES
               23.        71.       148.       228.       267.       267.       238.       197.       143.       104.
               77.        59.        43.        32.        24.        18.        13.        10.         7.         6.
                4.         3.         2.         2.         1.         1.         0.

     TOTAL RAINFALL =     3.00, TOTAL LOSS =     1.18, TOTAL EXCESS =     1.82

   PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR         24-HR        72-HR      24.92-HR
+    (CFS)       (HR)
                           (CFS)
+     251.       3.83                 50.          13.          12.          12.
                         (INCHES)   1.814        1.818        1.818        1.818
                          (AC-FT)     25.          25.          25.          25.

                      CUMULATIVE AREA =      .26 SQ MI

     ***            ***            ***             ***            ***

                       HYDROGRAPH AT STATION      OFF5
                         FOR PLAN 1, RATIO = 1.00

     TOTAL RAINFALL =     3.00, TOTAL LOSS =     1.18, TOTAL EXCESS =     1.82

   PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR         24-HR        72-HR      24.92-HR
+    (CFS)       (HR)
                           (CFS)
+     251.       3.83                 50.          13.          12.          12.
                         (INCHES)   1.814        1.818        1.818        1.818
                          (AC-FT)     25.          25.          25.          25.

                      CUMULATIVE AREA =      .26 SQ MI

     ***            ***            ***             ***            ***

                       HYDROGRAPH AT STATION      OFF5
                         FOR PLAN 1, RATIO =  .98

     TOTAL RAINFALL =     2.94, TOTAL LOSS =     1.18, TOTAL EXCESS =     1.76

   PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR         24-HR        72-HR      24.92-HR
+    (CFS)       (HR)
                           (CFS)
+     244.       3.83                 49.          12.          12.          12.
                         (INCHES)   1.761        1.765        1.765        1.765
                          (AC-FT)     24.          24.          24.          24.

                      CUMULATIVE AREA =      .26 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
  70 KK    *     OFF6   *
           *            *
           **************
```

```
 73 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 74 BA          SUBBASIN CHARACTERISTICS
                     TAREA        .04  SUBBASIN AREA

               PRECIPITATION DATA

 27 PB               STORM        3.00  BASIN TOTAL PRECIPITATION

 28 PI          INCREMENTAL PRECIPITATION PATTERN
                   .02    .04    .01    .02    .02    .02    .01    .00    .00    .00
                   .00    .00    .00    .01    .00    .01    .01    .01    .01    .01
                   .01    .00    .00    .00    .00    .01    .02    .01    .01    .00
                   .01    .01    .01    .00    .00    .01    .03    .03    .06    .09
                   .09    .12    .03    .04    .03    .01    .02    .02    .00    .00
                   .01    .01    .01    .02    .02    .01    .01    .02    .01    .01
                   .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                   .00    .00

 75 LS          SCS LOSS RATE
                     STRTL         .27  INITIAL ABSTRACTION
                     CRVNBR      88.00  CURVE NUMBER
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

 76 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG          .12  LAG

                                                    ***

                                                UNIT HYDROGRAPH
                                            9 END-OF-PERIOD ORDINATES
                    59.     119.     76.     31.     14.      6.      3.      1.      0.

      TOTAL RAINFALL =   3.00, TOTAL LOSS =   1.18, TOTAL EXCESS =   1.82

   PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
+    (CFS)       (HR)              6-HR       24-HR       72-HR      24.92-HR
+      62.       3.58     (CFS)       8.          2.          2.          2.
                          (INCHES)  1.818       1.818       1.818       1.818
                          (AC-FT)     4.          4.          4.          4.

                          CUMULATIVE AREA =    .04 SQ MI

        ***               ***         ***         ***         ***

                          HYDROGRAPH AT STATION     OFF6
                            FOR PLAN 1, RATIO = 1.00

      TOTAL RAINFALL =   3.00, TOTAL LOSS =   1.18, TOTAL EXCESS =   1.82

   PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
+    (CFS)       (HR)              6-HR       24-HR       72-HR      24.92-HR
+      62.       3.58     (CFS)       8.          2.          2.          2.
                          (INCHES)  1.818       1.818       1.818       1.818
                          (AC-FT)     4.          4.          4.          4.

                          CUMULATIVE AREA =    .04 SQ MI

        ***               ***         ***         ***         ***

                          HYDROGRAPH AT STATION     OFF6
                            FOR PLAN 1, RATIO =  .98

      TOTAL RAINFALL =   2.94, TOTAL LOSS =   1.18, TOTAL EXCESS =   1.76

   PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
+    (CFS)       (HR)              6-HR       24-HR       72-HR      24.92-HR
+      61.       3.58     (CFS)       8.          2.          2.          2.
                          (INCHES)  1.765       1.765       1.765       1.765
                          (AC-FT)     4.          4.          4.          4.

                          CUMULATIVE AREA =    .04 SQ MI

1

          PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                          FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                      TIME TO PEAK IN HOURS

                                                                  RATIOS APPLIED TO PRECIPITATION
 OPERATION        STATION      AREA     PLAN                      RATIO 1    RATIO 2
                                                                     1.00        .98
 HYDROGRAPH AT
+                   OFF1        .43       1    FLOW                399.       387.
                                               TIME                3.83       3.83
 HYDROGRAPH AT
+                   OFF2        .04       1    FLOW                 49.       48.
                                               TIME                3.58       3.58
 HYDROGRAPH AT
+                   OFF3        .03       1    FLOW                 40.       39.
                                               TIME                3.58       3.58
  3 COMBINED AT
+                    CP1        .50       1    FLOW                440.       428.
                                               TIME                3.83       3.83
 HYDROGRAPH AT
+                   OFF4        .06       1    FLOW                 90.       87.
                                               TIME                3.58       3.58
 HYDROGRAPH AT
+                   OFF5        .26       1    FLOW                251.       244.
                                               TIME                3.83       3.83
 HYDROGRAPH AT
+                   OFF6        .04       1    FLOW                 62.       61.
                                               TIME                3.58       3.58
 HYDROGRAPH AT
+                    ON1        .03       1    FLOW                 49.       48.
                                               TIME                3.50       3.50
```

5 COMBINED AT						
+	DB1	.88	1	FLOW	784.	761.
				TIME	3.75	3.75
ROUTED TO						
+	RDB1	.88	1	FLOW	71.	71.
				TIME	5.67	5.58

** PEAK STAGES IN FEET **

1	STAGE	3035.27	3034.99
	TIME	5.67	5.58

*** NORMAL END OF HEC-1 ***

Ultimate Condition HEC-1 Output

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   09AUG16  TIME  15:58:04   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     NINETY-FIVE MANAGEMENT, LLC.
    3         ID     SKYE CANYON - DETENTION BASIN #1
    4         ID     UPDATE (SHEEP MOUNTAIN)
    5         ID     ULTIMATE DRAINAGE CONDITION
    6         ID
    7         ID     RETURN PERIOD -------- 100-YEAR
    8         ID     DISTRIBUTION -------- 6-HOUR SDN3
    9         ID     PROJECT NO. --------- OLY1401.004
   10         ID     FILENAME ------------ ULT1.H1
   11         ID     DATE ---------------- 7/25/2016
   12         ID     MODELED BY ---------- SMJ
   13         ID
   14         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   15         ID        DRAINAGE AREA (MI^2)     RATIO
   16         ID        0.0-0.49                 1.00
   17         ID        0.5-0.99                 0.98
   18         ID
   19         IT      5       0       0     500
   20         IO      5       0       0
   21         IN      5       0       0
   22         JR   PREC    1.00    0.98
              *

   23         KK    OFF1
   24         KM   EXISTING OFFSITE DRAINAGE BASIN
   25         KM   DISCHARGES INTO DETENTION BASIN "DB1"
   26         PB    3.00
   27         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   28         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   29         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   30         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   31         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   32         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   33         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   34         PC   0.998   0.999       1
   35         BA   .4073
   36         LS       0    86.8
   37         UD   0.356
              *

   38         KK    OFF7
   39         KM   FUTURE DEVELOPED OFFSITE DRAINAGE BASIN
   40         KM   DISCHARGES INTO DETENTION BASIN "DB1"
   41         BA   .0281
   42         LS       0    96.0
   43         UD   0.118
              *
```

1 HEC-1 INPUT PAGE 2

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   44         KK     CP2
   45         KM   COMBINE OFF1, OFF7
   46         HC       2
              *

   47         KK    OFF2
   48         KM   EXISTING OFFSITE DRAINAGE BASIN
   49         KM   DISCHARGES INTO DETENTION BASIN "DB1"
   50         BA   .0355
   51         LS       0    81.8
   52         UD   0.148
              *

   53         KK    OFF3
   54         KM   EXISTING OFFSITE DRAINAGE BASIN
   55         KM   DISCHARGES INTO DETENTION BASIN "DB1"
   56         BA   .0259
   57         LS       0    88.0
   58         UD   0.112
              *

   59         KK     CP1
   60         KM   COMBINE CP2, OFF2, AND OFF3
   61         HC       3
              *

   62         KK    OFF4
   63         KM   EXISTING OFFSITE DRAINAGE BASIN
   64         KM   DISCHARGES INTO DETENTION BASIN "DB1"
   65         BA   .0581
   66         LS       0    88.0
   67         UD   0.136
              *

   68         KK    OFF5
   69         KM   EXISTING OFFSITE DRAINAGE BASIN
   70         KM   DISCHARGES INTO DETENTION BASIN "DB1"
```

```
          71          BA   .2569
          72          LS      0    88.0
          73          UD   0.419
                      *

          74          KK    OFF6
          75          KM   EXISTING OFFSITE DRAINAGE BASIN
          76          KM   DISCHARGES INTO DETENTION BASIN "DB1"
          77          BA   .0399
          78          LS      0    88.0
          79          UD   0.121
                      *
1                                        HEC-1 INPUT                                    PAGE  3

        LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

          80          KK     ON1
          81          KM   PROPOSED ONSITE DRAINAGE BASIN
          82          BA   .0261
          83          LS      0    94.0
          84          UD   0.116
                      *

          85          KK     DB1
          86          KM   COMBINE CP1, OFF4, OFF5, OFF6 AND ON1
          87          KO      1
          88          HC      5
                      *

          89          KK    RDB1
          90          KM   OUTLET = 24" ORIFICE @ INVERT ELEVATION = 3013.8-FT
          91          KO      1
          92          RS      1    ELEV  3025.5
          93          SA   4.58    5.63    5.81    6.00    6.19    6.77    7.17    7.37    7.61    8.31
          94          SE  3025.5    3027    3028    3029    3030    3033    3035    3036    3037    3040
          95          SQ   49.7    60.6    70.8    74.5  1436.0  3920.5  7136.3
          96          SE  3025.5    3030    3035    3037    3040    3043    3046
                      *
          97          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

    23        OFF1
              .
              .
    38        .         OFF7
              .           .
              .           .
    44        CP2.........
              .
              .
    47        .         OFF2
              .           .
              .           .
    53        .           .         OFF3
              .           .           .
              .           .           .
    59        CP1.........................
              .
              .
    62        .         OFF4
              .           .
              .           .
    68        .           .         OFF5
              .           .           .
              .           .           .
    74        .           .           .         OFF6
              .           .           .           .
              .           .           .           .
    80        .           .           .           .         ON1
              .           .           .           .           .
              .           .           .           .           .
    85        DB1.....................................................
              V
              V
    89        RDB1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE   09AUG16  TIME  15:58:04  *
*                                      *
****************************************

****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************

                      SLATER HANIFAN GROUP
                      NINETY-FIVE MANAGEMENT, LLC.
                      SKYE CANYON - DETENTION BASIN #1
                      UPDATE (SHEEP MOUNTAIN)
                      ULTIMATE DRAINAGE CONDITION

                      RETURN PERIOD ------- 100-YEAR
                      DISTRIBUTION -------- 6-HOUR SDN3
                      PROJECT NO. --------- OLY1401.004
                      FILENAME ------------ ULT1.H1
                      DATE ---------------- 7/25/2016
                      MODELED BY ---------- SMJ

                         SIX HOUR DEPTH-AREA REDUCTION FACTORS
                         DRAINAGE AREA (MI^2)    RATIO
                         0.0-0.49                1.00
                         0.5-0.99                0.98

  20 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1   0  STARTING DATE
                       ITIME       0000  STARTING TIME
                         NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     2   0  ENDING DATE
                       NDTIME      1735  ENDING TIME
                       ICENT         19  CENTURY MARK
```

```
                COMPUTATION INTERVAL     .08 HOURS
                     TOTAL TIME BASE   41.58 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

    JP              MULTI-PLAN OPTION
                        NPLAN            1  NUMBER OF PLANS

    JR              MULTI-RATIO OPTION
                        RATIOS OF PRECIPITATION
                       1.00        .98

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
  85 KK    *     DB1    *
           *            *
           **************

  87 KO             OUTPUT CONTROL VARIABLES
                          IPRNT          1  PRINT CONTROL
                          IPLOT          0  PLOT CONTROL
                          QSCAL         0.  HYDROGRAPH PLOT SCALE

  88 HC             HYDROGRAPH COMBINATION
                          ICOMP          5  NUMBER OF HYDROGRAPHS TO COMBINE

                                                             ***

*********************************************************************************************************************************

                                          HYDROGRAPH AT STATION       DB1
                                              SUM OF  5 HYDROGRAPHS
                                            PLAN 1,    RATIO =  1.00

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

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		1025	126	0.	1		2050	251	0.	2		0715	376	0.
1		0005	2	0.	1		1030	127	0.	1		2055	252	0.	2		0720	377	0.
1		0010	3	1.	1		1035	128	0.	1		2100	253	0.	2		0725	378	0.
1		0015	4	2.	1		1040	129	0.	1		2105	254	0.	2		0730	379	0.
1		0020	5	4.	1		1045	130	0.	1		2110	255	0.	2		0735	380	0.
1		0025	6	7.	1		1050	131	0.	1		2115	256	0.	2		0740	381	0.
1		0030	7	11.	1		1055	132	0.	1		2120	257	0.	2		0745	382	0.
1		0035	8	13.	1		1100	133	0.	1		2125	258	0.	2		0750	383	0.
1		0040	9	11.	1		1105	134	0.	1		2130	259	0.	2		0755	384	0.
1		0045	10	8.	1		1110	135	0.	1		2135	260	0.	2		0800	385	0.
1		0050	11	6.	1		1115	136	0.	1		2140	261	0.	2		0805	386	0.
1		0055	12	5.	1		1120	137	0.	1		2145	262	0.	2		0810	387	0.
1		0100	13	4.	1		1125	138	0.	1		2150	263	0.	2		0815	388	0.
1		0105	14	4.	1		1130	139	0.	1		2155	264	0.	2		0820	389	0.
1		0110	15	6.	1		1135	140	0.	1		2200	265	0.	2		0825	390	0.
1		0115	16	8.	1		1140	141	0.	1		2205	266	0.	2		0830	391	0.
1		0120	17	9.	1		1145	142	0.	1		2210	267	0.	2		0835	392	0.
1		0125	18	13.	1		1150	143	0.	1		2215	268	0.	2		0840	393	0.
1		0130	19	21.	1		1155	144	0.	1		2220	269	0.	2		0845	394	0.
1		0135	20	28.	1		1200	145	0.	1		2225	270	0.	2		0850	395	0.
1		0140	21	34.	1		1205	146	0.	1		2230	271	0.	2		0855	396	0.
1		0145	22	38.	1		1210	147	0.	1		2235	272	0.	2		0900	397	0.
1		0150	23	39.	1		1215	148	0.	1		2240	273	0.	2		0905	398	0.
1		0155	24	36.	1		1220	149	0.	1		2245	274	0.	2		0910	399	0.
1		0200	25	32.	1		1225	150	0.	1		2250	275	0.	2		0915	400	0.
1		0205	26	28.	1		1230	151	0.	1		2255	276	0.	2		0920	401	0.
1		0210	27	29.	1		1235	152	0.	1		2300	277	0.	2		0925	402	0.
1		0215	28	38.	1		1240	153	0.	1		2305	278	0.	2		0930	403	0.
1		0220	29	48.	1		1245	154	0.	1		2310	279	0.	2		0935	404	0.
1		0225	30	56.	1		1250	155	0.	1		2315	280	0.	2		0940	405	0.
1		0230	31	57.	1		1255	156	0.	1		2320	281	0.	2		0945	406	0.
1		0235	32	56.	1		1300	157	0.	1		2325	282	0.	2		0950	407	0.
1		0240	33	61.	1		1305	158	0.	1		2330	283	0.	2		0955	408	0.
1		0245	34	69.	1		1310	159	0.	1		2335	284	0.	2		1000	409	0.
1		0250	35	68.	1		1315	160	0.	1		2340	285	0.	2		1005	410	0.
1		0255	36	62.	1		1320	161	0.	1		2345	286	0.	2		1010	411	0.
1		0300	37	62.	1		1325	162	0.	1		2350	287	0.	2		1015	412	0.
1		0305	38	80.	1		1330	163	0.	1		2355	288	0.	2		1020	413	0.
1		0310	39	114.	1		1335	164	0.	2		0000	289	0.	2		1025	414	0.
1		0315	40	173.	1		1340	165	0.	2		0005	290	0.	2		1030	415	0.
1		0320	41	287.	1		1345	166	0.	2		0010	291	0.	2		1035	416	0.
1		0325	42	446.	1		1350	167	0.	2		0015	292	0.	2		1040	417	0.
1		0330	43	640.	1		1355	168	0.	2		0020	293	0.	2		1045	418	0.
1		0335	44	789.	1		1400	169	0.	2		0025	294	0.	2		1050	419	0.
1		0340	45	833.	1		1405	170	0.	2		0030	295	0.	2		1055	420	0.
1		0345	46	842.	1		1410	171	0.	2		0035	296	0.	2		1100	421	0.
1		0350	47	803.	1		1415	172	0.	2		0040	297	0.	2		1105	422	0.
1		0355	48	718.	1		1420	173	0.	2		0045	298	0.	2		1110	423	0.
1		0400	49	630.	1		1425	174	0.	2		0050	299	0.	2		1115	424	0.
1		0405	50	534.	1		1430	175	0.	2		0055	300	0.	2		1120	425	0.
1		0410	51	437.	1		1435	176	0.	2		0100	301	0.	2		1125	426	0.
1		0415	52	358.	1		1440	177	0.	2		0105	302	0.	2		1130	427	0.
1		0420	53	300.	1		1445	178	0.	2		0110	303	0.	2		1135	428	0.
1		0425	54	260.	1		1450	179	0.	2		0115	304	0.	2		1140	429	0.
1		0430	55	245.	1		1455	180	0.	2		0120	305	0.	2		1145	430	0.
1		0435	56	247.	1		1500	181	0.	2		0125	306	0.	2		1150	431	0.
1		0440	57	245.	1		1505	182	0.	2		0130	307	0.	2		1155	432	0.
1		0445	58	242.	1		1510	183	0.	2		0135	308	0.	2		1200	433	0.
1		0450	59	249.	1		1515	184	0.	2		0140	309	0.	2		1205	434	0.
1		0455	60	252.	1		1520	185	0.	2		0145	310	0.	2		1210	435	0.
1		0500	61	236.	1		1525	186	0.	2		0150	311	0.	2		1215	436	0.
1		0505	62	212.	1		1530	187	0.	2		0155	312	0.	2		1220	437	0.
1		0510	63	185.	1		1535	188	0.	2		0200	313	0.	2		1225	438	0.
1		0515	64	157.	1		1540	189	0.	2		0205	314	0.	2		1230	439	0.
1		0520	65	130.	1		1545	190	0.	2		0210	315	0.	2		1235	440	0.
1		0525	66	106.	1		1550	191	0.	2		0215	316	0.	2		1240	441	0.
1		0530	67	86.	1		1555	192	0.	2		0220	317	0.	2		1245	442	0.
1		0535	68	68.	1		1600	193	0.	2		0225	318	0.	2		1250	443	0.
1		0540	69	55.	1		1605	194	0.	2		0230	319	0.	2		1255	444	0.
1		0545	70	47.	1		1610	195	0.	2		0235	320	0.	2		1300	445	0.
1		0550	71	42.	1		1615	196	0.	2		0240	321	0.	2		1305	446	0.
1		0555	72	35.	1		1620	197	0.	2		0245	322	0.	2		1310	447	0.
1		0600	73	31.	1		1625	198	0.	2		0250	323	0.	2		1315	448	0.
1		0605	74	27.	1		1630	199	0.	2		0255	324	0.	2		1320	449	0.
1		0610	75	22.	1		1635	200	0.	2		0300	325	0.	2		1325	450	0.
1		0615	76	17.	1		1640	201	0.	2		0305	326	0.	2		1330	451	0.
1		0620	77	14.	1		1645	202	0.	2		0310	327	0.	2		1335	452	0.
1		0625	78	10.	1		1650	203	0.	2		0315	328	0.	2		1340	453	0.

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0630	79	8.	*	1		1655	204	0.	*	2		0320	329	0.	*	2		1345	454	0.
1		0635	80	5.	*	1		1700	205	0.	*	2		0325	330	0.	*	2		1350	455	0.
1		0640	81	4.	*	1		1705	206	0.	*	2		0330	331	0.	*	2		1355	456	0.
1		0645	82	3.	*	1		1710	207	0.	*	2		0335	332	0.	*	2		1400	457	0.
1		0650	83	2.	*	1		1715	208	0.	*	2		0340	333	0.	*	2		1405	458	0.
1		0655	84	1.	*	1		1720	209	0.	*	2		0345	334	0.	*	2		1410	459	0.
1		0700	85	1.	*	1		1725	210	0.	*	2		0350	335	0.	*	2		1415	460	0.
1		0705	86	1.	*	1		1730	211	0.	*	2		0355	336	0.	*	2		1420	461	0.
1		0710	87	0.	*	1		1735	212	0.	*	2		0400	337	0.	*	2		1425	462	0.
1		0715	88	0.	*	1		1740	213	0.	*	2		0405	338	0.	*	2		1430	463	0.
1		0720	89	0.	*	1		1745	214	0.	*	2		0410	339	0.	*	2		1435	464	0.
1		0725	90	0.	*	1		1750	215	0.	*	2		0415	340	0.	*	2		1440	465	0.
1		0730	91	0.	*	1		1755	216	0.	*	2		0420	341	0.	*	2		1445	466	0.
1		0735	92	0.	*	1		1800	217	0.	*	2		0425	342	0.	*	2		1450	467	0.
1		0740	93	0.	*	1		1805	218	0.	*	2		0430	343	0.	*	2		1455	468	0.
1		0745	94	0.	*	1		1810	219	0.	*	2		0435	344	0.	*	2		1500	469	0.
1		0750	95	0.	*	1		1815	220	0.	*	2		0440	345	0.	*	2		1505	470	0.
1		0755	96	0.	*	1		1820	221	0.	*	2		0445	346	0.	*	2		1510	471	0.
1		0800	97	0.	*	1		1825	222	0.	*	2		0450	347	0.	*	2		1515	472	0.
1		0805	98	0.	*	1		1830	223	0.	*	2		0455	348	0.	*	2		1520	473	0.
1		0810	99	0.	*	1		1835	224	0.	*	2		0500	349	0.	*	2		1525	474	0.
1		0815	100	0.	*	1		1840	225	0.	*	2		0505	350	0.	*	2		1530	475	0.
1		0820	101	0.	*	1		1845	226	0.	*	2		0510	351	0.	*	2		1535	476	0.
1		0825	102	0.	*	1		1850	227	0.	*	2		0515	352	0.	*	2		1540	477	0.
1		0830	103	0.	*	1		1855	228	0.	*	2		0520	353	0.	*	2		1545	478	0.
1		0835	104	0.	*	1		1900	229	0.	*	2		0525	354	0.	*	2		1550	479	0.
1		0840	105	0.	*	1		1905	230	0.	*	2		0530	355	0.	*	2		1555	480	0.
1		0845	106	0.	*	1		1910	231	0.	*	2		0535	356	0.	*	2		1600	481	0.
1		0850	107	0.	*	1		1915	232	0.	*	2		0540	357	0.	*	2		1605	482	0.
1		0855	108	0.	*	1		1920	233	0.	*	2		0545	358	0.	*	2		1610	483	0.
1		0900	109	0.	*	1		1925	234	0.	*	2		0550	359	0.	*	2		1615	484	0.
1		0905	110	0.	*	1		1930	235	0.	*	2		0555	360	0.	*	2		1620	485	0.
1		0910	111	0.	*	1		1935	236	0.	*	2		0600	361	0.	*	2		1625	486	0.
1		0915	112	0.	*	1		1940	237	0.	*	2		0605	362	0.	*	2		1630	487	0.
1		0920	113	0.	*	1		1945	238	0.	*	2		0610	363	0.	*	2		1635	488	0.
1		0925	114	0.	*	1		1950	239	0.	*	2		0615	364	0.	*	2		1640	489	0.
1		0930	115	0.	*	1		1955	240	0.	*	2		0620	365	0.	*	2		1645	490	0.
1		0935	116	0.	*	1		2000	241	0.	*	2		0625	366	0.	*	2		1650	491	0.
1		0940	117	0.	*	1		2005	242	0.	*	2		0630	367	0.	*	2		1655	492	0.
1		0945	118	0.	*	1		2010	243	0.	*	2		0635	368	0.	*	2		1700	493	0.
1		0950	119	0.	*	1		2015	244	0.	*	2		0640	369	0.	*	2		1705	494	0.
1		0955	120	0.	*	1		2020	245	0.	*	2		0645	370	0.	*	2		1710	495	0.
1		1000	121	0.	*	1		2025	246	0.	*	2		0650	371	0.	*	2		1715	496	0.
1		1005	122	0.	*	1		2030	247	0.	*	2		0655	372	0.	*	2		1720	497	0.
1		1010	123	0.	*	1		2035	248	0.	*	2		0700	373	0.	*	2		1725	498	0.
1		1015	124	0.	*	1		2040	249	0.	*	2		0705	374	0.	*	2		1730	499	0.
1		1020	125	0.	*	1		2045	250	0.	*	2		0710	375	0.	*	2		1735	500	0.

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	41.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 842.	3.75		169.	42.	24.	24.
		(INCHES)	1.789	1.795	1.795	1.795
		(AC-FT)	84.	84.	84.	84.

CUMULATIVE AREA = .88 SQ MI

****

HYDROGRAPH AT STATION DB1
SUM OF 5 HYDROGRAPHS
PLAN 1, RATIO = .98

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		1025	126	0.	*	1		2050	251	0.	*	2		0715	376	0.
1		0005	2	0.	*	1		1030	127	0.	*	1		2055	252	0.	*	2		0720	377	0.
1		0010	3	1.	*	1		1035	128	0.	*	1		2100	253	0.	*	2		0725	378	0.
1		0015	4	2.	*	1		1040	129	0.	*	1		2105	254	0.	*	2		0730	379	0.
1		0020	5	4.	*	1		1045	130	0.	*	1		2110	255	0.	*	2		0735	380	0.
1		0025	6	7.	*	1		1050	131	0.	*	1		2115	256	0.	*	2		0740	381	0.
1		0030	7	11.	*	1		1055	132	0.	*	1		2120	257	0.	*	2		0745	382	0.
1		0035	8	12.	*	1		1100	133	0.	*	1		2125	258	0.	*	2		0750	383	0.
1		0040	9	10.	*	1		1105	134	0.	*	1		2130	259	0.	*	2		0755	384	0.
1		0045	10	7.	*	1		1110	135	0.	*	1		2135	260	0.	*	2		0800	385	0.
1		0050	11	6.	*	1		1115	136	0.	*	1		2140	261	0.	*	2		0805	386	0.
1		0055	12	5.	*	1		1120	137	0.	*	1		2145	262	0.	*	2		0810	387	0.
1		0100	13	4.	*	1		1125	138	0.	*	1		2150	263	0.	*	2		0815	388	0.
1		0105	14	4.	*	1		1130	139	0.	*	1		2155	264	0.	*	2		0820	389	0.
1		0110	15	5.	*	1		1135	140	0.	*	1		2200	265	0.	*	2		0825	390	0.
1		0115	16	7.	*	1		1140	141	0.	*	1		2205	266	0.	*	2		0830	391	0.
1		0120	17	8.	*	1		1145	142	0.	*	1		2210	267	0.	*	2		0835	392	0.
1		0125	18	12.	*	1		1150	143	0.	*	1		2215	268	0.	*	2		0840	393	0.
1		0130	19	20.	*	1		1155	144	0.	*	1		2220	269	0.	*	2		0845	394	0.
1		0135	20	27.	*	1		1200	145	0.	*	1		2225	270	0.	*	2		0850	395	0.
1		0140	21	32.	*	1		1205	146	0.	*	1		2230	271	0.	*	2		0855	396	0.
1		0145	22	36.	*	1		1210	147	0.	*	1		2235	272	0.	*	2		0900	397	0.
1		0150	23	36.	*	1		1215	148	0.	*	1		2240	273	0.	*	2		0905	398	0.
1		0155	24	34.	*	1		1220	149	0.	*	1		2245	274	0.	*	2		0910	399	0.
1		0200	25	30.	*	1		1225	150	0.	*	1		2250	275	0.	*	2		0915	400	0.
1		0205	26	27.	*	1		1230	151	0.	*	1		2255	276	0.	*	2		0920	401	0.
1		0210	27	28.	*	1		1235	152	0.	*	1		2300	277	0.	*	2		0925	402	0.
1		0215	28	36.	*	1		1240	153	0.	*	1		2305	278	0.	*	2		0930	403	0.
1		0220	29	46.	*	1		1245	154	0.	*	1		2310	279	0.	*	2		0935	404	0.
1		0225	30	53.	*	1		1250	155	0.	*	1		2315	280	0.	*	2		0940	405	0.
1		0230	31	55.	*	1		1255	156	0.	*	1		2320	281	0.	*	2		0945	406	0.
1		0235	32	54.	*	1		1300	157	0.	*	1		2325	282	0.	*	2		0950	407	0.
1		0240	33	59.	*	1		1305	158	0.	*	1		2330	283	0.	*	2		0955	408	0.
1		0245	34	66.	*	1		1310	159	0.	*	1		2335	284	0.	*	2		1000	409	0.
1		0250	35	65.	*	1		1315	160	0.	*	1		2340	285	0.	*	2		1005	410	0.
1		0255	36	59.	*	1		1320	161	0.	*	1		2345	286	0.	*	2		1010	411	0.
1		0300	37	60.	*	1		1325	162	0.	*	1		2350	287	0.	*	2		1015	412	0.
1		0305	38	77.	*	1		1330	163	0.	*	1		2355	288	0.	*	2		1020	413	0.
1		0310	39	110.	*	1		1335	164	0.	*	2		0000	289	0.	*	2		1025	414	0.
1		0315	40	167.	*	1		1340	165	0.	*	2		0005	290	0.	*	2		1030	415	0.
1		0320	41	278.	*	1		1345	166	0.	*	2		0010	291	0.	*	2		1035	416	0.
1		0325	42	432.	*	1		1350	167	0.	*	2		0015	292	0.	*	2		1040	417	0.
1		0330	43	621.	*	1		1355	168	0.	*	2		0020	293	0.	*	2		1045	418	0.
1		0335	44	766.	*	1		1400	169	0.	*	2		0025	294	0.	*	2		1050	419	0.
1		0340	45	809.	*	1		1405	170	0.	*	2		0030	295	0.	*	2		1055	420	0.
1		0345	46	818.	*	1		1410	171	0.	*	2		0035	296	0.	*	2		1100	421	0.
1		0350	47	781.	*	1		1415	172	0.	*	2		0040	297	0.	*	2		1105	422	0.
1		0355	48	698.	*	1		1420	173	0.	*	2		0045	298	0.	*	2		1110	423	0.
1		0400	49	612.	*	1		1425	174	0.	*	2		0050	299	0.	*	2		1115	424	0.
1		0405	50	519.	*	1		1430	175	0.	*	2		0055	300	0.	*	2		1120	425	0.
1		0410	51	425.	*	1		1435	176	0.	*	2		0100	301	0.	*	2		1125	426	0.
1		0415	52	349.	*	1		1440	177	0.	*	2		0105	302	0.	*	2		1130	427	0.
1		0420	53	292.	*	1		1445	178	0.	*	2		0110	303	0.	*	2		1135	428	0.
1		0425	54	253.	*	1		1450	179	0.	*	2		0115	304	0.	*	2		1140	429	0.
1		0430	55	239.	*	1		1455	180	0.	*	2		0120	305	0.	*	2		1145	430	0.
1		0435	56	240.	*	1		1500	181	0.	*	2		0125	306	0.	*	2		1150	431	0.
1		0440	57	239.	*	1		1505	182	0.	*	2		0130	307	0.	*	2		1155	432	0.
1		0445	58	236.	*	1		1510	183	0.	*	2		0135	308	0.	*	2		1200	433	0.

1	0450	59	243.	*	1	1515	184	0.	*	2	0140	309	0.	*	2	1205	434	0.		
1	0455	60	246.	*	1	1520	185	0.	*	2	0145	310	0.	*	2	1210	435	0.		
1	0500	61	230.	*	1	1525	186	0.	*	2	0150	311	0.	*	2	1215	436	0.		
1	0505	62	207.	*	1	1530	187	0.	*	2	0155	312	0.	*	2	1220	437	0.		
1	0510	63	181.	*	1	1535	188	0.	*	2	0200	313	0.	*	2	1225	438	0.		
1	0515	64	153.	*	1	1540	189	0.	*	2	0205	314	0.	*	2	1230	439	0.		
1	0520	65	127.	*	1	1545	190	0.	*	2	0210	315	0.	*	2	1235	440	0.		
1	0525	66	103.	*	1	1550	191	0.	*	2	0215	316	0.	*	2	1240	441	0.		
1	0530	67	84.	*	1	1555	192	0.	*	2	0220	317	0.	*	2	1245	442	0.		
1	0535	68	67.	*	1	1600	193	0.	*	2	0225	318	0.	*	2	1250	443	0.		
1	0540	69	54.	*	1	1605	194	0.	*	2	0230	319	0.	*	2	1255	444	0.		
1	0545	70	46.	*	1	1610	195	0.	*	2	0235	320	0.	*	2	1300	445	0.		
1	0550	71	41.	*	1	1615	196	0.	*	2	0240	321	0.	*	2	1305	446	0.		
1	0555	72	34.	*	1	1620	197	0.	*	2	0245	322	0.	*	2	1310	447	0.		
1	0600	73	30.	*	1	1625	198	0.	*	2	0250	323	0.	*	2	1315	448	0.		
1	0605	74	26.	*	1	1630	199	0.	*	2	0255	324	0.	*	2	1320	449	0.		
1	0610	75	21.	*	1	1635	200	0.	*	2	0300	325	0.	*	2	1325	450	0.		
1	0615	76	17.	*	1	1640	201	0.	*	2	0305	326	0.	*	2	1330	451	0.		
1	0620	77	13.	*	1	1645	202	0.	*	2	0310	327	0.	*	2	1335	452	0.		
1	0625	78	10.	*	1	1650	203	0.	*	2	0315	328	0.	*	2	1340	453	0.		
1	0630	79	7.	*	1	1655	204	0.	*	2	0320	329	0.	*	2	1345	454	0.		
1	0635	80	5.	*	1	1700	205	0.	*	2	0325	330	0.	*	2	1350	455	0.		
1	0640	81	4.	*	1	1705	206	0.	*	2	0330	331	0.	*	2	1355	456	0.		
1	0645	82	3.	*	1	1710	207	0.	*	2	0335	332	0.	*	2	1400	457	0.		
1	0650	83	2.	*	1	1715	208	0.	*	2	0340	333	0.	*	2	1405	458	0.		
1	0655	84	1.	*	1	1720	209	0.	*	2	0345	334	0.	*	2	1410	459	0.		
1	0700	85	1.	*	1	1725	210	0.	*	2	0350	335	0.	*	2	1415	460	0.		
1	0705	86	1.	*	1	1730	211	0.	*	2	0355	336	0.	*	2	1420	461	0.		
1	0710	87	0.	*	1	1735	212	0.	*	2	0400	337	0.	*	2	1425	462	0.		
1	0715	88	0.	*	1	1740	213	0.	*	2	0405	338	0.	*	2	1430	463	0.		
1	0720	89	0.	*	1	1745	214	0.	*	2	0410	339	0.	*	2	1435	464	0.		
1	0725	90	0.	*	1	1750	215	0.	*	2	0415	340	0.	*	2	1440	465	0.		
1	0730	91	0.	*	1	1755	216	0.	*	2	0420	341	0.	*	2	1445	466	0.		
1	0735	92	0.	*	1	1800	217	0.	*	2	0425	342	0.	*	2	1450	467	0.		
1	0740	93	0.	*	1	1805	218	0.	*	2	0430	343	0.	*	2	1455	468	0.		
1	0745	94	0.	*	1	1810	219	0.	*	2	0435	344	0.	*	2	1500	469	0.		
1	0750	95	0.	*	1	1815	220	0.	*	2	0440	345	0.	*	2	1505	470	0.		
1	0755	96	0.	*	1	1820	221	0.	*	2	0445	346	0.	*	2	1510	471	0.		
1	0800	97	0.	*	1	1825	222	0.	*	2	0450	347	0.	*	2	1515	472	0.		
1	0805	98	0.	*	1	1830	223	0.	*	2	0455	348	0.	*	2	1520	473	0.		
1	0810	99	0.	*	1	1835	224	0.	*	2	0500	349	0.	*	2	1525	474	0.		
1	0815	100	0.	*	1	1840	225	0.	*	2	0505	350	0.	*	2	1530	475	0.		
1	0820	101	0.	*	1	1845	226	0.	*	2	0510	351	0.	*	2	1535	476	0.		
1	0825	102	0.	*	1	1850	227	0.	*	2	0515	352	0.	*	2	1540	477	0.		
1	0830	103	0.	*	1	1855	228	0.	*	2	0520	353	0.	*	2	1545	478	0.		
1	0835	104	0.	*	1	1900	229	0.	*	2	0525	354	0.	*	2	1550	479	0.		
1	0840	105	0.	*	1	1905	230	0.	*	2	0530	355	0.	*	2	1555	480	0.		
1	0845	106	0.	*	1	1910	231	0.	*	2	0535	356	0.	*	2	1600	481	0.		
1	0850	107	0.	*	1	1915	232	0.	*	2	0540	357	0.	*	2	1605	482	0.		
1	0855	108	0.	*	1	1920	233	0.	*	2	0545	358	0.	*	2	1610	483	0.		
1	0900	109	0.	*	1	1925	234	0.	*	2	0550	359	0.	*	2	1615	484	0.		
1	0905	110	0.	*	1	1930	235	0.	*	2	0555	360	0.	*	2	1620	485	0.		
1	0910	111	0.	*	1	1935	236	0.	*	2	0600	361	0.	*	2	1625	486	0.		
1	0915	112	0.	*	1	1940	237	0.	*	2	0605	362	0.	*	2	1630	487	0.		
1	0920	113	0.	*	1	1945	238	0.	*	2	0610	363	0.	*	2	1635	488	0.		
1	0925	114	0.	*	1	1950	239	0.	*	2	0615	364	0.	*	2	1640	489	0.		
1	0930	115	0.	*	1	1955	240	0.	*	2	0620	365	0.	*	2	1645	490	0.		
1	0935	116	0.	*	1	2000	241	0.	*	2	0625	366	0.	*	2	1650	491	0.		
1	0940	117	0.	*	1	2005	242	0.	*	2	0630	367	0.	*	2	1655	492	0.		
1	0945	118	0.	*	1	2010	243	0.	*	2	0635	368	0.	*	2	1700	493	0.		
1	0950	119	0.	*	1	2015	244	0.	*	2	0640	369	0.	*	2	1705	494	0.		
1	0955	120	0.	*	1	2020	245	0.	*	2	0645	370	0.	*	2	1710	495	0.		
1	1000	121	0.	*	1	2025	246	0.	*	2	0650	371	0.	*	2	1715	496	0.		
1	1005	122	0.	*	1	2030	247	0.	*	2	0655	372	0.	*	2	1720	497	0.		
1	1010	123	0.	*	1	2035	248	0.	*	2	0700	373	0.	*	2	1725	498	0.		
1	1015	124	0.	*	1	2040	249	0.	*	2	0705	374	0.	*	2	1730	499	0.		
1	1020	125	0.	*	1	2045	250	0.	*	2	0710	375	0.	*	2	1735	500	0.		

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	41.58-HR
+ (CFS)	(HR)	(CFS)				
+ 818.	3.75		164.	41.	24.	24.
		(INCHES)	1.736	1.743	1.743	1.743
		(AC-FT)	81.	82.	82.	82.

CUMULATIVE AREA = .88 SQ MI

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          **************
          *            *
 89 KK    *    RDB1    *
          *            *
          **************

 91 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 92 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC    3025.50  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 93 SA               AREA         4.6       5.6       5.8       6.0       6.2       6.8       7.2       7.4       7.6       8.3

 94 SE          ELEVATION     3025.50   3027.00   3028.00   3029.00   3030.00   3033.00   3035.00   3036.00   3037.00   3040.00

 95 SQ          DISCHARGE          50.       61.       71.       75.     1436.     3921.     7136.

 96 SE          ELEVATION     3025.50   3030.00   3035.00   3037.00   3040.00   3043.00   3046.00
                                                            ***

                                   COMPUTED STORAGE-ELEVATION DATA

          STORAGE         .00      7.64     13.36     19.27     25.36     44.80     58.73     66.00     73.49     97.37
        ELEVATION     3025.50   3027.00   3028.00   3029.00   3030.00   3033.00   3035.00   3036.00   3037.00   3040.00

                                COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE         .00      7.64     13.36     19.27     25.36     44.80     58.73     66.00     73.49     97.37
          OUTFLOW       49.70     53.33     55.76     58.18     60.60     66.72     70.80     72.65     74.50   1436.00
        ELEVATION     3025.50   3027.00   3028.00   3029.00   3030.00   3033.00   3035.00   3036.00   3037.00   3040.00
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STORAGE	123.39	151.64
OUTFLOW	3920.50	7136.30
ELEVATION	3043.00	3046.00

HYDROGRAPH AT STATION RDB1
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	50.	.0	3025.5
1		0005	2	50.	-.2	3025.5
1		0010	3	50.	-.2	3025.5
1		0015	4	50.	-.2	3025.5
1		0020	5	50.	-.2	3025.5
1		0025	6	50.	-.2	3025.5
1		0030	7	50.	-.2	3025.5
1		0035	8	50.	-.2	3025.5
1		0040	9	50.	-.2	3025.5
1		0045	10	50.	-.2	3025.5
1		0050	11	50.	-.2	3025.5
1		0055	12	50.	-.2	3025.5
1		0100	13	50.	-.2	3025.5
1		0105	14	50.	-.2	3025.5
1		0110	15	50.	-.2	3025.5
1		0115	16	50.	-.2	3025.5
1		0120	17	50.	-.2	3025.5
1		0125	18	50.	-.2	3025.5
1		0130	19	50.	-.2	3025.5
1		0135	20	50.	-.2	3025.5
1		0140	21	50.	-.2	3025.5
1		0145	22	50.	-.2	3025.5
1		0150	23	50.	-.2	3025.5
1		0155	24	50.	-.2	3025.5
1		0200	25	50.	-.2	3025.5
1		0205	26	50.	-.2	3025.5
1		0210	27	50.	-.2	3025.5
1		0215	28	50.	-.2	3025.5
1		0220	29	50.	-.2	3025.5
1		0225	30	50.	-.2	3025.5
1		0230	31	50.	-.1	3025.5
1		0235	32	50.	-.1	3025.5
1		0240	33	50.	.0	3025.5
1		0245	34	50.	.1	3025.5
1		0250	35	50.	.2	3025.5
1		0255	36	50.	.3	3025.6
1		0300	37	50.	.4	3025.6
1		0305	38	50.	.6	3025.6
1		0310	39	50.	.9	3025.7
1		0315	40	50.	1.5	3025.8
1		0320	41	51.	2.8	3026.0
1		0325	42	52.	4.9	3026.5
1		0330	43	54.	8.3	3027.1
1		0335	44	56.	12.9	3027.9
1		0340	45	58.	18.1	3028.8
1		0345	46	60.	23.4	3029.7
1		0350	47	62.	28.7	3030.5
1		0355	48	63.	33.5	3031.3
1		0400	49	64.	37.7	3031.9
1		0405	50	66.	41.2	3032.5
1		0410	51	67.	44.1	3032.9
1		0415	52	67.	46.4	3033.2
1		0420	53	68.	48.2	3033.5
1		0425	54	68.	49.7	3033.7
1		0430	55	69.	50.9	3033.9
1		0435	56	69.	52.1	3034.1
1		0440	57	69.	53.4	3034.2
1		0445	58	70.	54.6	3034.4
1		0450	59	70.	55.8	3034.6
1		0455	60	70.	57.0	3034.8
1		0500	61	71.	58.2	3034.9
1		0505	62	71.	59.3	3035.1
1		0510	63	71.	60.1	3035.2
1		0515	64	71.	60.8	3035.3
1		0520	65	71.	61.3	3035.4
1		0525	66	72.	61.7	3035.4
1		0530	67	72.	61.8	3035.4
1		0535	68	72.	61.9	3035.4
1		0540	69	72.	61.8	3035.4
1		0545	70	72.	61.6	3035.4
1		0550	71	71.	61.5	3035.4
1		0555	72	71.	61.2	3035.3
1		0600	73	71.	61.0	3035.3
1		0605	74	71.	60.7	3035.3
1		0610	75	71.	60.3	3035.2
1		0615	76	71.	60.0	3035.2
1		0620	77	71.	59.6	3035.1
1		0625	78	71.	59.2	3035.1
1		0630	79	71.	58.8	3035.0
1		0635	80	71.	58.3	3034.9
1		0640	81	71.	57.9	3034.9
1		0645	82	70.	57.4	3034.8
1		0650	83	70.	56.9	3034.7
1		0655	84	70.	56.5	3034.7
1		0700	85	70.	56.0	3034.6
1		0705	86	70.	55.5	3034.5
1		0710	87	70.	55.0	3034.5
1		0715	88	70.	54.6	3034.4
1		0720	89	69.	54.1	3034.3
1		0725	90	69.	53.6	3034.3
1		0730	91	69.	53.1	3034.2
1		0735	92	69.	52.7	3034.1
1		0740	93	69.	52.2	3034.1
1		0745	94	69.	51.7	3034.0
1		0750	95	69.	51.2	3033.9
1		0755	96	68.	50.8	3033.9
1		0800	97	68.	50.3	3033.8
1		0805	98	68.	49.8	3033.7
1		0810	99	68.	49.4	3033.7
1		0815	100	68.	48.9	3033.6
1		0820	101	68.	48.4	3033.5
1		0825	102	68.	48.0	3033.5
1		0830	103	68.	47.5	3033.4
1		0835	104	67.	47.0	3033.3
1		0840	105	67.	46.6	3033.3
1		0845	106	67.	46.1	3033.2
1		0850	107	67.	45.6	3033.1
1		0855	108	67.	45.2	3033.1
1		0900	109	67.	44.7	3033.0
1		0905	110	67.	44.3	3032.9
1		0910	111	66.	43.8	3032.8
1		0915	112	66.	43.4	3032.8
1		0920	113	66.	42.9	3032.7
1		0925	114	66.	42.4	3032.6
1		0930	115	66.	42.0	3032.6
1		0935	116	66.	41.5	3032.5
1		1355	168	58.	19.3	3029.0
1		1400	169	58.	18.9	3028.9
1		1405	170	58.	18.5	3028.9
1		1410	171	58.	18.1	3028.8
1		1415	172	58.	17.7	3028.7
1		1420	173	57.	17.3	3028.7
1		1425	174	57.	16.9	3028.6
1		1430	175	57.	16.5	3028.5
1		1435	176	57.	16.1	3028.5
1		1440	177	57.	15.8	3028.4
1		1445	178	57.	15.4	3028.3
1		1450	179	56.	15.0	3028.3
1		1455	180	56.	14.6	3028.2
1		1500	181	56.	14.2	3028.1
1		1505	182	56.	13.8	3028.1
1		1510	183	56.	13.4	3028.0
1		1515	184	56.	13.0	3027.9
1		1520	185	55.	12.7	3027.9
1		1525	186	55.	12.3	3027.8
1		1530	187	55.	11.9	3027.7
1		1535	188	55.	11.5	3027.7
1		1540	189	55.	11.1	3027.6
1		1545	190	55.	10.8	3027.5
1		1550	191	54.	10.4	3027.5
1		1555	192	54.	10.0	3027.4
1		1600	193	54.	9.6	3027.3
1		1605	194	54.	9.3	3027.3
1		1610	195	54.	8.9	3027.2
1		1615	196	54.	8.5	3027.2
1		1620	197	54.	8.2	3027.1
1		1625	198	53.	7.8	3027.0
1		1630	199	53.	7.4	3027.0
1		1635	200	53.	7.1	3026.9
1		1640	201	53.	6.7	3026.8
1		1645	202	53.	6.3	3026.7
1		1650	203	53.	6.0	3026.7
1		1655	204	52.	5.6	3026.6
1		1700	205	52.	5.2	3026.5
1		1705	206	52.	4.9	3026.5
1		1710	207	52.	4.5	3026.4
1		1715	208	52.	4.2	3026.3
1		1720	209	52.	3.8	3026.2
1		1725	210	51.	3.5	3026.2
1		1730	211	51.	3.1	3026.1
1		1735	212	51.	2.8	3026.0
1		1740	213	51.	2.4	3026.0
1		1745	214	51.	2.1	3025.9
1		1750	215	51.	1.7	3025.8
1		1755	216	50.	1.4	3025.8
1		1800	217	50.	1.0	3025.7
1		1805	218	50.	.7	3025.6
1		1810	219	50.	.3	3025.6
1		1815	220	50.	.0	3025.5
1		1820	221	50.	-.2	3025.5
1		1825	222	50.	-.2	3025.5
1		1830	223	50.	-.2	3025.5
1		1835	224	50.	-.2	3025.5
1		1840	225	50.	-.2	3025.5
1		1845	226	50.	-.2	3025.5
1		1850	227	50.	-.2	3025.5
1		1855	228	50.	-.2	3025.5
1		1900	229	50.	-.2	3025.5
1		1905	230	50.	-.2	3025.5
1		1910	231	50.	-.2	3025.5
1		1915	232	50.	-.2	3025.5
1		1920	233	50.	-.2	3025.5
1		1925	234	50.	-.2	3025.5
1		1930	235	50.	-.2	3025.5
1		1935	236	50.	-.2	3025.5
1		1940	237	50.	-.2	3025.5
1		1945	238	50.	-.2	3025.5
1		1950	239	50.	-.2	3025.5
1		1955	240	50.	-.2	3025.5
1		2000	241	50.	-.2	3025.5
1		2005	242	50.	-.2	3025.5
1		2010	243	50.	-.2	3025.5
1		2015	244	50.	-.2	3025.5
1		2020	245	50.	-.2	3025.5
1		2025	246	50.	-.2	3025.5
1		2030	247	50.	-.2	3025.5
1		2035	248	50.	-.2	3025.5
1		2040	249	50.	-.2	3025.5
1		2045	250	50.	-.2	3025.5
1		2050	251	50.	-.2	3025.5
1		2055	252	50.	-.2	3025.5
1		2100	253	50.	-.2	3025.5
1		2105	254	50.	-.2	3025.5
1		2110	255	50.	-.2	3025.5
1		2115	256	50.	-.2	3025.5
1		2120	257	50.	-.2	3025.5
1		2125	258	50.	-.2	3025.5
1		2130	259	50.	-.2	3025.5
1		2135	260	50.	-.2	3025.5
1		2140	261	50.	-.2	3025.5
1		2145	262	50.	-.2	3025.5
1		2150	263	50.	-.2	3025.5
1		2155	264	50.	-.2	3025.5
1		2200	265	50.	-.2	3025.5
1		2205	266	50.	-.2	3025.5
1		2210	267	50.	-.2	3025.5
1		2215	268	50.	-.2	3025.5
1		2220	269	50.	-.2	3025.5
1		2225	270	50.	-.2	3025.5
1		2230	271	50.	-.2	3025.5
1		2235	272	50.	-.2	3025.5
1		2240	273	50.	-.2	3025.5
1		2245	274	50.	-.2	3025.5
1		2250	275	50.	-.2	3025.5
1		2255	276	50.	-.2	3025.5
1		2300	277	50.	-.2	3025.5
1		2305	278	50.	-.2	3025.5
1		2310	279	50.	-.2	3025.5
1		2315	280	50.	-.2	3025.5
1		2320	281	50.	-.2	3025.5
1		2325	282	50.	-.2	3025.5
1		2330	283	50.	-.2	3025.5
2		0350	335	50.	-.2	3025.5
2		0355	336	50.	-.2	3025.5
2		0400	337	50.	-.2	3025.5
2		0405	338	50.	-.2	3025.5
2		0410	339	50.	-.2	3025.5
2		0415	340	50.	-.2	3025.5
2		0420	341	50.	-.2	3025.5
2		0425	342	50.	-.2	3025.5
2		0430	343	50.	-.2	3025.5
2		0435	344	50.	-.2	3025.5
2		0440	345	50.	-.2	3025.5
2		0445	346	50.	-.2	3025.5
2		0450	347	50.	-.2	3025.5
2		0455	348	50.	-.2	3025.5
2		0500	349	50.	-.2	3025.5
2		0505	350	50.	-.2	3025.5
2		0510	351	50.	-.2	3025.5
2		0515	352	50.	-.2	3025.5
2		0520	353	50.	-.2	3025.5
2		0525	354	50.	-.2	3025.5
2		0530	355	50.	-.2	3025.5
2		0535	356	50.	-.2	3025.5
2		0540	357	50.	-.2	3025.5
2		0545	358	50.	-.2	3025.5
2		0550	359	50.	-.2	3025.5
2		0555	360	50.	-.2	3025.5
2		0600	361	50.	-.2	3025.5
2		0605	362	50.	-.2	3025.5
2		0610	363	50.	-.2	3025.5
2		0615	364	50.	-.2	3025.5
2		0620	365	50.	-.2	3025.5
2		0625	366	50.	-.2	3025.5
2		0630	367	50.	-.2	3025.5
2		0635	368	50.	-.2	3025.5
2		0640	369	50.	-.2	3025.5
2		0645	370	50.	-.2	3025.5
2		0650	371	50.	-.2	3025.5
2		0655	372	50.	-.2	3025.5
2		0700	373	50.	-.2	3025.5
2		0705	374	50.	-.2	3025.5
2		0710	375	50.	-.2	3025.5
2		0715	376	50.	-.2	3025.5
2		0720	377	50.	-.2	3025.5
2		0725	378	50.	-.2	3025.5
2		0730	379	50.	-.2	3025.5
2		0735	380	50.	-.2	3025.5
2		0740	381	50.	-.2	3025.5
2		0745	382	50.	-.2	3025.5
2		0750	383	50.	-.2	3025.5
2		0755	384	50.	-.2	3025.5
2		0800	385	50.	-.2	3025.5
2		0805	386	50.	-.2	3025.5
2		0810	387	50.	-.2	3025.5
2		0815	388	50.	-.2	3025.5
2		0820	389	50.	-.2	3025.5
2		0825	390	50.	-.2	3025.5
2		0830	391	50.	-.2	3025.5
2		0835	392	50.	-.2	3025.5
2		0840	393	50.	-.2	3025.5
2		0845	394	50.	-.2	3025.5
2		0850	395	50.	-.2	3025.5
2		0855	396	50.	-.2	3025.5
2		0900	397	50.	-.2	3025.5
2		0905	398	50.	-.2	3025.5
2		0910	399	50.	-.2	3025.5
2		0915	400	50.	-.2	3025.5
2		0920	401	50.	-.2	3025.5
2		0925	402	50.	-.2	3025.5
2		0930	403	50.	-.2	3025.5
2		0935	404	50.	-.2	3025.5
2		0940	405	50.	-.2	3025.5
2		0945	406	50.	-.2	3025.5
2		0950	407	50.	-.2	3025.5
2		0955	408	50.	-.2	3025.5
2		1000	409	50.	-.2	3025.5
2		1005	410	50.	-.2	3025.5
2		1010	411	50.	-.2	3025.5
2		1015	412	50.	-.2	3025.5
2		1020	413	50.	-.2	3025.5
2		1025	414	50.	-.2	3025.5
2		1030	415	50.	-.2	3025.5
2		1035	416	50.	-.2	3025.5
2		1040	417	50.	-.2	3025.5
2		1045	418	50.	-.2	3025.5
2		1050	419	50.	-.2	3025.5
2		1055	420	50.	-.2	3025.5
2		1100	421	50.	-.2	3025.5
2		1105	422	50.	-.2	3025.5
2		1110	423	50.	-.2	3025.5
2		1115	424	50.	-.2	3025.5
2		1120	425	50.	-.2	3025.5
2		1125	426	50.	-.2	3025.5
2		1130	427	50.	-.2	3025.5
2		1135	428	50.	-.2	3025.5
2		1140	429	50.	-.2	3025.5
2		1145	430	50.	-.2	3025.5
2		1150	431	50.	-.2	3025.5
2		1155	432	50.	-.2	3025.5
2		1200	433	50.	-.2	3025.5
2		1205	434	50.	-.2	3025.5
2		1210	435	50.	-.2	3025.5
2		1215	436	50.	-.2	3025.5
2		1220	437	50.	-.2	3025.5
2		1225	438	50.	-.2	3025.5
2		1230	439	50.	-.2	3025.5
2		1235	440	50.	-.2	3025.5
2		1240	441	50.	-.2	3025.5
2		1245	442	50.	-.2	3025.5
2		1250	443	50.	-.2	3025.5
2		1255	444	50.	-.2	3025.5
2		1300	445	50.	-.2	3025.5
2		1305	446	50.	-.2	3025.5
2		1310	447	50.	-.2	3025.5
2		1315	448	50.	-.2	3025.5
2		1320	449	50.	-.2	3025.5
2		1325	450	50.	-.2	3025.5

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0940	117		66.	41.1	3032.4 *	1	2335	284		50.	-.2	3025.5 *	2	1330	451		50.	-.2	3025.5
1	0945	118		65.	40.6	3032.4 *	1	2340	285		50.	-.2	3025.5 *	2	1335	452		50.	-.2	3025.5
1	0950	119		65.	40.2	3032.3 *	1	2345	286		50.	-.2	3025.5 *	2	1340	453		50.	-.2	3025.5
1	0955	120		65.	39.7	3032.2 *	1	2350	287		50.	-.2	3025.5 *	2	1345	454		50.	-.2	3025.5
1	1000	121		65.	39.3	3032.1 *	1	2355	288		50.	-.2	3025.5 *	2	1350	455		50.	-.2	3025.5
1	1005	122		65.	38.8	3032.1 *	2	0000	289		50.	-.2	3025.5 *	2	1355	456		50.	-.2	3025.5
1	1010	123		65.	38.4	3032.0 *	2	0005	290		50.	-.2	3025.5 *	2	1400	457		50.	-.2	3025.5
1	1015	124		65.	37.9	3031.9 *	2	0010	291		50.	-.2	3025.5 *	2	1405	458		50.	-.2	3025.5
1	1020	125		64.	37.5	3031.9 *	2	0015	292		50.	-.2	3025.5 *	2	1410	459		50.	-.2	3025.5
1	1025	126		64.	37.1	3031.8 *	2	0020	293		50.	-.2	3025.5 *	2	1415	460		50.	-.2	3025.5
1	1030	127		64.	36.6	3031.7 *	2	0025	294		50.	-.2	3025.5 *	2	1420	461		50.	-.2	3025.5
1	1035	128		64.	36.2	3031.7 *	2	0030	295		50.	-.2	3025.5 *	2	1425	462		50.	-.2	3025.5
1	1040	129		64.	35.7	3031.6 *	2	0035	296		50.	-.2	3025.5 *	2	1430	463		50.	-.2	3025.5
1	1045	130		64.	35.3	3031.5 *	2	0040	297		50.	-.2	3025.5 *	2	1435	464		50.	-.2	3025.5
1	1050	131		64.	34.9	3031.5 *	2	0045	298		50.	-.2	3025.5 *	2	1440	465		50.	-.2	3025.5
1	1055	132		63.	34.4	3031.4 *	2	0050	299		50.	-.2	3025.5 *	2	1445	466		50.	-.2	3025.5
1	1100	133		63.	34.0	3031.3 *	2	0055	300		50.	-.2	3025.5 *	2	1450	467		50.	-.2	3025.5
1	1105	134		63.	33.5	3031.3 *	2	0100	301		50.	-.2	3025.5 *	2	1455	468		50.	-.2	3025.5
1	1110	135		63.	33.1	3031.2 *	2	0105	302		50.	-.2	3025.5 *	2	1500	469		50.	-.2	3025.5
1	1115	136		63.	32.7	3031.1 *	2	0110	303		50.	-.2	3025.5 *	2	1505	470		50.	-.2	3025.5
1	1120	137		63.	32.2	3031.1 *	2	0115	304		50.	-.2	3025.5 *	2	1510	471		50.	-.2	3025.5
1	1125	138		63.	31.8	3031.0 *	2	0120	305		50.	-.2	3025.5 *	2	1515	472		50.	-.2	3025.5
1	1130	139		62.	31.4	3030.9 *	2	0125	306		50.	-.2	3025.5 *	2	1520	473		50.	-.2	3025.5
1	1135	140		62.	31.0	3030.9 *	2	0130	307		50.	-.2	3025.5 *	2	1525	474		50.	-.2	3025.5
1	1140	141		62.	30.5	3030.8 *	2	0135	308		50.	-.2	3025.5 *	2	1530	475		50.	-.2	3025.5
1	1145	142		62.	30.1	3030.7 *	2	0140	309		50.	-.2	3025.5 *	2	1535	476		50.	-.2	3025.5
1	1150	143		62.	29.7	3030.7 *	2	0145	310		50.	-.2	3025.5 *	2	1540	477		50.	-.2	3025.5
1	1155	144		62.	29.2	3030.6 *	2	0150	311		50.	-.2	3025.5 *	2	1545	478		50.	-.2	3025.5
1	1200	145		62.	28.8	3030.5 *	2	0155	312		50.	-.2	3025.5 *	2	1550	479		50.	-.2	3025.5
1	1205	146		62.	28.4	3030.5 *	2	0200	313		50.	-.2	3025.5 *	2	1555	480		50.	-.2	3025.5
1	1210	147		61.	28.0	3030.4 *	2	0205	314		50.	-.2	3025.5 *	2	1600	481		50.	-.2	3025.5
1	1215	148		61.	27.5	3030.3 *	2	0210	315		50.	-.2	3025.5 *	2	1605	482		50.	-.2	3025.5
1	1220	149		61.	27.1	3030.3 *	2	0215	316		50.	-.2	3025.5 *	2	1610	483		50.	-.2	3025.5
1	1225	150		61.	26.7	3030.2 *	2	0220	317		50.	-.2	3025.5 *	2	1615	484		50.	-.2	3025.5
1	1230	151		61.	26.3	3030.1 *	2	0225	318		50.	-.2	3025.5 *	2	1620	485		50.	-.2	3025.5
1	1235	152		61.	25.9	3030.1 *	2	0230	319		50.	-.2	3025.5 *	2	1625	486		50.	-.2	3025.5
1	1240	153		61.	25.4	3030.0 *	2	0235	320		50.	-.2	3025.5 *	2	1630	487		50.	-.2	3025.5
1	1245	154		60.	25.0	3029.9 *	2	0240	321		50.	-.2	3025.5 *	2	1635	488		50.	-.2	3025.5
1	1250	155		60.	24.6	3029.9 *	2	0245	322		50.	-.2	3025.5 *	2	1640	489		50.	-.2	3025.5
1	1255	156		60.	24.2	3029.8 *	2	0250	323		50.	-.2	3025.5 *	2	1645	490		50.	-.2	3025.5
1	1300	157		60.	23.8	3029.7 *	2	0255	324		50.	-.2	3025.5 *	2	1650	491		50.	-.2	3025.5
1	1305	158		60.	23.4	3029.7 *	2	0300	325		50.	-.2	3025.5 *	2	1655	492		50.	-.2	3025.5
1	1310	159		60.	23.0	3029.6 *	2	0305	326		50.	-.2	3025.5 *	2	1700	493		50.	-.2	3025.5
1	1315	160		59.	22.6	3029.5 *	2	0310	327		50.	-.2	3025.5 *	2	1705	494		50.	-.2	3025.5
1	1320	161		59.	22.1	3029.5 *	2	0315	328		50.	-.2	3025.5 *	2	1710	495		50.	-.2	3025.5
1	1325	162		59.	21.7	3029.4 *	2	0320	329		50.	-.2	3025.5 *	2	1715	496		50.	-.2	3025.5
1	1330	163		59.	21.3	3029.3 *	2	0325	330		50.	-.2	3025.5 *	2	1720	497		50.	-.2	3025.5
1	1335	164		59.	20.9	3029.3 *	2	0330	331		50.	-.2	3025.5 *	2	1725	498		50.	-.2	3025.5
1	1340	165		59.	20.5	3029.2 *	2	0335	332		50.	-.2	3025.5 *	2	1730	499		50.	-.2	3025.5
1	1345	166		59.	20.1	3029.1 *	2	0340	333		50.	-.2	3025.5 *	2	1735	500		50.	-.2	3025.5
1	1350	167		58.	19.7	3029.1 *	2	0345	334		50.	-.2	3025.5 *							

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	41.58-HR	
+ (CFS)	(HR)	(CFS)				
+ 72.	5.58		69.	57.	54.	54.
		(INCHES)	.729	2.434	3.976	3.976
		(AC-FT)	34.	114.	186.	186.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	41.58-HR
+ (AC-FT)	(HR)				
62.	5.58	52.	20.	12.	11.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	41.58-HR
+ (FEET)	(HR)				
3035.43	5.58	3034.04	3028.88	3027.45	3027.45

CUMULATIVE AREA = .88 SQ MI

HYDROGRAPH AT STATION RDB1
PLAN 1, RATIO = .98

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000		1	50.	.0	3025.5 *	1	1355	168		57.	17.5	3028.7 *	2	0350	335		50.	-.2	3025.5
1	0005		2	50.	-.2	3025.5 *	1	1400	169		57.	17.2	3028.6 *	2	0355	336		50.	-.2	3025.5
1	0010		3	50.	-.2	3025.5 *	1	1405	170		57.	16.8	3028.6 *	2	0400	337		50.	-.2	3025.5
1	0015		4	50.	-.2	3025.5 *	1	1410	171		57.	16.4	3028.5 *	2	0405	338		50.	-.2	3025.5
1	0020		5	50.	-.2	3025.5 *	1	1415	172		57.	16.0	3028.4 *	2	0410	339		50.	-.2	3025.5
1	0025		6	50.	-.2	3025.5 *	1	1420	173		57.	15.6	3028.4 *	2	0415	340		50.	-.2	3025.5
1	0030		7	50.	-.2	3025.5 *	1	1425	174		57.	15.2	3028.3 *	2	0420	341		50.	-.2	3025.5
1	0035		8	50.	-.2	3025.5 *	1	1430	175		56.	14.8	3028.2 *	2	0425	342		50.	-.2	3025.5
1	0040		9	50.	-.2	3025.5 *	1	1435	176		56.	14.4	3028.2 *	2	0430	343		50.	-.2	3025.5
1	0045		10	50.	-.2	3025.5 *	1	1440	177		56.	14.0	3028.1 *	2	0435	344		50.	-.2	3025.5
1	0050		11	50.	-.2	3025.5 *	1	1445	178		56.	13.6	3028.0 *	2	0440	345		50.	-.2	3025.5
1	0055		12	50.	-.2	3025.5 *	1	1450	179		56.	13.3	3028.0 *	2	0445	346		50.	-.2	3025.5
1	0100		13	50.	-.2	3025.5 *	1	1455	180		56.	12.9	3027.9 *	2	0450	347		50.	-.2	3025.5
1	0105		14	50.	-.2	3025.5 *	1	1500	181		55.	12.5	3027.8 *	2	0455	348		50.	-.2	3025.5
1	0110		15	50.	-.2	3025.5 *	1	1505	182		55.	12.1	3027.8 *	2	0500	349		50.	-.2	3025.5
1	0115		16	50.	-.2	3025.5 *	1	1510	183		55.	11.7	3027.7 *	2	0505	350		50.	-.2	3025.5
1	0120		17	50.	-.2	3025.5 *	1	1515	184		55.	11.4	3027.6 *	2	0510	351		50.	-.2	3025.5
1	0125		18	50.	-.2	3025.5 *	1	1520	185		55.	11.0	3027.6 *	2	0515	352		50.	-.2	3025.5
1	0130		19	50.	-.2	3025.5 *	1	1525	186		55.	10.6	3027.5 *	2	0520	353		50.	-.2	3025.5
1	0135		20	50.	-.2	3025.5 *	1	1530	187		54.	10.2	3027.5 *	2	0525	354		50.	-.2	3025.5
1	0140		21	50.	-.2	3025.5 *	1	1535	188		54.	9.9	3027.4 *	2	0530	355		50.	-.2	3025.5
1	0145		22	50.	-.2	3025.5 *	1	1540	189		54.	9.5	3027.3 *	2	0535	356		50.	-.2	3025.5
1	0150		23	50.	-.2	3025.5 *	1	1545	190		54.	9.1	3027.3 *	2	0540	357		50.	-.2	3025.5
1	0155		24	50.	-.2	3025.5 *	1	1550	191		54.	8.7	3027.2 *	2	0545	358		50.	-.2	3025.5
1	0200		25	50.	-.2	3025.5 *	1	1555	192		54.	8.4	3027.1 *	2	0550	359		50.	-.2	3025.5
1	0205		26	50.	-.2	3025.5 *	1	1600	193		53.	8.0	3027.1 *	2	0555	360		50.	-.2	3025.5
1	0210		27	50.	-.2	3025.5 *	1	1605	194		53.	7.6	3027.0 *	2	0600	361		50.	-.2	3025.5
1	0215		28	50.	-.2	3025.5 *	1	1610	195		53.	7.3	3026.9 *	2	0605	362		50.	-.2	3025.5
1	0220		29	50.	-.2	3025.5 *	1	1615	196		53.	6.9	3026.9 *	2	0610	363		50.	-.2	3025.5
1	0225		30	50.	-.2	3025.5 *	1	1620	197		53.	6.5	3026.8 *	2	0615	364		50.	-.2	3025.5
1	0230		31	50.	-.1	3025.5 *	1	1625	198		53.	6.2	3026.7 *	2	0620	365		50.	-.2	3025.5
1	0235		32	50.	-.1	3025.5 *	1	1630	199		52.	5.8	3026.6 *	2	0625	366		50.	-.2	3025.5
1	0240		33	50.	-.1	3025.5 *	1	1635	200		52.	5.4	3026.6 *	2	0630	367		50.	-.2	3025.5
1	0245		34	50.	.0	3025.5 *	1	1640	201		52.	5.1	3026.5 *	2	0635	368		50.	-.2	3025.5
1	0250		35	50.	.1	3025.5 *	1	1645	202		52.	4.7	3026.4 *	2	0640	369		50.	-.2	3025.5
1	0255		36	50.	.2	3025.5 *	1	1650	203		52.	4.4	3026.4 *	2	0645	370		50.	-.2	3025.5
1	0300		37	50.	.3	3025.6 *	1	1655	204		52.	4.0	3026.3 *	2	0650	371		50.	-.2	3025.5
1	0305		38	50.	.4	3025.6 *	1	1700	205		51.	3.7	3026.2 *	2	0655	372		50.	-.2	3025.5
1	0310		39	50.	.7	3025.6 *	1	1705	206		51.	3.3	3026.1 *	2	0700	373		50.	-.2	3025.5
1	0315		40	50.	1.3	3025.8 *	1	1710	207		51.	3.0	3026.1 *	2	0705	374		50.	-.2	3025.5
1	0320		41	51.	2.5	3026.0 *	1	1715	208		51.	2.6	3026.0 *	2	0710	375		50.	-.2	3025.5
1	0325		42	52.	4.6	3026.4 *	1	1720	209		51.	2.3	3025.9 *	2	0715	376		50.	-.2	3025.5
1	0330		43	53.	7.9	3027.0 *	1	1725	210		51.	1.9	3025.9 *	2	0720	377		50.	-.2	3025.5
1	0335		44	55.	12.3	3027.8 *	1	1730	211		50.	1.6	3025.8 *	2	0725	378		50.	-.2	3025.5
1	0340		45	57.	17.3	3028.7 *	1	1735	212		50.	1.2	3025.7 *	2	0730	379		50.	-.2	3025.5

1	0345	46	59.	22.5	3029.5	*	1	1740	213	50.	.9	3025.7	*	2	0735	380	50.	-.2	3025.5
1	0350	47	61.	27.6	3030.3	*	1	1745	214	50.	.5	3025.6	*	2	0740	381	50.	-.2	3025.5
1	0355	48	63.	32.3	3031.1	*	1	1750	215	50.	.2	3025.5	*	2	0745	382	50.	-.2	3025.5
1	0400	49	64.	36.3	3031.7	*	1	1755	216	50.	-.2	3025.5	*	2	0750	383	50.	-.2	3025.5
1	0405	50	65.	39.8	3032.2	*	1	1800	217	50.	-.2	3025.5	*	2	0755	384	50.	-.2	3025.5
1	0410	51	66.	42.6	3032.7	*	1	1805	218	50.	-.2	3025.5	*	2	0800	385	50.	-.2	3025.5
1	0415	52	67.	44.8	3033.0	*	1	1810	219	50.	-.2	3025.5	*	2	0805	386	50.	-.2	3025.5
1	0420	53	67.	46.5	3033.2	*	1	1815	220	50.	-.2	3025.5	*	2	0810	387	50.	-.2	3025.5
1	0425	54	68.	47.9	3033.5	*	1	1820	221	50.	-.2	3025.5	*	2	0815	388	50.	-.2	3025.5
1	0430	55	68.	49.2	3033.6	*	1	1825	222	50.	-.2	3025.5	*	2	0820	389	50.	-.2	3025.5
1	0435	56	68.	50.4	3033.8	*	1	1830	223	50.	-.2	3025.5	*	2	0825	390	50.	-.2	3025.5
1	0440	57	69.	51.5	3034.0	*	1	1835	224	50.	-.2	3025.5	*	2	0830	391	50.	-.2	3025.5
1	0445	58	69.	52.7	3034.1	*	1	1840	225	50.	-.2	3025.5	*	2	0835	392	50.	-.2	3025.5
1	0450	59	69.	53.9	3034.3	*	1	1845	226	50.	-.2	3025.5	*	2	0840	393	50.	-.2	3025.5
1	0455	60	70.	55.1	3034.5	*	1	1850	227	50.	-.2	3025.5	*	2	0845	394	50.	-.2	3025.5
1	0500	61	70.	56.2	3034.6	*	1	1855	228	50.	-.2	3025.5	*	2	0850	395	50.	-.2	3025.5
1	0505	62	70.	57.2	3034.8	*	1	1900	229	50.	-.2	3025.5	*	2	0855	396	50.	-.2	3025.5
1	0510	63	71.	58.1	3034.9	*	1	1905	230	50.	-.2	3025.5	*	2	0900	397	50.	-.2	3025.5
1	0515	64	71.	58.8	3035.0	*	1	1910	231	50.	-.2	3025.5	*	2	0905	398	50.	-.2	3025.5
1	0520	65	71.	59.2	3035.1	*	1	1915	232	50.	-.2	3025.5	*	2	0910	399	50.	-.2	3025.5
1	0525	66	71.	59.5	3035.1	*	1	1920	233	50.	-.2	3025.5	*	2	0915	400	50.	-.2	3025.5
1	0530	67	71.	59.7	3035.1	*	1	1925	234	50.	-.2	3025.5	*	2	0920	401	50.	-.2	3025.5
1	0535	68	71.	59.7	3035.1	*	1	1930	235	50.	-.2	3025.5	*	2	0925	402	50.	-.2	3025.5
1	0540	69	71.	59.6	3035.1	*	1	1935	236	50.	-.2	3025.5	*	2	0930	403	50.	-.2	3025.5
1	0545	70	71.	59.5	3035.1	*	1	1940	237	50.	-.2	3025.5	*	2	0935	404	50.	-.2	3025.5
1	0550	71	71.	59.3	3035.1	*	1	1945	238	50.	-.2	3025.5	*	2	0940	405	50.	-.2	3025.5
1	0555	72	71.	59.1	3035.0	*	1	1950	239	50.	-.2	3025.5	*	2	0945	406	50.	-.2	3025.5
1	0600	73	71.	58.8	3035.0	*	1	1955	240	50.	-.2	3025.5	*	2	0950	407	50.	-.2	3025.5
1	0605	74	71.	58.5	3035.0	*	1	2000	241	50.	-.2	3025.5	*	2	0955	408	50.	-.2	3025.5
1	0610	75	71.	58.2	3034.9	*	1	2005	242	50.	-.2	3025.5	*	2	1000	409	50.	-.2	3025.5
1	0615	76	71.	57.8	3034.9	*	1	2010	243	50.	-.2	3025.5	*	2	1005	410	50.	-.2	3025.5
1	0620	77	70.	57.5	3034.8	*	1	2015	244	50.	-.2	3025.5	*	2	1010	411	50.	-.2	3025.5
1	0625	78	70.	57.1	3034.8	*	1	2020	245	50.	-.2	3025.5	*	2	1015	412	50.	-.2	3025.5
1	0630	79	70.	56.6	3034.7	*	1	2025	246	50.	-.2	3025.5	*	2	1020	413	50.	-.2	3025.5
1	0635	80	70.	56.2	3034.6	*	1	2030	247	50.	-.2	3025.5	*	2	1025	414	50.	-.2	3025.5
1	0640	81	70.	55.7	3034.6	*	1	2035	248	50.	-.2	3025.5	*	2	1030	415	50.	-.2	3025.5
1	0645	82	70.	55.3	3034.5	*	1	2040	249	50.	-.2	3025.5	*	2	1035	416	50.	-.2	3025.5
1	0650	83	70.	54.8	3034.4	*	1	2045	250	50.	-.2	3025.5	*	2	1040	417	50.	-.2	3025.5
1	0655	84	70.	54.3	3034.4	*	1	2050	251	50.	-.2	3025.5	*	2	1045	418	50.	-.2	3025.5
1	0700	85	69.	53.9	3034.3	*	1	2055	252	50.	-.2	3025.5	*	2	1050	419	50.	-.2	3025.5
1	0705	86	69.	53.4	3034.2	*	1	2100	253	50.	-.2	3025.5	*	2	1055	420	50.	-.2	3025.5
1	0710	87	69.	52.9	3034.2	*	1	2105	254	50.	-.2	3025.5	*	2	1100	421	50.	-.2	3025.5
1	0715	88	69.	52.5	3034.1	*	1	2110	255	50.	-.2	3025.5	*	2	1105	422	50.	-.2	3025.5
1	0720	89	69.	52.0	3034.0	*	1	2115	256	50.	-.2	3025.5	*	2	1110	423	50.	-.2	3025.5
1	0725	90	69.	51.5	3034.0	*	1	2120	257	50.	-.2	3025.5	*	2	1115	424	50.	-.2	3025.5
1	0730	91	69.	51.0	3033.9	*	1	2125	258	50.	-.2	3025.5	*	2	1120	425	50.	-.2	3025.5
1	0735	92	68.	50.6	3033.8	*	1	2130	259	50.	-.2	3025.5	*	2	1125	426	50.	-.2	3025.5
1	0740	93	68.	50.1	3033.8	*	1	2135	260	50.	-.2	3025.5	*	2	1130	427	50.	-.2	3025.5
1	0745	94	68.	49.6	3033.7	*	1	2140	261	50.	-.2	3025.5	*	2	1135	428	50.	-.2	3025.5
1	0750	95	68.	49.2	3033.6	*	1	2145	262	50.	-.2	3025.5	*	2	1140	429	50.	-.2	3025.5
1	0755	96	68.	48.7	3033.6	*	1	2150	263	50.	-.2	3025.5	*	2	1145	430	50.	-.2	3025.5
1	0800	97	68.	48.2	3033.5	*	1	2155	264	50.	-.2	3025.5	*	2	1150	431	50.	-.2	3025.5
1	0805	98	68.	47.8	3033.4	*	1	2200	265	50.	-.2	3025.5	*	2	1155	432	50.	-.2	3025.5
1	0810	99	67.	47.3	3033.4	*	1	2205	266	50.	-.2	3025.5	*	2	1200	433	50.	-.2	3025.5
1	0815	100	67.	46.8	3033.3	*	1	2210	267	50.	-.2	3025.5	*	2	1205	434	50.	-.2	3025.5
1	0820	101	67.	46.4	3033.2	*	1	2215	268	50.	-.2	3025.5	*	2	1210	435	50.	-.2	3025.5
1	0825	102	67.	45.9	3033.2	*	1	2220	269	50.	-.2	3025.5	*	2	1215	436	50.	-.2	3025.5
1	0830	103	67.	45.5	3033.1	*	1	2225	270	50.	-.2	3025.5	*	2	1220	437	50.	-.2	3025.5
1	0835	104	67.	45.0	3033.0	*	1	2230	271	50.	-.2	3025.5	*	2	1225	438	50.	-.2	3025.5
1	0840	105	67.	44.5	3033.0	*	1	2235	272	50.	-.2	3025.5	*	2	1230	439	50.	-.2	3025.5
1	0845	106	66.	44.1	3032.9	*	1	2240	273	50.	-.2	3025.5	*	2	1235	440	50.	-.2	3025.5
1	0850	107	66.	43.6	3032.8	*	1	2245	274	50.	-.2	3025.5	*	2	1240	441	50.	-.2	3025.5
1	0855	108	66.	43.2	3032.7	*	1	2250	275	50.	-.2	3025.5	*	2	1245	442	50.	-.2	3025.5
1	0900	109	66.	42.7	3032.7	*	1	2255	276	50.	-.2	3025.5	*	2	1250	443	50.	-.2	3025.5
1	0905	110	66.	42.2	3032.6	*	1	2300	277	50.	-.2	3025.5	*	2	1255	444	50.	-.2	3025.5
1	0910	111	66.	41.8	3032.5	*	1	2305	278	50.	-.2	3025.5	*	2	1300	445	50.	-.2	3025.5
1	0915	112	66.	41.3	3032.5	*	1	2310	279	50.	-.2	3025.5	*	2	1305	446	50.	-.2	3025.5
1	0920	113	65.	40.9	3032.4	*	1	2315	280	50.	-.2	3025.5	*	2	1310	447	50.	-.2	3025.5
1	0925	114	65.	40.4	3032.3	*	1	2320	281	50.	-.2	3025.5	*	2	1315	448	50.	-.2	3025.5
1	0930	115	65.	40.0	3032.3	*	1	2325	282	50.	-.2	3025.5	*	2	1320	449	50.	-.2	3025.5
1	0935	116	65.	39.5	3032.2	*	1	2330	283	50.	-.2	3025.5	*	2	1325	450	50.	-.2	3025.5
1	0940	117	65.	39.1	3032.1	*	1	2335	284	50.	-.2	3025.5	*	2	1330	451	50.	-.2	3025.5
1	0945	118	65.	38.6	3032.1	*	1	2340	285	50.	-.2	3025.5	*	2	1335	452	50.	-.2	3025.5
1	0950	119	65.	38.2	3032.0	*	1	2345	286	50.	-.2	3025.5	*	2	1340	453	50.	-.2	3025.5
1	0955	120	65.	37.8	3031.9	*	1	2350	287	50.	-.2	3025.5	*	2	1345	454	50.	-.2	3025.5
1	1000	121	64.	37.3	3031.8	*	1	2355	288	50.	-.2	3025.5	*	2	1350	455	50.	-.2	3025.5
1	1005	122	64.	36.9	3031.8	*	2	0000	289	50.	-.2	3025.5	*	2	1355	456	50.	-.2	3025.5
1	1010	123	64.	36.4	3031.7	*	2	0005	290	50.	-.2	3025.5	*	2	1400	457	50.	-.2	3025.5
1	1015	124	64.	36.0	3031.6	*	2	0010	291	50.	-.2	3025.5	*	2	1405	458	50.	-.2	3025.5
1	1020	125	64.	35.5	3031.6	*	2	0015	292	50.	-.2	3025.5	*	2	1410	459	50.	-.2	3025.5
1	1025	126	64.	35.1	3031.5	*	2	0020	293	50.	-.2	3025.5	*	2	1415	460	50.	-.2	3025.5
1	1030	127	64.	34.7	3031.4	*	2	0025	294	50.	-.2	3025.5	*	2	1420	461	50.	-.2	3025.5
1	1035	128	63.	34.2	3031.4	*	2	0030	295	50.	-.2	3025.5	*	2	1425	462	50.	-.2	3025.5
1	1040	129	63.	33.8	3031.3	*	2	0035	296	50.	-.2	3025.5	*	2	1430	463	50.	-.2	3025.5
1	1045	130	63.	33.4	3031.2	*	2	0040	297	50.	-.2	3025.5	*	2	1435	464	50.	-.2	3025.5
1	1050	131	63.	32.9	3031.2	*	2	0045	298	50.	-.2	3025.5	*	2	1440	465	50.	-.2	3025.5
1	1055	132	63.	32.5	3031.1	*	2	0050	299	50.	-.2	3025.5	*	2	1445	466	50.	-.2	3025.5
1	1100	133	63.	32.1	3031.0	*	2	0055	300	50.	-.2	3025.5	*	2	1450	467	50.	-.2	3025.5
1	1105	134	63.	31.6	3031.0	*	2	0100	301	50.	-.2	3025.5	*	2	1455	468	50.	-.2	3025.5
1	1110	135	62.	31.2	3030.9	*	2	0105	302	50.	-.2	3025.5	*	2	1500	469	50.	-.2	3025.5
1	1115	136	62.	30.8	3030.8	*	2	0110	303	50.	-.2	3025.5	*	2	1505	470	50.	-.2	3025.5
1	1120	137	62.	30.3	3030.8	*	2	0115	304	50.	-.2	3025.5	*	2	1510	471	50.	-.2	3025.5
1	1125	138	62.	29.9	3030.7	*	2	0120	305	50.	-.2	3025.5	*	2	1515	472	50.	-.2	3025.5
1	1130	139	62.	29.5	3030.6	*	2	0125	306	50.	-.2	3025.5	*	2	1520	473	50.	-.2	3025.5
1	1135	140	62.	29.1	3030.6	*	2	0130	307	50.	-.2	3025.5	*	2	1525	474	50.	-.2	3025.5
1	1140	141	62.	28.6	3030.5	*	2	0135	308	50.	-.2	3025.5	*	2	1530	475	50.	-.2	3025.5
1	1145	142	61.	28.2	3030.4	*	2	0140	309	50.	-.2	3025.5	*	2	1535	476	50.	-.2	3025.5
1	1150	143	61.	27.8	3030.4	*	2	0145	310	50.	-.2	3025.5	*	2	1540	477	50.	-.2	3025.5
1	1155	144	61.	27.4	3030.3	*	2	0150	311	50.	-.2	3025.5	*	2	1545	478	50.	-.2	3025.5
1	1200	145	61.	26.9	3030.2	*	2	0155	312	50.	-.2	3025.5	*	2	1550	479	50.	-.2	3025.5
1	1205	146	61.	26.5	3030.2	*	2	0200	313	50.	-.2	3025.5	*	2	1555	480	50.	-.2	3025.5
1	1210	147	61.	26.1	3030.1	*	2	0205	314	50.	-.2	3025.5	*	2	1600	481	50.	-.2	3025.5
1	1215	148	61.	25.7	3030.1	*	2	0210	315	50.	-.2	3025.5	*	2	1605	482	50.	-.2	3025.5
1	1220	149	61.	25.3	3030.0	*	2	0215	316	50.	-.2	3025.5	*	2	1610	483	50.	-.2	3025.5
1	1225	150	60.	24.9	3029.9	*	2	0220	317	50.	-.2	3025.5	*	2	1615	484	50.	-.2	3025.5
1	1230	151	60.	24.4	3029.8	*	2	0225	318	50.	-.2	3025.5	*	2	1620	485	50.	-.2	3025.5
1	1235	152	60.	24.0	3029.8	*	2	0230	319	50.	-.2	3025.5	*	2	1625	486	50.	-.2	3025.5
1	1240	153	60.	23.6	3029.7	*	2	0235	320	50.	-.2	3025.5	*	2	1630	487	50.	-.2	3025.5
1	1245	154	60.	23.2	3029.6	*	2	0240	321	50.	-.2	3025.5	*	2	1635	488	50.	-.2	3025.5
1	1250	155	60.	22.8	3029.6	*	2	0245	322	50.	-.2	3025.5	*	2	1640	489	50.	-.2	3025.5
1	1255	156	59.	22.4	3029.5	*	2	0250	323	50.	-.2	3025.5	*	2	1645	490	50.	-.2	3025.5
1	1300	157	59.	22.0	3029.4	*	2	0255	324	50.	-.2	3025.5	*	2	1650	491	50.	-.2	3025.5
1	1305	158	59.	21.6	3029.4	*	2	0300	325	50.	-.2	3025.5	*	2	1655	492	50.	-.2	3025.5
1	1310	159	59.	21.2	3029.3	*	2	0305	326	50.	-.2	3025.5	*	2	1700	493	50.	-.2	3025.5
1	1315	160	59.	20.8	3029.2	*	2	0310	327	50.	-.2	3025.5	*	2	1705	494	50.	-.2	3025.5
1	1320	161	59.	20.3	3029.2	*	2	0315	328	50.	-.2	3025.5	*	2	1710	495	50.	-.2	3025.5
1	1325	162	58.	19.9	3029.1	*	2	0320	329	50.	-.2	3025.5	*	2	1715	496	50.	-.2	3025.5
1	1330	163	58.	19.5	3029.0	*	2	0325	330	50.	-.2	3025.5	*	2	1720	497	50.	-.2	3025.5
1	1335	164	58.	19.1	3029.0	*	2	0330	331	50.	-.2	3025.5	*	2	1725	498	50.	-.2	3025.5
1	1340	165	58.	18.7	3028.9	*	2	0335	332	50.	-.2	3025.5	*	2	1730	499	50.	-.2	3025.5
1	1345	166	58.	18.3	3028.8	*	2	0340	333	50.	-.2	3025.5	*	2	1735	500	50.	-.2	3025.5
1	1350	167	58.	17.9	3028.8	*	2	0345	334	50.	-.2	3025.5	*						

****

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	41.58-HR	
+ (CFS)	(HR)	(CFS)				

+	71.	5.58		68.	57.	54.	54.
			(INCHES)	.723	2.417	3.960	3.960
			(AC-FT)	34.	113.	185.	185.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	41.58-HR
+ (AC-FT)	(HR)				
60.	5.58	50.	19.	11.	11.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	41.58-HR
+ (FEET)	(HR)				
3035.14	5.58	3033.74	3028.70	3027.35	3027.35

CUMULATIVE AREA = .88 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98
HYDROGRAPH AT						
+	OFF1	.41	1	FLOW	410.	397.
				TIME	3.75	3.75
HYDROGRAPH AT						
+	OFF7	.03	1	FLOW	55.	54.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP2	.44	1	FLOW	439.	426.
				TIME	3.75	3.75
HYDROGRAPH AT						
+	OFF2	.04	1	FLOW	42.	41.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OFF3	.03	1	FLOW	40.	39.
				TIME	3.58	3.58
3 COMBINED AT						
+	CP1	.50	1	FLOW	489.	475.
				TIME	3.75	3.75
HYDROGRAPH AT						
+	OFF4	.06	1	FLOW	90.	87.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OFF5	.26	1	FLOW	251.	244.
				TIME	3.83	3.83
HYDROGRAPH AT						
+	OFF6	.04	1	FLOW	62.	61.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON1	.03	1	FLOW	49.	48.
				TIME	3.50	3.50
5 COMBINED AT						
+	DB1	.88	1	FLOW	842.	818.
				TIME	3.75	3.75
ROUTED TO						
+	RDB1	.88	1	FLOW	72.	71.
				TIME	5.58	5.58

** PEAK STAGES IN FEET **

1	STAGE	3035.43	3035.14
	TIME	5.58	5.58

*** NORMAL END OF HEC-1 ***

PMF Condition HEC-1 Output

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   09AUG16  TIME  15:58:11   *
*                                       *
*****************************************
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*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*      DAVIS, CALIFORNIA 95616          *
*         (916) 756-1104                *
*                                       *
*****************************************
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```
X    X  XXXXXXX  XXXXX          X
X    X  X       X     X        XX
X    X  X       X              X
XXXXXXX  XXXX    X       XXXXX  X
X    X  X       X              X
X    X  X       X     X        X
X    X  XXXXXXX  XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     NINETY-FIVE MANAGEMENT, LLC.
    3         ID     SKYE CANYON - DETENTION BASIN 1
    4         ID     UPDATE (SHEEP MOUNTAIN)
    5         ID     PMF DRAINAGE CONDITION
    6         ID
    7         ID     RETURN PERIOD -------- 100-YEAR
    8         ID     DISTRIBUTION -------- 6-HOUR SDN3
    9         ID     PROJECT NO. ---------- OLY1401.004
   10         ID     FILENAME ------------ PMF.H1
   11         ID     DATE ---------------- 7/25/2016
   12         ID     MODELED BY ---------- ETM
   13         ID
   14         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
   15         ID        DRAINAGE AREA (MI^2)     RATIO
   16         ID        0.0-0.49                 1.00
   17         ID        0.5-0.99                 0.98
   18         ID
   19         IT      15       0       0     500
   20         IO       5       0       0
   21         IN      15       0       0
   22         JR    PREC    1.00
              *

   23         KK    OFF1
   24         KM    EXISTING OFFSITE DRAINAGE BASIN
   25         KM    DISCHARGES INTO DETENTION BASIN "DB1"
   26         PB     14.1
   27         PC   0.000   0.004   0.007   0.011   0.014   0.023   0.032   0.041   0.050   0.078
   28         PC   0.106   0.135   0.163   0.681   0.816   0.872   0.915   0.929   0.943   0.957
   29         PC   0.972   0.979   0.986   0.993   1.000
   30         BA   .4073
   31         LS       0    86.8
   32         UD   0.356
              *

   33         KK    OFF7
   34         KM    FUTURE DEVELOPED OFFSITE DRAINAGE BASIN
   35         KM    DISCHARGES INTO DETENTION BASIN "DB1"
   36         BA   .0281
   37         LS       0    96.0
   38         UD   0.118
              *

   39         KK     CP2
   40         KM    COMBINE OFF1, OFF7
   41         HC       2
              *
```

1 HEC-1 INPUT PAGE 2

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   42         KK    OFF2
   43         KM    EXISTING OFFSITE DRAINAGE BASIN
   44         KM    DISCHARGES INTO DETENTION BASIN "DB1"
   45         BA   .0355
   46         LS       0    81.8
   47         UD   0.148
              *

   48         KK    OFF3
   49         KM    EXISTING OFFSITE DRAINAGE BASIN
   50         KM    DISCHARGES INTO DETENTION BASIN "DB1"
   51         BA   .0259
   52         LS       0    88.0
   53         UD   0.112
              *

   54         KK     CP1
   55         KM    COMBINE CP2, OFF2, AND OFF3
   56         HC       3
              *

   57         KK    OFF4
   58         KM    EXISTING OFFSITE DRAINAGE BASIN
   59         KM    DISCHARGES INTO DETENTION BASIN "DB1"
   60         BA   .0581
   61         LS       0    88.0
   62         UD   0.136
              *

   63         KK    OFF5
   64         KM    EXISTING OFFSITE DRAINAGE BASIN
   65         KM    DISCHARGES INTO DETENTION BASIN "DB1"
   66         BA   .2569
   67         LS       0    88.0
   68         UD   0.419
              *
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            69          KK    OFF6
            70          KM    EXISTING OFFSITE DRAINAGE BASIN
            71          KM    DISCHARGES INTO DETENTION BASIN "DB1"
            72          BA    .0399
            73          LS       0    88.0
            74          UD    0.121
                        *

            75          KK     ON1
            76          KM    PROPOSED ONSITE DRAINAGE BASIN
            77          BA    .0261
            78          LS       0    94.0
            79          UD    0.116
                        *
1                                                HEC-1 INPUT                                                    PAGE  3

          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

            80          KK     DB1
            81          KM    COMBINE CP1, OFF4, OFF5, OFF6 AND ON1
            82          KO       1
            83          HC       5
                        *

            84          KK    RDB1
            85          KM    OUTLET = 24" ORIFICE @ INVERT ELEVATION = 3013.8-FT
            86          KM    87-FT WIDE SPILLWAY @ CREST ELEVATION = 3037.0-FT
            87          KO       1
            88          RS       1    ELEV  3025.5
            89          SA    4.58    5.63    5.81    6.00    6.19    7.17    7.61    8.31    9.00    9.69
            90          SE  3025.5    3027    3028    3029    3030    3035    3037    3040    3043    3046
            91          SQ    49.7    60.6    70.8    74.5  1436.0  3920.5  7136.3
            92          SE  3025.5    3030    3035    3037    3040    3043    3046
                        *
            93          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

    23        OFF1
                .
                .
    33          .         OFF7
                .           .
                .           .
    39        CP2...........
                .
                .
    42          .         OFF2
                .           .
                .           .
    48          .           .         OFF3
                .           .           .
                .           .           .
    54        CP1.........................
                .
                .
    57          .         OFF4
                .           .
                .           .
    63          .           .         OFF5
                .           .           .
                .           .           .
    69          .           .           .         OFF6
                .           .           .           .
                .           .           .           .
    75          .           .           .           .          ON1
                .           .           .           .           .
                .           .           .           .           .
    80        DB1.....................................................
                V
                V
    84        RDB1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         JUN  1998                     *
*       VERSION 4.1                     *
*                                       *
*  RUN DATE   09AUG16  TIME  15:58:11   *
*                                       *
*****************************************

*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************

                        SLATER HANIFAN GROUP
                        NINETY-FIVE MANAGEMENT, LLC.
                        SKYE CANYON - DETENTION BASIN 1
                        UPDATE (SHEEP MOUNTAIN)
                        PMF DRAINAGE CONDITION

                        RETURN PERIOD -------- 100-YEAR
                        DISTRIBUTION --------- 6-HOUR SDN3
                        PROJECT NO. ---------- OLY1401.004
                        FILENAME ------------- PMF.H1
                        DATE ----------------- 7/25/2016
                        MODELED BY ----------- ETM

                           SIX HOUR DEPTH-AREA REDUCTION FACTORS
                           DRAINAGE AREA (MI^2)     RATIO
                           0.0-0.49                 1.00
                           0.5-0.99                 0.98


  20 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN          15  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME         0000  STARTING TIME
                          NQ          500  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      6    0  ENDING DATE
                      NDTIME         0445  ENDING TIME
                      ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL      .25 HOURS
                         TOTAL TIME BASE  124.75 HOURS
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      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

   JP        MULTI-PLAN OPTION
               NPLAN            1  NUMBER OF PLANS

   JR        MULTI-RATIO OPTION
               RATIOS OF PRECIPITATION
             1.00


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


        **************
        *            *
 80 KK  *     DB1    *
        *            *
        **************

 82 KO        OUTPUT CONTROL VARIABLES
                IPRNT          1  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE

 83 HC        HYDROGRAPH COMBINATION
                ICOMP          5  NUMBER OF HYDROGRAPHS TO COMBINE
                                                ***
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****

HYDROGRAPH AT STATION DB1
SUM OF 5 HYDROGRAPHS
PLAN 1, RATIO = 1.00

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	2		0715	126	0.	*	3		1430	251	0.	*	4		2145	376	0.
1		0015	2	0.	*	2		0730	127	0.	*	3		1445	252	0.	*	4		2200	377	0.
1		0030	3	0.	*	2		0745	128	0.	*	3		1500	253	0.	*	4		2215	378	0.
1		0045	4	1.	*	2		0800	129	0.	*	3		1515	254	0.	*	4		2230	379	0.
1		0100	5	1.	*	2		0815	130	0.	*	3		1530	255	0.	*	4		2245	380	0.
1		0115	6	6.	*	2		0830	131	0.	*	3		1545	256	0.	*	4		2300	381	0.
1		0130	7	19.	*	2		0845	132	0.	*	3		1600	257	0.	*	4		2315	382	0.
1		0145	8	41.	*	2		0900	133	0.	*	3		1615	258	0.	*	4		2330	383	0.
1		0200	9	68.	*	2		0915	134	0.	*	3		1630	259	0.	*	4		2345	384	0.
1		0215	10	202.	*	2		0930	135	0.	*	3		1645	260	0.	*	5		0000	385	0.
1		0230	11	368.	*	2		0945	136	0.	*	3		1700	261	0.	*	5		0015	386	0.
1		0245	12	517.	*	2		1000	137	0.	*	3		1715	262	0.	*	5		0030	387	0.
1		0300	13	618.	*	2		1015	138	0.	*	3		1730	263	0.	*	5		0045	388	0.
1		0315	14	5295.	*	2		1030	139	0.	*	3		1745	264	0.	*	5		0100	389	0.
1		0330	15	6786.	*	2		1045	140	0.	*	3		1800	265	0.	*	5		0115	390	0.
1		0345	16	5235.	*	2		1100	141	0.	*	3		1815	266	0.	*	5		0130	391	0.
1		0400	17	3248.	*	2		1115	142	0.	*	3		1830	267	0.	*	5		0145	392	0.
1		0415	18	1921.	*	2		1130	143	0.	*	3		1845	268	0.	*	5		0200	393	0.
1		0430	19	1143.	*	2		1145	144	0.	*	3		1900	269	0.	*	5		0215	394	0.
1		0445	20	751.	*	2		1200	145	0.	*	3		1915	270	0.	*	5		0230	395	0.
1		0500	21	593.	*	2		1215	146	0.	*	3		1930	271	0.	*	5		0245	396	0.
1		0515	22	447.	*	2		1230	147	0.	*	3		1945	272	0.	*	5		0300	397	0.
1		0530	23	330.	*	2		1245	148	0.	*	3		2000	273	0.	*	5		0315	398	0.
1		0545	24	265.	*	2		1300	149	0.	*	3		2015	274	0.	*	5		0330	399	0.
1		0600	25	240.	*	2		1315	150	0.	*	3		2030	275	0.	*	5		0345	400	0.
1		0615	26	161.	*	2		1330	151	0.	*	3		2045	276	0.	*	5		0400	401	0.
1		0630	27	82.	*	2		1345	152	0.	*	3		2100	277	0.	*	5		0415	402	0.
1		0645	28	35.	*	2		1400	153	0.	*	3		2115	278	0.	*	5		0430	403	0.
1		0700	29	15.	*	2		1415	154	0.	*	3		2130	279	0.	*	5		0445	404	0.
1		0715	30	7.	*	2		1430	155	0.	*	3		2145	280	0.	*	5		0500	405	0.
1		0730	31	3.	*	2		1445	156	0.	*	3		2200	281	0.	*	5		0515	406	0.
1		0745	32	1.	*	2		1500	157	0.	*	3		2215	282	0.	*	5		0530	407	0.
1		0800	33	0.	*	2		1515	158	0.	*	3		2230	283	0.	*	5		0545	408	0.
1		0815	34	0.	*	2		1530	159	0.	*	3		2245	284	0.	*	5		0600	409	0.
1		0830	35	0.	*	2		1545	160	0.	*	3		2300	285	0.	*	5		0615	410	0.
1		0845	36	0.	*	2		1600	161	0.	*	3		2315	286	0.	*	5		0630	411	0.
1		0900	37	0.	*	2		1615	162	0.	*	3		2330	287	0.	*	5		0645	412	0.
1		0915	38	0.	*	2		1630	163	0.	*	3		2345	288	0.	*	5		0700	413	0.
1		0930	39	0.	*	2		1645	164	0.	*	4		0000	289	0.	*	5		0715	414	0.
1		0945	40	0.	*	2		1700	165	0.	*	4		0015	290	0.	*	5		0730	415	0.
1		1000	41	0.	*	2		1715	166	0.	*	4		0030	291	0.	*	5		0745	416	0.
1		1015	42	0.	*	2		1730	167	0.	*	4		0045	292	0.	*	5		0800	417	0.
1		1030	43	0.	*	2		1745	168	0.	*	4		0100	293	0.	*	5		0815	418	0.
1		1045	44	0.	*	2		1800	169	0.	*	4		0115	294	0.	*	5		0830	419	0.
1		1100	45	0.	*	2		1815	170	0.	*	4		0130	295	0.	*	5		0845	420	0.
1		1115	46	0.	*	2		1830	171	0.	*	4		0145	296	0.	*	5		0900	421	0.
1		1130	47	0.	*	2		1845	172	0.	*	4		0200	297	0.	*	5		0915	422	0.
1		1145	48	0.	*	2		1900	173	0.	*	4		0215	298	0.	*	5		0930	423	0.
1		1200	49	0.	*	2		1915	174	0.	*	4		0230	299	0.	*	5		0945	424	0.
1		1215	50	0.	*	2		1930	175	0.	*	4		0245	300	0.	*	5		1000	425	0.
1		1230	51	0.	*	2		1945	176	0.	*	4		0300	301	0.	*	5		1015	426	0.
1		1245	52	0.	*	2		2000	177	0.	*	4		0315	302	0.	*	5		1030	427	0.
1		1300	53	0.	*	2		2015	178	0.	*	4		0330	303	0.	*	5		1045	428	0.
1		1315	54	0.	*	2		2030	179	0.	*	4		0345	304	0.	*	5		1100	429	0.
1		1330	55	0.	*	2		2045	180	0.	*	4		0400	305	0.	*	5		1115	430	0.
1		1345	56	0.	*	2		2100	181	0.	*	4		0415	306	0.	*	5		1130	431	0.
1		1400	57	0.	*	2		2115	182	0.	*	4		0430	307	0.	*	5		1145	432	0.
1		1415	58	0.	*	2		2130	183	0.	*	4		0445	308	0.	*	5		1200	433	0.
1		1430	59	0.	*	2		2145	184	0.	*	4		0500	309	0.	*	5		1215	434	0.
1		1445	60	0.	*	2		2200	185	0.	*	4		0515	310	0.	*	5		1230	435	0.
1		1500	61	0.	*	2		2215	186	0.	*	4		0530	311	0.	*	5		1245	436	0.
1		1515	62	0.	*	2		2230	187	0.	*	4		0545	312	0.	*	5		1300	437	0.
1		1530	63	0.	*	2		2245	188	0.	*	4		0600	313	0.	*	5		1315	438	0.
1		1545	64	0.	*	2		2300	189	0.	*	4		0615	314	0.	*	5		1330	439	0.
1		1600	65	0.	*	2		2315	190	0.	*	4		0630	315	0.	*	5		1345	440	0.
1		1615	66	0.	*	2		2330	191	0.	*	4		0645	316	0.	*	5		1400	441	0.
1		1630	67	0.	*	2		2345	192	0.	*	4		0700	317	0.	*	5		1415	442	0.
1		1645	68	0.	*	3		0000	193	0.	*	4		0715	318	0.	*	5		1430	443	0.
1		1700	69	0.	*	3		0015	194	0.	*	4		0730	319	0.	*	5		1445	444	0.
1		1715	70	0.	*	3		0030	195	0.	*	4		0745	320	0.	*	5		1500	445	0.
1		1730	71	0.	*	3		0045	196	0.	*	4		0800	321	0.	*	5		1515	446	0.
1		1745	72	0.	*	3		0100	197	0.	*	4		0815	322	0.	*	5		1530	447	0.
1		1800	73	0.	*	3		0115	198	0.	*	4		0830	323	0.	*	5		1545	448	0.
1		1815	74	0.	*	3		0130	199	0.	*	4		0845	324	0.	*	5		1600	449	0.
1		1830	75	0.	*	3		0145	200	0.	*	4		0900	325	0.	*	5		1615	450	0.
1		1845	76	0.	*	3		0200	201	0.	*	4		0915	326	0.	*	5		1630	451	0.
1		1900	77	0.	*	3		0215	202	0.	*	4		0930	327	0.	*	5		1645	452	0.
1		1915	78	0.	*	3		0230	203	0.	*	4		0945	328	0.	*	5		1700	453	0.
1		1930	79	0.	*	3		0245	204	0.	*	4		1000	329	0.	*	5		1715	454	0.
1		1945	80	0.	*	3		0300	205	0.	*	4		1015	330	0.	*	5		1730	455	0.
1		2000	81	0.	*	3		0315	206	0.	*	4		1030	331	0.	*	5		1745	456	0.
1		2015	82	0.	*	3		0330	207	0.	*	4		1045	332	0.	*	5		1800	457	0.

1	2030	83	0.	*	3	0345	208	0.	*	4	1100	333	0.	*	5	1815	458	0.
1	2045	84	0.	*	3	0400	209	0.	*	4	1115	334	0.	*	5	1830	459	0.
1	2100	85	0.	*	3	0415	210	0.	*	4	1130	335	0.	*	5	1845	460	0.
1	2115	86	0.	*	3	0430	211	0.	*	4	1145	336	0.	*	5	1900	461	0.
1	2130	87	0.	*	3	0445	212	0.	*	4	1200	337	0.	*	5	1915	462	0.
1	2145	88	0.	*	3	0500	213	0.	*	4	1215	338	0.	*	5	1930	463	0.
1	2200	89	0.	*	3	0515	214	0.	*	4	1230	339	0.	*	5	1945	464	0.
1	2215	90	0.	*	3	0530	215	0.	*	4	1245	340	0.	*	5	2000	465	0.
1	2230	91	0.	*	3	0545	216	0.	*	4	1300	341	0.	*	5	2015	466	0.
1	2245	92	0.	*	3	0600	217	0.	*	4	1315	342	0.	*	5	2030	467	0.
1	2300	93	0.	*	3	0615	218	0.	*	4	1330	343	0.	*	5	2045	468	0.
1	2315	94	0.	*	3	0630	219	0.	*	4	1345	344	0.	*	5	2100	469	0.
1	2330	95	0.	*	3	0645	220	0.	*	4	1400	345	0.	*	5	2115	470	0.
1	2345	96	0.	*	3	0700	221	0.	*	4	1415	346	0.	*	5	2130	471	0.
2	0000	97	0.	*	3	0715	222	0.	*	4	1430	347	0.	*	5	2145	472	0.
2	0015	98	0.	*	3	0730	223	0.	*	4	1445	348	0.	*	5	2200	473	0.
2	0030	99	0.	*	3	0745	224	0.	*	4	1500	349	0.	*	5	2215	474	0.
2	0045	100	0.	*	3	0800	225	0.	*	4	1515	350	0.	*	5	2230	475	0.
2	0100	101	0.	*	3	0815	226	0.	*	4	1530	351	0.	*	5	2245	476	0.
2	0115	102	0.	*	3	0830	227	0.	*	4	1545	352	0.	*	5	2300	477	0.
2	0130	103	0.	*	3	0845	228	0.	*	4	1600	353	0.	*	5	2315	478	0.
2	0145	104	0.	*	3	0900	229	0.	*	4	1615	354	0.	*	5	2330	479	0.
2	0200	105	0.	*	3	0915	230	0.	*	4	1630	355	0.	*	5	2345	480	0.
2	0215	106	0.	*	3	0930	231	0.	*	4	1645	356	0.	*	6	0000	481	0.
2	0230	107	0.	*	3	0945	232	0.	*	4	1700	357	0.	*	6	0015	482	0.
2	0245	108	0.	*	3	1000	233	0.	*	4	1715	358	0.	*	6	0030	483	0.
2	0300	109	0.	*	3	1015	234	0.	*	4	1730	359	0.	*	6	0045	484	0.
2	0315	110	0.	*	3	1030	235	0.	*	4	1745	360	0.	*	6	0100	485	0.
2	0330	111	0.	*	3	1045	236	0.	*	4	1800	361	0.	*	6	0115	486	0.
2	0345	112	0.	*	3	1100	237	0.	*	4	1815	362	0.	*	6	0130	487	0.
2	0400	113	0.	*	3	1115	238	0.	*	4	1830	363	0.	*	6	0145	488	0.
2	0415	114	0.	*	3	1130	239	0.	*	4	1845	364	0.	*	6	0200	489	0.
2	0430	115	0.	*	3	1145	240	0.	*	4	1900	365	0.	*	6	0215	490	0.
2	0445	116	0.	*	3	1200	241	0.	*	4	1915	366	0.	*	6	0230	491	0.
2	0500	117	0.	*	3	1215	242	0.	*	4	1930	367	0.	*	6	0245	492	0.
2	0515	118	0.	*	3	1230	243	0.	*	4	1945	368	0.	*	6	0300	493	0.
2	0530	119	0.	*	3	1245	244	0.	*	4	2000	369	0.	*	6	0315	494	0.
2	0545	120	0.	*	3	1300	245	0.	*	4	2015	370	0.	*	6	0330	495	0.
2	0600	121	0.	*	3	1315	246	0.	*	4	2030	371	0.	*	6	0345	496	0.
2	0615	122	0.	*	3	1330	247	0.	*	4	2045	372	0.	*	6	0400	497	0.
2	0630	123	0.	*	3	1345	248	0.	*	4	2100	373	0.	*	6	0415	498	0.
2	0645	124	0.	*	3	1400	249	0.	*	4	2115	374	0.	*	6	0430	499	0.
2	0700	125	0.	*	3	1415	250	0.	*	4	2130	375	0.	*	6	0445	500	0.
				*					*					*				

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PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	124.75-HR
(CFS)	(HR)	(CFS)			
6786.	3.50	1183.	296.	99.	57.
		(INCHES) 12.528	12.534	12.534	12.534
		(AC-FT) 587.	587.	587.	587.

CUMULATIVE AREA = .88 SQ MI

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          **************
          *            *
 84 KK    *    RDB1    *
          *            *
          **************

 87 KO          OUTPUT CONTROL VARIABLES
                     IPRNT         1  PRINT CONTROL
                     IPLOT         0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 88 RS          STORAGE ROUTING
                     NSTPS         1  NUMBER OF SUBREACHES
                      ITYP      ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC   3025.50  INITIAL CONDITION
                         X       .00 WORKING R AND D COEFFICIENT

 89 SA              AREA        4.6       5.6       5.8       6.0       6.2       7.2       7.6       8.3       9.0       9.7

 90 SE              ELEVATION  3025.50   3027.00   3028.00   3029.00   3030.00   3035.00   3037.00   3040.00   3043.00   3046.00

 91 SQ              DISCHARGE     50.       61.       71.       75.     1436.     3921.     7136.

 92 SE              ELEVATION  3025.50   3030.00   3035.00   3037.00   3040.00   3043.00   3046.00
                                                        ***
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COMPUTED STORAGE-ELEVATION DATA

STORAGE	.00	7.64	13.36	19.27	25.36	58.73	73.51	97.38	123.34	151.37
ELEVATION	3025.50	3027.00	3028.00	3029.00	3030.00	3035.00	3037.00	3040.00	3043.00	3046.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	7.64	13.36	19.27	25.36	58.73	73.51	97.38	123.34	151.37
OUTFLOW	49.70	53.33	55.76	58.18	60.60	70.80	74.50	1436.00	3920.50	7136.30
ELEVATION	3025.50	3027.00	3028.00	3029.00	3030.00	3035.00	3037.00	3040.00	3043.00	3046.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 3921. TO 7136.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RDB1
PLAN 1, RATIO = 1.00

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	50.	.0	3025.5	2		1745	168	50.	-.5	3025.5	4		1130	335	50.	-.5	3025.5
1		0015	2	50.	-.5	3025.5	2		1800	169	50.	-.5	3025.5	4		1145	336	50.	-.5	3025.5
1		0030	3	50.	-.5	3025.5	2		1815	170	50.	-.5	3025.5	4		1200	337	50.	-.5	3025.5
1		0045	4	50.	-.5	3025.5	2		1830	171	50.	-.5	3025.5	4		1215	338	50.	-.5	3025.5
1		0100	5	50.	-.5	3025.5	2		1845	172	50.	-.5	3025.5	4		1230	339	50.	-.5	3025.5
1		0115	6	50.	-.5	3025.5	2		1900	173	50.	-.5	3025.5	4		1245	340	50.	-.5	3025.5
1		0130	7	50.	-.5	3025.5	2		1915	174	50.	-.5	3025.5	4		1300	341	50.	-.5	3025.5
1		0145	8	50.	-.5	3025.5	2		1930	175	50.	-.5	3025.5	4		1315	342	50.	-.5	3025.5
1		0200	9	50.	-.4	3025.5	2		1945	176	50.	-.5	3025.5	4		1330	343	50.	-.5	3025.5
1		0215	10	50.	1.3	3025.8	2		2000	177	50.	-.5	3025.5	4		1345	344	50.	-.5	3025.5

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1	0230	11	53.	6.2	3026.7	*	2	2015	178	50.	-.5	3025.5	*	4	1400	345	50.	-.5	3025.5
1	0245	12	56.	14.2	3028.1	*	2	2030	179	50.	-.5	3025.5	*	4	1415	346	50.	-.5	3025.5
1	0300	13	60.	24.7	3029.9	*	2	2045	180	50.	-.5	3025.5	*	4	1430	347	50.	-.5	3025.5
1	0315	14	465.	80.4	3037.9	*	2	2100	181	50.	-.5	3025.5	*	4	1445	348	50.	-.5	3025.5
1	0330	15	5838.	140.1	3044.8	*	2	2115	182	50.	-.5	3025.5	*	4	1500	349	50.	-.5	3025.5
1	0345	16	6025.	141.7	3045.0	*	2	2130	183	50.	-.5	3025.5	*	4	1515	350	50.	-.5	3025.5
1	0400	17	4090.	124.8	3043.2	*	2	2145	184	50.	-.5	3025.5	*	4	1530	351	50.	-.5	3025.5
1	0415	18	2579.	109.3	3041.4	*	2	2200	185	50.	-.5	3025.5	*	4	1545	352	50.	-.5	3025.5
1	0430	19	1538.	98.4	3040.1	*	2	2215	186	50.	-.5	3025.5	*	4	1600	353	50.	-.5	3025.5
1	0445	20	1074.	91.0	3039.2	*	2	2230	187	50.	-.5	3025.5	*	4	1615	354	50.	-.5	3025.5
1	0500	21	776.	85.8	3038.5	*	2	2245	188	50.	-.5	3025.5	*	4	1630	355	50.	-.5	3025.5
1	0515	22	586.	82.5	3038.1	*	2	2300	189	50.	-.5	3025.5	*	4	1645	356	50.	-.5	3025.5
1	0530	23	440.	79.9	3037.8	*	2	2315	190	50.	-.5	3025.5	*	4	1700	357	50.	-.5	3025.5
1	0545	24	334.	78.1	3037.6	*	2	2330	191	50.	-.5	3025.5	*	4	1715	358	50.	-.5	3025.5
1	0600	25	274.	77.0	3037.4	*	2	2345	192	50.	-.5	3025.5	*	4	1730	359	50.	-.5	3025.5
1	0615	26	219.	76.0	3037.3	*	3	0000	193	50.	-.5	3025.5	*	4	1745	360	50.	-.5	3025.5
1	0630	27	147.	74.8	3037.2	*	3	0015	194	50.	-.5	3025.5	*	4	1800	361	50.	-.5	3025.5
1	0645	28	81.	73.6	3037.0	*	3	0030	195	50.	-.5	3025.5	*	4	1815	362	50.	-.5	3025.5
1	0700	29	74.	72.5	3036.9	*	3	0045	196	50.	-.5	3025.5	*	4	1830	363	50.	-.5	3025.5
1	0715	30	74.	71.2	3036.7	*	3	0100	197	50.	-.5	3025.5	*	4	1845	364	50.	-.5	3025.5
1	0730	31	74.	69.8	3036.5	*	3	0115	198	50.	-.5	3025.5	*	4	1900	365	50.	-.5	3025.5
1	0745	32	73.	68.3	3036.3	*	3	0130	199	50.	-.5	3025.5	*	4	1915	366	50.	-.5	3025.5
1	0800	33	73.	66.9	3036.1	*	3	0145	200	50.	-.5	3025.5	*	4	1930	367	50.	-.5	3025.5
1	0815	34	72.	65.4	3035.9	*	3	0200	201	50.	-.5	3025.5	*	4	1945	368	50.	-.5	3025.5
1	0830	35	72.	63.9	3035.7	*	3	0215	202	50.	-.5	3025.5	*	4	2000	369	50.	-.5	3025.5
1	0845	36	72.	62.4	3035.5	*	3	0230	203	50.	-.5	3025.5	*	4	2015	370	50.	-.5	3025.5
1	0900	37	71.	60.9	3035.3	*	3	0245	204	50.	-.5	3025.5	*	4	2030	371	50.	-.5	3025.5
1	0915	38	71.	59.4	3035.1	*	3	0300	205	50.	-.5	3025.5	*	4	2045	372	50.	-.5	3025.5
1	0930	39	71.	58.0	3034.9	*	3	0315	206	50.	-.5	3025.5	*	4	2100	373	50.	-.5	3025.5
1	0945	40	70.	56.5	3034.7	*	3	0330	207	50.	-.5	3025.5	*	4	2115	374	50.	-.5	3025.5
1	1000	41	70.	55.1	3034.5	*	3	0345	208	50.	-.5	3025.5	*	4	2130	375	50.	-.5	3025.5
1	1015	42	69.	53.6	3034.2	*	3	0400	209	50.	-.5	3025.5	*	4	2145	376	50.	-.5	3025.5
1	1030	43	69.	52.2	3034.0	*	3	0415	210	50.	-.5	3025.5	*	4	2200	377	50.	-.5	3025.5
1	1045	44	68.	50.8	3033.8	*	3	0430	211	50.	-.5	3025.5	*	4	2215	378	50.	-.5	3025.5
1	1100	45	68.	49.4	3033.6	*	3	0445	212	50.	-.5	3025.5	*	4	2230	379	50.	-.5	3025.5
1	1115	46	68.	48.0	3033.4	*	3	0500	213	50.	-.5	3025.5	*	4	2245	380	50.	-.5	3025.5
1	1130	47	67.	46.6	3033.2	*	3	0515	214	50.	-.5	3025.5	*	4	2300	381	50.	-.5	3025.5
1	1145	48	67.	45.2	3033.0	*	3	0530	215	50.	-.5	3025.5	*	4	2315	382	50.	-.5	3025.5
1	1200	49	66.	43.8	3032.8	*	3	0545	216	50.	-.5	3025.5	*	4	2330	383	50.	-.5	3025.5
1	1215	50	66.	42.5	3032.6	*	3	0600	217	50.	-.5	3025.5	*	4	2345	384	50.	-.5	3025.5
1	1230	51	65.	41.1	3032.4	*	3	0615	218	50.	-.5	3025.5	*	5	0000	385	50.	-.5	3025.5
1	1245	52	65.	39.8	3032.2	*	3	0630	219	50.	-.5	3025.5	*	5	0015	386	50.	-.5	3025.5
1	1300	53	65.	38.4	3032.0	*	3	0645	220	50.	-.5	3025.5	*	5	0030	387	50.	-.5	3025.5
1	1315	54	64.	37.1	3031.8	*	3	0700	221	50.	-.5	3025.5	*	5	0045	388	50.	-.5	3025.5
1	1330	55	64.	35.8	3031.6	*	3	0715	222	50.	-.5	3025.5	*	5	0100	389	50.	-.5	3025.5
1	1345	56	63.	34.5	3031.4	*	3	0730	223	50.	-.5	3025.5	*	5	0115	390	50.	-.5	3025.5
1	1400	57	63.	33.2	3031.2	*	3	0745	224	50.	-.5	3025.5	*	5	0130	391	50.	-.5	3025.5
1	1415	58	63.	31.9	3031.0	*	3	0800	225	50.	-.5	3025.5	*	5	0145	392	50.	-.5	3025.5
1	1430	59	62.	30.6	3030.8	*	3	0815	226	50.	-.5	3025.5	*	5	0200	393	50.	-.5	3025.5
1	1445	60	62.	29.3	3030.6	*	3	0830	227	50.	-.5	3025.5	*	5	0215	394	50.	-.5	3025.5
1	1500	61	61.	28.0	3030.4	*	3	0845	228	50.	-.5	3025.5	*	5	0230	395	50.	-.5	3025.5
1	1515	62	61.	26.8	3030.2	*	3	0900	229	50.	-.5	3025.5	*	5	0245	396	50.	-.5	3025.5
1	1530	63	61.	25.5	3030.0	*	3	0915	230	50.	-.5	3025.5	*	5	0300	397	50.	-.5	3025.5
1	1545	64	60.	24.3	3029.8	*	3	0930	231	50.	-.5	3025.5	*	5	0315	398	50.	-.5	3025.5
1	1600	65	60.	23.0	3029.6	*	3	0945	232	50.	-.5	3025.5	*	5	0330	399	50.	-.5	3025.5
1	1615	66	59.	21.8	3029.4	*	3	1000	233	50.	-.5	3025.5	*	5	0345	400	50.	-.5	3025.5
1	1630	67	59.	20.6	3029.2	*	3	1015	234	50.	-.5	3025.5	*	5	0400	401	50.	-.5	3025.5
1	1645	68	58.	19.4	3029.0	*	3	1030	235	50.	-.5	3025.5	*	5	0415	402	50.	-.5	3025.5
1	1700	69	58.	18.2	3028.8	*	3	1045	236	50.	-.5	3025.5	*	5	0430	403	50.	-.5	3025.5
1	1715	70	57.	17.0	3028.6	*	3	1100	237	50.	-.5	3025.5	*	5	0445	404	50.	-.5	3025.5
1	1730	71	57.	15.8	3028.4	*	3	1115	238	50.	-.5	3025.5	*	5	0500	405	50.	-.5	3025.5
1	1745	72	56.	14.6	3028.2	*	3	1130	239	50.	-.5	3025.5	*	5	0515	406	50.	-.5	3025.5
1	1800	73	56.	13.5	3028.0	*	3	1145	240	50.	-.5	3025.5	*	5	0530	407	50.	-.5	3025.5
1	1815	74	55.	12.3	3027.8	*	3	1200	241	50.	-.5	3025.5	*	5	0545	408	50.	-.5	3025.5
1	1830	75	55.	11.2	3027.6	*	3	1215	242	50.	-.5	3025.5	*	5	0600	409	50.	-.5	3025.5
1	1845	76	54.	10.1	3027.4	*	3	1230	243	50.	-.5	3025.5	*	5	0615	410	50.	-.5	3025.5
1	1900	77	54.	8.9	3027.2	*	3	1245	244	50.	-.5	3025.5	*	5	0630	411	50.	-.5	3025.5
1	1915	78	53.	7.8	3027.0	*	3	1300	245	50.	-.5	3025.5	*	5	0645	412	50.	-.5	3025.5
1	1930	79	53.	6.7	3026.8	*	3	1315	246	50.	-.5	3025.5	*	5	0700	413	50.	-.5	3025.5
1	1945	80	52.	5.6	3026.6	*	3	1330	247	50.	-.5	3025.5	*	5	0715	414	50.	-.5	3025.5
1	2000	81	52.	4.6	3026.4	*	3	1345	248	50.	-.5	3025.5	*	5	0730	415	50.	-.5	3025.5
1	2015	82	51.	3.5	3026.2	*	3	1400	249	50.	-.5	3025.5	*	5	0745	416	50.	-.5	3025.5
1	2030	83	51.	2.4	3026.0	*	3	1415	250	50.	-.5	3025.5	*	5	0800	417	50.	-.5	3025.5
1	2045	84	50.	1.4	3025.8	*	3	1430	251	50.	-.5	3025.5	*	5	0815	418	50.	-.5	3025.5
1	2100	85	50.	.4	3025.6	*	3	1445	252	50.	-.5	3025.5	*	5	0830	419	50.	-.5	3025.5
1	2115	86	50.	-.5	3025.5	*	3	1500	253	50.	-.5	3025.5	*	5	0845	420	50.	-.5	3025.5
1	2130	87	50.	-.5	3025.5	*	3	1515	254	50.	-.5	3025.5	*	5	0900	421	50.	-.5	3025.5
1	2145	88	50.	-.5	3025.5	*	3	1530	255	50.	-.5	3025.5	*	5	0915	422	50.	-.5	3025.5
1	2200	89	50.	-.5	3025.5	*	3	1545	256	50.	-.5	3025.5	*	5	0930	423	50.	-.5	3025.5
1	2215	90	50.	-.5	3025.5	*	3	1600	257	50.	-.5	3025.5	*	5	0945	424	50.	-.5	3025.5
1	2230	91	50.	-.5	3025.5	*	3	1615	258	50.	-.5	3025.5	*	5	1000	425	50.	-.5	3025.5
1	2245	92	50.	-.5	3025.5	*	3	1630	259	50.	-.5	3025.5	*	5	1015	426	50.	-.5	3025.5
1	2300	93	50.	-.5	3025.5	*	3	1645	260	50.	-.5	3025.5	*	5	1030	427	50.	-.5	3025.5
1	2315	94	50.	-.5	3025.5	*	3	1700	261	50.	-.5	3025.5	*	5	1045	428	50.	-.5	3025.5
1	2330	95	50.	-.5	3025.5	*	3	1715	262	50.	-.5	3025.5	*	5	1100	429	50.	-.5	3025.5
1	2345	96	50.	-.5	3025.5	*	3	1730	263	50.	-.5	3025.5	*	5	1115	430	50.	-.5	3025.5
2	0000	97	50.	-.5	3025.5	*	3	1745	264	50.	-.5	3025.5	*	5	1130	431	50.	-.5	3025.5
2	0015	98	50.	-.5	3025.5	*	3	1800	265	50.	-.5	3025.5	*	5	1145	432	50.	-.5	3025.5
2	0030	99	50.	-.5	3025.5	*	3	1815	266	50.	-.5	3025.5	*	5	1200	433	50.	-.5	3025.5
2	0045	100	50.	-.5	3025.5	*	3	1830	267	50.	-.5	3025.5	*	5	1215	434	50.	-.5	3025.5
2	0100	101	50.	-.5	3025.5	*	3	1845	268	50.	-.5	3025.5	*	5	1230	435	50.	-.5	3025.5
2	0115	102	50.	-.5	3025.5	*	3	1900	269	50.	-.5	3025.5	*	5	1245	436	50.	-.5	3025.5
2	0130	103	50.	-.5	3025.5	*	3	1915	270	50.	-.5	3025.5	*	5	1300	437	50.	-.5	3025.5
2	0145	104	50.	-.5	3025.5	*	3	1930	271	50.	-.5	3025.5	*	5	1315	438	50.	-.5	3025.5
2	0200	105	50.	-.5	3025.5	*	3	1945	272	50.	-.5	3025.5	*	5	1330	439	50.	-.5	3025.5
2	0215	106	50.	-.5	3025.5	*	3	2000	273	50.	-.5	3025.5	*	5	1345	440	50.	-.5	3025.5
2	0230	107	50.	-.5	3025.5	*	3	2015	274	50.	-.5	3025.5	*	5	1400	441	50.	-.5	3025.5
2	0245	108	50.	-.5	3025.5	*	3	2030	275	50.	-.5	3025.5	*	5	1415	442	50.	-.5	3025.5
2	0300	109	50.	-.5	3025.5	*	3	2045	276	50.	-.5	3025.5	*	5	1430	443	50.	-.5	3025.5
2	0315	110	50.	-.5	3025.5	*	3	2100	277	50.	-.5	3025.5	*	5	1445	444	50.	-.5	3025.5
2	0330	111	50.	-.5	3025.5	*	3	2115	278	50.	-.5	3025.5	*	5	1500	445	50.	-.5	3025.5
2	0345	112	50.	-.5	3025.5	*	3	2130	279	50.	-.5	3025.5	*	5	1515	446	50.	-.5	3025.5
2	0400	113	50.	-.5	3025.5	*	3	2145	280	50.	-.5	3025.5	*	5	1530	447	50.	-.5	3025.5
2	0415	114	50.	-.5	3025.5	*	3	2200	281	50.	-.5	3025.5	*	5	1545	448	50.	-.5	3025.5
2	0430	115	50.	-.5	3025.5	*	3	2215	282	50.	-.5	3025.5	*	5	1600	449	50.	-.5	3025.5
2	0445	116	50.	-.5	3025.5	*	3	2230	283	50.	-.5	3025.5	*	5	1615	450	50.	-.5	3025.5
2	0500	117	50.	-.5	3025.5	*	3	2245	284	50.	-.5	3025.5	*	5	1630	451	50.	-.5	3025.5
2	0515	118	50.	-.5	3025.5	*	3	2300	285	50.	-.5	3025.5	*	5	1645	452	50.	-.5	3025.5
2	0530	119	50.	-.5	3025.5	*	3	2315	286	50.	-.5	3025.5	*	5	1700	453	50.	-.5	3025.5
2	0545	120	50.	-.5	3025.5	*	3	2330	287	50.	-.5	3025.5	*	5	1715	454	50.	-.5	3025.5
2	0600	121	50.	-.5	3025.5	*	3	2345	288	50.	-.5	3025.5	*	5	1730	455	50.	-.5	3025.5
2	0615	122	50.	-.5	3025.5	*	4	0000	289	50.	-.5	3025.5	*	5	1745	456	50.	-.5	3025.5
2	0630	123	50.	-.5	3025.5	*	4	0015	290	50.	-.5	3025.5	*	5	1800	457	50.	-.5	3025.5
2	0645	124	50.	-.5	3025.5	*	4	0030	291	50.	-.5	3025.5	*	5	1815	458	50.	-.5	3025.5
2	0700	125	50.	-.5	3025.5	*	4	0045	292	50.	-.5	3025.5	*	5	1830	459	50.	-.5	3025.5
2	0715	126	50.	-.5	3025.5	*	4	0100	293	50.	-.5	3025.5	*	5	1845	460	50.	-.5	3025.5
2	0730	127	50.	-.5	3025.5	*	4	0115	294	50.	-.5	3025.5	*	5	1900	461	50.	-.5	3025.5
2	0745	128	50.	-.5	3025.5	*	4	0130	295	50.	-.5	3025.5	*	5	1915	462	50.	-.5	3025.5
2	0800	129	50.	-.5	3025.5	*	4	0145	296	50.	-.5	3025.5	*	5	1930	463	50.	-.5	3025.5
2	0815	130	50.	-.5	3025.5	*	4	0200	297	50.	-.5	3025.5	*	5	1945	464	50.	-.5	3025.5
2	0830	131	50.	-.5	3025.5	*	4	0215	298	50.	-.5	3025.5	*	5	2000	465	50.	-.5	3025.5
2	0845	132	50.	-.5	3025.5	*	4	0230	299	50.	-.5	3025.5	*	5	2015	466	50.	-.5	3025.5
2	0900	133	50.	-.5	3025.5	*	4	0245	300	50.	-.5	3025.5	*	5	2030	467	50.	-.5	3025.5
2	0915	134	50.	-.5	3025.5	*	4	0300	301	50.	-.5	3025.5	*	5	2045	468	50.	-.5	3025.5
2	0930	135	50.	-.5	3025.5	*	4	0315	302	50.	-.5	3025.5	*	5	2100	469	50.	-.5	3025.5
2	0945	136	50.	-.5	3025.5	*	4	0330	303	50.	-.5	3025.5	*	5	2115	470	50.	-.5	3025.5
2	1000	137	50.	-.5	3025.5	*	4	0345	304	50.	-.5	3025.5	*	5	2130	471	50.	-.5	3025.5
2	1015	138	50.	-.5	3025.5	*	4	0400	305	50.	-.5	3025.5	*	5	2145	472	50.	-.5	3025.5
2	1030	139	50.	-.5	3025.5	*	4	0415	306	50.	-.5	3025.5	*	5	2200	473	50.	-.5	3025.5

2	1045	140	50.	-.5	3025.5	*	4	0430	307	50.	-.5	3025.5	*	5	2215	474	50.	-.5	3025.5
2	1100	141	50.	-.5	3025.5	*	4	0445	308	50.	-.5	3025.5	*	5	2230	475	50.	-.5	3025.5
2	1115	142	50.	-.5	3025.5	*	4	0500	309	50.	-.5	3025.5	*	5	2245	476	50.	-.5	3025.5
2	1130	143	50.	-.5	3025.5	*	4	0515	310	50.	-.5	3025.5	*	5	2300	477	50.	-.5	3025.5
2	1145	144	50.	-.5	3025.5	*	4	0530	311	50.	-.5	3025.5	*	5	2315	478	50.	-.5	3025.5
2	1200	145	50.	-.5	3025.5	*	4	0545	312	50.	-.5	3025.5	*	5	2330	479	50.	-.5	3025.5
2	1215	146	50.	-.5	3025.5	*	4	0600	313	50.	-.5	3025.5	*	5	2345	480	50.	-.5	3025.5
2	1230	147	50.	-.5	3025.5	*	4	0615	314	50.	-.5	3025.5	*	6	0000	481	50.	-.5	3025.5
2	1245	148	50.	-.5	3025.5	*	4	0630	315	50.	-.5	3025.5	*	6	0015	482	50.	-.5	3025.5
2	1300	149	50.	-.5	3025.5	*	4	0645	316	50.	-.5	3025.5	*	6	0030	483	50.	-.5	3025.5
2	1315	150	50.	-.5	3025.5	*	4	0700	317	50.	-.5	3025.5	*	6	0045	484	50.	-.5	3025.5
2	1330	151	50.	-.5	3025.5	*	4	0715	318	50.	-.5	3025.5	*	6	0100	485	50.	-.5	3025.5
2	1345	152	50.	-.5	3025.5	*	4	0730	319	50.	-.5	3025.5	*	6	0115	486	50.	-.5	3025.5
2	1400	153	50.	-.5	3025.5	*	4	0745	320	50.	-.5	3025.5	*	6	0130	487	50.	-.5	3025.5
2	1415	154	50.	-.5	3025.5	*	4	0800	321	50.	-.5	3025.5	*	6	0145	488	50.	-.5	3025.5
2	1430	155	50.	-.5	3025.5	*	4	0815	322	50.	-.5	3025.5	*	6	0200	489	50.	-.5	3025.5
2	1445	156	50.	-.5	3025.5	*	4	0830	323	50.	-.5	3025.5	*	6	0215	490	50.	-.5	3025.5
2	1500	157	50.	-.5	3025.5	*	4	0845	324	50.	-.5	3025.5	*	6	0230	491	50.	-.5	3025.5
2	1515	158	50.	-.5	3025.5	*	4	0900	325	50.	-.5	3025.5	*	6	0245	492	50.	-.5	3025.5
2	1530	159	50.	-.5	3025.5	*	4	0915	326	50.	-.5	3025.5	*	6	0300	493	50.	-.5	3025.5
2	1545	160	50.	-.5	3025.5	*	4	0930	327	50.	-.5	3025.5	*	6	0315	494	50.	-.5	3025.5
2	1600	161	50.	-.5	3025.5	*	4	0945	328	50.	-.5	3025.5	*	6	0330	495	50.	-.5	3025.5
2	1615	162	50.	-.5	3025.5	*	4	1000	329	50.	-.5	3025.5	*	6	0345	496	50.	-.5	3025.5
2	1630	163	50.	-.5	3025.5	*	4	1015	330	50.	-.5	3025.5	*	6	0400	497	50.	-.5	3025.5
2	1645	164	50.	-.5	3025.5	*	4	1030	331	50.	-.5	3025.5	*	6	0415	498	50.	-.5	3025.5
2	1700	165	50.	-.5	3025.5	*	4	1045	332	50.	-.5	3025.5	*	6	0430	499	50.	-.5	3025.5
2	1715	166	50.	-.5	3025.5	*	4	1100	333	50.	-.5	3025.5	*	6	0445	500	50.	-.5	3025.5
2	1730	167	50.	-.5	3025.5	*	4	1115	334	50.	-.5	3025.5	*						

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	124.75-HR
+ (CFS)	(HR)	(CFS)				
+ 6025.	3.75		1047.	305.	135.	99.
		(INCHES)	11.084	12.911	17.122	21.750
		(AC-FT)	519.	604.	802.	1018.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	124.75-HR
+ (AC-FT)	(HR)				
142.	3.75	84.	36.	12.	6.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	124.75-HR
+ (FEET)	(HR)				
3044.96	3.75	3038.16	3031.17	3027.39	3026.59

CUMULATIVE AREA = .88 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00
HYDROGRAPH AT					
+	OFF1	.41	1	FLOW	3334.
				TIME	3.50
HYDROGRAPH AT					
+	OFF7	.03	1	FLOW	398.
				TIME	3.25
2 COMBINED AT					
+	CP2	.44	1	FLOW	3547.
				TIME	3.50
HYDROGRAPH AT					
+	OFF2	.04	1	FLOW	411.
				TIME	3.25
HYDROGRAPH AT					
+	OFF3	.03	1	FLOW	350.
				TIME	3.25
3 COMBINED AT					
+	CP1	.50	1	FLOW	4004.
				TIME	3.50
HYDROGRAPH AT					
+	OFF4	.06	1	FLOW	751.
				TIME	3.25
HYDROGRAPH AT					
+	OFF5	.26	1	FLOW	1850.
				TIME	3.50
HYDROGRAPH AT					
+	OFF6	.04	1	FLOW	539.
				TIME	3.25
HYDROGRAPH AT					
+	ON1	.03	1	FLOW	367.
				TIME	3.25
5 COMBINED AT					
+	DB1	.88	1	FLOW	6786.
				TIME	3.50
ROUTED TO					
+	RDB1	.88	1	FLOW	6025.
				TIME	3.75

** PEAK STAGES IN FEET **

1	STAGE	3044.96
	TIME	3.75

*** NORMAL END OF HEC-1 ***

APPENDIX D

Collector Channel WSPG Hydraulic Analysis

Summary of Collector Channel Hydraulic Characteristics								
Station	**Q_{100} (cfs)**	**Flow Depth (ft)**	**Flow Velocity (ft/s)**	**Froude Number**	**Hydraulic Freeboard (ft)[1]**	**Sedimentation Freeboard (ft)**	**Required Channel Depth (ft)**	**Proposed Channel Depth (ft)**
2489.05	475	0.69	27.66	5.88	1.61	1.0	3.3	4.5
2454.74	475	1.45	13.07	1.91	1.37	1.0	3.8	4.0
2422.47	475	2.15	11.99	1.68	1.39	1.0	4.5	5.0
2035.60	475	1.11	28.03	5.18	1.73	1.0	3.8	5.0
1825.49	475	1.50	19.18	3.11	1.55	1.0	4.0	5.0
1786.16	475	2.44	10.07	1.33	1.34	1.0	4.8	5.0
1674.49	475	2.44	10.07	1.33	1.34	1.0	4.8	5.0
1449.42	475	2.45	10.04	1.33	1.34	1.0	4.8	5.0
1304.15	475	2.49	9.82	1.19	1.29	1.0	4.8	5.0
1173.89	475	2.86	8.06	1.06	1.29	0.9	5.0	5.0
1 – Hydraulic Freeboard obtained from CCRFCD Manual Equations. If Froude Number <1, Equation 741; If Froude Number >1, Equation 747.								

CCHNL.WSW

```
T1 SKYE CANYON DETENTION BASIN, OLY1401.004
T2 TECHNICAL DRAINAGE STUDY UPDATE
T3 COLLECTOR CHANNEL
SO  -2489.0503025.900  2                              3030.300
R   -2454.7403036.900  2       .015
TS  -2422.4703037.060  1       .015                                    .000
R   -2035.6003039.000  1       .015
R   -1825.4903060.010  1       .015
R   -1786.1603063.940  1       .015                                   7.511
R   -1674.4903064.500  1       .015                                  21.327
R   -1449.4203065.630  1       .015
R   -1304.1503066.360  1       .015                                  18.374
R   -1173.8903067.010  1       .015
SH  -1173.8903067.010  1       .015
CD   1  1   0    .000   5.000   12.000 3.000 3.000   .00
CD   2  2   0    .000   5.000   25.000 0.000 0.000   .00
Q           475.000   .0
```

CCHNL.EDT

FILE: CCHNL.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 8-10-2016 Time: 5:23:27

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	1	0	.000	5.000	12.000	3.000	3.000	.00										
CD	2	2	0	.000	5.000	25.000			.00										

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON DETENTION BASIN, OLY1401.004

HEADING LINE NO 2 IS -

TECHNICAL DRAINAGE STUDY UPDATE

HEADING LINE NO 3 IS -

COLLECTOR CHANNEL

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-2489.050	3025.900	2	3030.300

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-2454.740	3036.900	2	.015	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	-2422.470	3037.060	1	.015	.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-2035.600	3039.000	1	.015	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1825.490	3060.010	1	.015	.000	.000	.000	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1786.160	3063.940	1	.015	300.019	7.511	.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1674.490	3064.500	1	.015	300.006	21.327	.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1449.420	3065.630	1	.015	.000	.000	.000	0

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1304.150	3066.360	1	.015	452.997	18.374	.000	0

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1173.890	3067.010	1	.015	.000	.000	.000	0

ELEMENT NO 11 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1173.890	3067.010	1	.000

HYDRAULICS ENTERING STILLING BASIN SAME AS PREV. APPROVED, NO CHANGES TO STILLING BASIN

W S P G W - CIVILDESIGN Version 14.06
Program Package Serial Number: 1704
WATER SURFACE PROFILE LISTING
Date: 8-10-2016 Time: 5:23:30
SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2489.051	3025.900	.687	3026.587	475.00	27.66	11.88	3038.47	.00	2.24	25.00	5.000	25.000	.00	0 .0
4.115	.3206					.1307	.54	.69	5.88	.53	.015	.00	.00	RECTANG
-2484.935	3027.219	.711	3027.931	475.00	26.71	11.08	3039.01	.00	2.24	25.00	5.000	25.000	.00	0 .0
4.713	.3206					.1143	.54	.71	5.58	.53	.015	.00	.00	RECTANG
-2480.222	3028.730	.746	3029.477	475.00	25.46	10.07	3039.55	.00	2.24	25.00	5.000	25.000	.00	0 .0
3.947	.3206					.0979	.39	.75	5.20	.53	.015	.00	.00	RECTANG
-2476.275	3029.996	.783	3030.778	475.00	24.28	9.15	3039.93	.00	2.24	25.00	5.000	25.000	.00	0 .0
3.353	.3206					.0838	.28	.78	4.84	.53	.015	.00	.00	RECTANG
-2472.922	3031.071	.821	3031.892	475.00	23.15	8.32	3040.21	.00	2.24	25.00	5.000	25.000	.00	0 .0
2.880	.3206					.0718	.21	.82	4.50	.53	.015	.00	.00	RECTANG
-2470.042	3031.994	.861	3032.855	475.00	22.07	7.57	3040.42	.00	2.24	25.00	5.000	25.000	.00	0 .0
2.492	.3206					.0615	.15	.86	4.19	.53	.015	.00	.00	RECTANG
-2467.550	3032.793	.903	3033.696	475.00	21.05	6.88	3040.57	.00	2.24	25.00	5.000	25.000	.00	0 .0
2.169	.3206					.0527	.11	.90	3.90	.53	.015	.00	.00	RECTANG
-2465.381	3033.489	.947	3034.435	475.00	20.07	6.25	3040.69	.00	2.24	25.00	5.000	25.000	.00	0 .0
1.896	.3206					.0452	.09	.95	3.63	.53	.015	.00	.00	RECTANG
-2463.485	3034.096	.993	3035.089	475.00	19.13	5.68	3040.77	.00	2.24	25.00	5.000	25.000	.00	0 .0
1.661	.3206					.0387	.06	.99	3.38	.53	.015	.00	.00	RECTANG

W S P G W - CIVILDESIGN Version 14.06
Program Package Serial Number: 1704
WATER SURFACE PROFILE LISTING
Date: 8-10-2016 Time: 5:23:30
SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2461.824	3034.629	1.042	3035.670	475.00	18.24	5.17	3040.84	.00	2.24	25.00	5.000	25.000	.00	0 .0
1.458	.3206					.0332	.05	1.04	3.15	.53	.015	.00	.00	RECTANG
-2460.367	3035.096	1.092	3036.188	475.00	17.39	4.70	3040.89	.00	2.24	25.00	5.000	25.000	.00	0 .0
1.279	.3206					.0285	.04	1.09	2.93	.53	.015	.00	.00	RECTANG
-2459.088	3035.506	1.146	3036.652	475.00	16.58	4.27	3040.92	.00	2.24	25.00	5.000	25.000	.00	0 .0
1.122	.3206					.0244	.03	1.15	2.73	.53	.015	.00	.00	RECTANG
-2457.966	3035.866	1.202	3037.067	475.00	15.81	3.88	3040.95	.00	2.24	25.00	5.000	25.000	.00	0 .0
.982	.3206					.0209	.02	1.20	2.54	.53	.015	.00	.00	RECTANG
-2456.984	3036.181	1.260	3037.441	475.00	15.08	3.53	3040.97	.00	2.24	25.00	5.000	25.000	.00	0 .0
.857	.3206					.0180	.02	1.26	2.37	.53	.015	.00	.00	RECTANG
-2456.127	3036.455	1.322	3037.777	475.00	14.37	3.21	3040.99	.00	2.24	25.00	5.000	25.000	.00	0 .0
.744	.3206					.0154	.01	1.32	2.20	.53	.015	.00	.00	RECTANG
-2455.383	3036.694	1.386	3038.080	475.00	13.71	2.92	3041.00	.00	2.24	25.00	5.000	25.000	.00	0 .0
.643	.3206					.0132	.01	1.39	2.05	.53	.015	.00	.00	RECTANG
-2454.740	3036.900	1.454	3038.354	475.00	13.07	2.65	3041.01	.00	2.24	25.00	5.000	25.000	.00	0 .0
TRANS STR	.0050					.0102	.33	1.45	1.91		.015	.00	.00	RECTANG
-2422.469	3037.060	2.147	3039.207	475.00	11.99	2.23	3041.44	.00	2.86	24.88	5.000	12.000	3.00	0 .0
32.457	.0050					.0087	.28	2.15	1.68	2.44	.015	.00	3.00	TRAP

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WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 5:23:30

SKYE CANYON DETENTION BASIN, OLY1401.004

TECHNICAL DRAINAGE STUDY UPDATE

COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2390.013	3037.223	2.087	3039.310	475.00	12.47	2.41	3041.72	.00	2.86	24.52	5.000	12.000	3.00	0 .0
35.338	.0050					.0098	.35	2.09	1.76	2.44	.015	.00	3.00	TRAP
-2354.675	3037.400	2.014	3039.414	475.00	13.07	2.65	3042.07	.00	2.86	24.08	5.000	12.000	3.00	0 .0

31.542	.0050					.0112	.35	2.01	1.88	2.44	.015	.00	3.00	TRAP
-2323.133	3037.558	1.943	3039.501	475.00	13.71	2.92	3042.42	.00	2.86	23.66	5.000	12.000	3.00	0 .0
28.688	.0050					.0128	.37	1.94	2.00	2.44	.015	.00	3.00	TRAP
-2294.444	3037.702	1.874	3039.576	475.00	14.38	3.21	3042.79	.00	2.86	23.24	5.000	12.000	3.00	0 .0
26.426	.0050					.0146	.39	1.87	2.13	2.44	.015	.00	3.00	TRAP
-2268.018	3037.835	1.807	3039.642	475.00	15.08	3.53	3043.18	.00	2.86	22.84	5.000	12.000	3.00	0 .0
24.561	.0050					.0168	.41	1.81	2.26	2.44	.015	.00	3.00	TRAP
-2243.457	3037.958	1.743	3039.700	475.00	15.82	3.89	3043.59	.00	2.86	22.46	5.000	12.000	3.00	0 .0
22.976	.0050					.0192	.44	1.74	2.41	2.44	.015	.00	3.00	TRAP
-2220.481	3038.073	1.680	3039.753	475.00	16.59	4.28	3044.03	.00	2.86	22.08	5.000	12.000	3.00	0 .0
21.597	.0050					.0220	.47	1.68	2.57	2.44	.015	.00	3.00	TRAP
-2198.884	3038.181	1.619	3039.801	475.00	17.40	4.70	3044.50	.00	2.86	21.71	5.000	12.000	3.00	0 .0
20.376	.0050					.0252	.51	1.62	2.74	2.44	.015	.00	3.00	TRAP
-2178.508	3038.284	1.560	3039.844	475.00	18.25	5.17	3045.02	.00	2.86	21.36	5.000	12.000	3.00	0 .0
19.277	.0050					.0289	.56	1.56	2.91	2.44	.015	.00	3.00	TRAP

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING

Date: 8-10-2016 Time: 5:23:30

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2159.231	3038.380	1.503	3039.883	475.00	19.14	5.69	3045.57	.00	2.86	21.02	5.000	12.000	3.00	0 .0
18.276	.0050					.0331	.61	1.50	3.10	2.44	.015	.00	3.00	TRAP
-2140.955	3038.472	1.448	3039.920	475.00	20.08	6.26	3046.18	.00	2.86	20.69	5.000	12.000	3.00	0 .0
17.356	.0050					.0380	.66	1.45	3.31	2.44	.015	.00	3.00	TRAP
-2123.599	3038.559	1.394	3039.953	475.00	21.06	6.89	3046.84	.00	2.86	20.36	5.000	12.000	3.00	0 .0
16.504	.0050					.0436	.72	1.39	3.53	2.44	.015	.00	3.00	TRAP
-2107.095	3038.642	1.342	3039.984	475.00	22.08	7.57	3047.56	.00	2.86	20.05	5.000	12.000	3.00	0 .0

15.708	.0050					.0500	.79	1.34	3.76	2.44	.015	.00	3.00	TRAP
-2091.387	3038.720	1.292	3040.012	475.00	23.16	8.33	3048.34	.00	2.86	19.75	5.000	12.000	3.00	0 .0
14.963	.0050					.0574	.86	1.29	4.01	2.44	.015	.00	3.00	TRAP
-2076.424	3038.795	1.243	3040.039	475.00	24.29	9.16	3049.20	.00	2.86	19.46	5.000	12.000	3.00	0 .0
14.260	.0050					.0660	.94	1.24	4.27	2.44	.015	.00	3.00	TRAP
-2062.163	3038.867	1.196	3040.063	475.00	25.48	10.08	3050.14	.00	2.86	19.18	5.000	12.000	3.00	0 .0
13.596	.0050					.0758	1.03	1.20	4.55	2.44	.015	.00	3.00	TRAP
-2048.567	3038.935	1.150	3040.085	475.00	26.72	11.09	3051.17	.00	2.86	18.90	5.000	12.000	3.00	0 .0
12.967	.0050					.0871	1.13	1.15	4.86	2.44	.015	.00	3.00	TRAP
-2035.600	3039.000	1.106	3040.106	475.00	28.03	12.20	3052.30	.00	2.86	18.64	5.000	12.000	3.00	0 .0
82.005	.1000					.0874	7.17	1.11	5.18	1.08	.015	.00	3.00	TRAP

♀ FILE: CCHNL.WSW

WATER SURFACE PROFILE LISTING

Date: 8-10-2016 Time: 5:23:30

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1953.595	3047.200	1.148	3048.348	475.00	26.78	11.13	3059.48	.00	2.86	18.89	5.000	12.000	3.00	0 .0
40.734	.1000					.0763	3.11	1.15	4.87	1.08	.015	.00	3.00	TRAP
-1912.861	3051.273	1.194	3052.467	475.00	25.53	10.12	3062.59	.00	2.86	19.16	5.000	12.000	3.00	0 .0
25.969	.1000					.0664	1.72	1.19	4.57	1.08	.015	.00	3.00	TRAP
-1886.892	3053.870	1.241	3055.111	475.00	24.34	9.20	3064.31	.00	2.86	19.45	5.000	12.000	3.00	0 .0
18.667	.1000					.0578	1.08	1.24	4.28	1.08	.015	.00	3.00	TRAP
-1868.225	3055.737	1.290	3057.026	475.00	23.21	8.37	3065.39	.00	2.86	19.74	5.000	12.000	3.00	0 .0
14.300	.1000					.0503	.72	1.29	4.02	1.08	.015	.00	3.00	TRAP
-1853.925	3057.167	1.340	3058.506	475.00	22.13	7.61	3066.11	.00	2.86	20.04	5.000	12.000	3.00	0 .0
11.389	.1000					.0438	.50	1.34	3.77	1.08	.015	.00	3.00	TRAP
-1842.536	3058.305	1.392	3059.697	475.00	21.10	6.91	3066.61	.00	2.86	20.35	5.000	12.000	3.00	0 .0
9.306	.1000					.0382	.36	1.39	3.54	1.08	.015	.00	3.00	TRAP

-1833.230	3059.236	1.445	3060.681	475.00	20.12	6.29	3066.97	.00	2.86	20.67	5.000	12.000	3.00	0 .0
7.740	.1000					.0333	.26	1.45	3.32	1.08	.015	.00	3.00	TRAP
-1825.490	3060.010	1.501	3061.511	475.00	19.18	5.71	3067.22	1.04	2.86	21.00	5.000	12.000	3.00	0 .0
3.524	.0999					.0300	.11	2.54	3.11	1.08	.015	.00	3.00	TRAP
-1821.966	3060.362	1.530	3061.892	475.00	18.71	5.44	3067.33	1.00	2.86	21.18	5.000	12.000	3.00	0 .0
5.990	.0999					.0271	.16	2.53	3.01	1.08	.015	.00	3.00	TRAP

♀ FILE: CCHNL.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 6

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 5:23:30

SKYE CANYON DETENTION BASIN, OLY1401.004

TECHNICAL DRAINAGE STUDY UPDATE

COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1815.976	3060.961	1.588	3062.549	475.00	17.84	4.94	3067.49	.92	2.86	21.53	5.000	12.000	3.00	0 .0
5.106	.0999					.0236	.12	2.51	2.83	1.08	.015	.00	3.00	TRAP
-1810.870	3061.471	1.648	3063.119	475.00	17.01	4.49	3067.61	.85	2.86	21.89	5.000	12.000	3.00	0 .0
4.373	.0999					.0206	.09	2.50	2.65	1.08	.015	.00	3.00	TRAP
-1806.497	3061.908	1.710	3063.617	475.00	16.22	4.09	3067.70	.79	2.86	22.26	5.000	12.000	3.00	0 .0
3.757	.0999					.0180	.07	2.50	2.49	1.08	.015	.00	3.00	TRAP
-1802.740	3062.283	1.773	3064.057	475.00	15.47	3.71	3067.77	.73	2.86	22.64	5.000	12.000	3.00	0 .0
3.231	.0999					.0157	.05	2.50	2.34	1.08	.015	.00	3.00	TRAP
-1799.509	3062.606	1.839	3064.445	475.00	14.75	3.38	3067.82	.67	2.86	23.03	5.000	12.000	3.00	0 .0
2.777	.0999					.0137	.04	2.51	2.20	1.08	.015	.00	3.00	TRAP
-1796.733	3062.884	1.907	3064.790	475.00	14.06	3.07	3067.86	.62	2.86	23.44	5.000	12.000	3.00	0 .0
2.381	.0999					.0120	.03	2.53	2.06	1.08	.015	.00	3.00	TRAP
-1794.352	3063.122	1.976	3065.098	475.00	13.41	2.79	3067.89	.58	2.86	23.86	5.000	12.000	3.00	0 .0
2.034	.0999					.0105	.02	2.55	1.94	1.08	.015	.00	3.00	TRAP
-1792.318	3063.325	2.048	3065.373	475.00	12.78	2.54	3067.91	.53	2.86	24.29	5.000	12.000	3.00	0 .0
1.726	.0999					.0092	.02	2.58	1.82	1.08	.015	.00	3.00	TRAP

-1790.592	3063.497	2.122	3065.619	475.00	12.19	2.31	3067.93	.49	2.86	24.73	5.000	12.000	3.00	0 .0
1.452	.0999					.0080	.01	2.62	1.71	1.08	.015	.00	3.00	TRAP

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WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 5:23:30

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1789.140	3063.642	2.198	3065.840	475.00	11.62	2.10	3067.94	.46	2.86	25.19	5.000	12.000	3.00	0 .0
1.207	.0999					.0070	.01	2.66	1.61	1.08	.015	.00	3.00	TRAP
-1787.933	3063.763	2.277	3066.040	475.00	11.08	1.91	3067.95	.42	2.86	25.66	5.000	12.000	3.00	0 .0
.986	.0999					.0061	.01	2.70	1.51	1.08	.015	.00	3.00	TRAP
-1786.947	3063.861	2.358	3066.219	475.00	10.56	1.73	3067.95	.39	2.86	26.15	5.000	12.000	3.00	0 .0
.787	.0999					.0054	.00	2.75	1.42	1.08	.015	.00	3.00	TRAP
-1786.160	3063.940	2.441	3066.381	475.00	10.07	1.58	3067.96	.36	2.86	26.64	5.000	12.000	3.00	0 .0
111.670	.0050					.0050	.56	2.80	1.33	2.44	.015	.00	3.00	TRAP
-1674.490	3064.500	2.441	3066.941	475.00	10.07	1.58	3068.52	.00	2.86	26.64	5.000	12.000	3.00	0 .0
28.344	.0050					.0050	.14	2.44	1.33	2.44	.015	.00	3.00	TRAP
-1646.146	3064.642	2.441	3067.083	475.00	10.07	1.58	3068.66	.00	2.86	26.64	5.000	12.000	3.00	0 .0
196.726	.0050					.0050	.98	2.44	1.33	2.44	.015	.00	3.00	TRAP
-1449.420	3065.630	2.446	3068.076	475.00	10.04	1.57	3069.64	.24	2.86	26.68	5.000	12.000	3.00	0 .0
145.270	.0050					.0048	.70	2.69	1.33	2.44	.015	.00	3.00	TRAP
-1304.150	3066.360	2.487	3068.847	475.00	9.82	1.50	3070.34	.00	2.86	26.92	5.000	12.000	3.00	0 .0
18.704	.0050					.0046	.09	2.49	1.29	2.44	.015	.00	3.00	TRAP
-1285.446	3066.453	2.497	3068.950	475.00	9.76	1.48	3070.43	.00	2.86	26.98	5.000	12.000	3.00	0 .0
70.323	.0050					.0043	.30	2.50	1.28	2.44	.015	.00	3.00	TRAP

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 5:23:30

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
COLLECTOR CHANNEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1215.123	3066.804	2.584	3069.388	475.00	9.31	1.35	3070.73	.00	2.86	27.50	5.000	12.000	3.00	0 .0
26.975	.0050					.0038	.10	2.58	1.20	2.44	.015	.00	3.00	TRAP
-1188.148	3066.939	2.673	3069.612	475.00	8.87	1.22	3070.84	.00	2.86	28.04	5.000	12.000	3.00	0 .0
11.286	.0050					.0033	.04	2.67	1.13	2.44	.015	.00	3.00	TRAP
-1176.862	3066.995	2.766	3069.761	475.00	8.46	1.11	3070.87	.00	2.86	28.59	5.000	12.000	3.00	0 .0
2.972	.0050					.0029	.01	2.77	1.06	2.44	.015	.00	3.00	TRAP
-1173.890	3067.010	2.862	3069.872	475.00	8.06	1.01	3070.88	.00	2.86	29.17	5.000	12.000	3.00	0 .0

SKYE CANYON DETENTION BASIN, OLY1401.004

TECHNICAL DRAINAGE STUDY UPDATE

COLLECTOR CHANNEL

```
-2489.05    .IW  C     H                E                                .    R
-2479.16    .  I W  C     H              E                                .    R
-2469.27    .      IW  C     H           E                                .    R
-2459.39    .        I W  C     H        E                                .    R
-2449.50    .           IW   C     H     E                                .    R
-2439.61    .             I W  C     H   E                                .    R
-2429.72    .               I W  C     H E                                .    R
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-2419.83	.	I W C H E	.	R
-2409.94	.	I W C H E	.	R
-2400.06	.	I W C H E	.	R
-2390.17	.	I W C H E	.	R
-2380.28	.	I W C HE	.	R
-2370.39	.	I W C H	.	R
-2360.50	.	I W C EH	.	R
-2350.61	.	I W C EH	.	R
-2340.72	.	I W C E H	.	R
-2330.84	.	I WC E H	.	TX
-2320.95	.	I W C E H	.	R
-2311.06	.	I WC EH	.	R
-2301.17	.	I W C H	.	R
-2291.28	.	I W C EH	.	R
-2281.39	.	I W C H	.	R
-2271.51	.		.	
-2261.62	.	I W C HE	.	R
-2251.73	.		.	
-2241.84	.	I W C H E	.	R

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-2231.95    .                                                                .
-2222.06    .                                                                .
-2212.18    .                    I   W C    H E                              .    R
-2202.29    .                                                                .
-2192.40    .                    I   W C    H  E                             .    R
-2182.51    .                                                                .
-2172.62    .                    I  W  C    H   E                            .    R
-2162.73    .                                                                .
-2152.84    .                     I  W  C    H    E                          .    R
-2142.96    .                                                                .
-2133.07    .                     I  W  C    H    E                          .    R
-2123.18    .                     I  W  C    H      E                        .    R
-2113.29    .                                                                .
-2103.40    .                     I  W  C    H      E                        .    R
-2093.51    .                                                                .
-2083.63    .                     I  W   C   H        E                      .    R
-2073.74    .                     I  W   C   H          E                    .    R
-2063.85    .                                                                .
-2053.96    .                      I W   C   H          E                    .    R
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-2044.07  .                  I W   C   H          E                       .  R
-2034.18  .                  I W   C   H            E                     .  R
-2024.29  .                                                               .
-2014.41  .                                                               .
-2004.52  .                                                               .
-1994.63  .                                                               .
-1984.74  .                                                               .
-1974.85  .                                                               .
-1964.96  .                                                               .
-1955.08  .                                                               .
-1945.19  .                           I W   C   H          E              .  R
-1935.30  .                                                               .
-1925.41  .                                                               .
-1915.52  .                                                               .
-1905.63  .                               I W   C  H         E            .  R
-1895.75  .                                                               .
-1885.86  .                                 I W  C   H        E           .  R
-1875.97  .                                                               .
-1866.08  .                                   I W  C   H       E          .  R
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-1856.19  .                                                  .
-1846.30  .                        I W   C  H       E        .  R
-1836.41  .                           I W  C    H      E     .  R
-1826.53  .                             I W  C    H     E    .  R
-1816.64  .                              I   W SC   H    E   .  R
-1806.75  .                               I   W S    H   E   .  R
-1796.86  .                                 I  W SC   H   E  .  R
-1786.97  .                                  I  W SC   H  E  .  R
-1777.08  .                                   I  W SC   H E  .  R
-1767.20  .                                   I   W SC   HE  .  R
-1757.31  .                                    I   W S    H  .  R
-1747.42  .                                     I   WSC    H .  R
-1737.53  .                                     I    WS    H .  R
-1727.64  .                                      I   WSC  EH .  R
-1717.75  .                                      I    WS  EH .  R
-1707.87  .                                      I    WSC EH .  R
-1697.98  .                                       I    WC EH .  R
-1688.09  .                                       I    WS E H.  R
-1678.20  .                                       I    WS E H.  R
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-1668.31    .                                                I    W  E H     .    R
-1658.42    .                                                                  .
-1648.53    .                                                                  .
-1638.65    .                                                I    WC E H     .    R
-1628.76    .                                                                  .
-1618.87    .                                                                  .
-1608.98    .                                                                  .
-1599.09    .                                                                  .
-1589.20    .                                                                  .
-1579.32    .                                                                  .
-1569.43    .                                                                  .
-1559.54    .                                                                  .
-1549.65    .                                                                  .
-1539.76    .                                                                  .
-1529.87    .                                                                  .
-1519.98    .                                                                  .
-1510.10    .                                                                  .
-1500.21    .                                                                  .
-1490.32    .                                                                  .
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-1480.43    .                                                                .
-1470.54    .                                                                .
-1460.65    .                                                                .
-1450.77    .                                                                .
-1440.88    .                                                I    WC E  H    .    R
-1430.99    .                                                                .
-1421.10    .                                                                .
-1411.21    .                                                                .
-1401.32    .                                                                .
-1391.44    .                                                                .
-1381.55    .                                                                .
-1371.66    .                                                                .
-1361.77    .                                                                .
-1351.88    .                                                                .
-1341.99    .                                                                .
-1332.10    .                                                                .
-1322.22    .                                                                .
-1312.33    .                                                                .
-1302.44    .                                                I     W  E H    .    R
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-1292.55    .                                                                                       .
-1282.66    .                                                                    I     WC E H  .    R
-1272.77    .                                                                                       .
-1262.89    .                                                                                       .
-1253.00    .                                                                                       .
-1243.11    .                                                                                       .
-1233.22    .                                                                                       .
-1223.33    .                                                                                       .
-1213.44    .                                                                     I     W  E H  .    R
-1203.56    .                                                                                       .
-1193.67    .                                                                                       .
-1183.78    .                                                                      I    WC E H  .    R
-1173.89    .                                                                      I     W E H  .    R

          3025.900  3030.511  3035.122  3039.733  3044.344  3048.955  3053.566  3058.177  3062.789  3067.400  3072.010
```

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

APPENDIX E

Outlet Pipe WSPG Hydraulic Analysis

WSPG Summary
Outlet Storm Drain

WSPG Station	Storm Drain Diameter (in)	Q_{100} (cfs)	Invert Elevation (ft)	WSE (ft)	Velocity (ft/s)	FG Elevation	Description	HGL Check[1]
1747.32	60	113	2995.40	2997.0	21.73	3001.4	End Model	OK
1641.84	60	113	3000.79	3002.5	19.24	3028.2	SDMH#5	OK
1641.84	60	106	3000.79	3002.3	20.79	3028.2	SM3 24" RCP Lateral	OK
1567.32	60	106	3004.60	3006.3	18.59	3028.8	SDMH#4	OK
1480.00	60	106	3009.06	3011.7	10.13	3027.4	SDMH#3	OK
1480.00	60	71	3009.06	3010.4	16.26	3027.4	SM1 & SM2 36" RCP Lateral	OK
1415.65	60	71	3012.35	3014.7	8.04	3028.0	SDMH#2	OK
1294.16	60	71	3012.83	3015.1	8.08	3035.5	SDMH#1	OK
1052.15	60	71	3013.80	3016.2	7.71	3025.5	Detention Basin Outlet Structure	OK

1 - 'HGL Check' reflects the minimum 1-ft below finished grade.

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T1 SKYE CANYON DETENTION BASIN, OLY1401.004
T2 TECHNICAL DRAINAGE STUDY UPDATE
T3 OUTLET PIPE
SO  -1747.3202995.400 60                          2996.890
R   -1641.8403000.790 60      .013                                .000    .000 1
JX  -1641.8403000.790 60 24   .013    7.000         3003.790       90.0          .000
R   -1567.3203004.600 60      .013                                .000    .000 1
R   -1480.0003009.060 60      .013                                .000    .000 1
JX  -1480.0003009.060 60 36   .013   35.0           3011.060       45.
R   -1415.6503012.350 60      .013                                .000  30.000 1
R   -1294.1603012.830 60      .013                                .000  45.000 1
R   -1052.1503013.800 60      .013
SH  -1052.1503013.800 60                                .000
CD  24  4   1    .000   2.0       .000  .000  .000   .00
CD  30  4   1    .000   2.5       .000  .000  .000   .00
CD  36  4   1    .000   3.0       .000  .000  .000   .00
CD  60  4   1    .000   5.0       .000  .000  .000   .00
Q           71.000   .0
```

FILE: 60-OUT.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 8-10-2016 Time: 3:46:50

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	24	4	1		2.000														
CD	30	4	1		2.500														
CD	36	4	1		3.000														
CD	60	4	1		5.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON DETENTION BASIN, OLY1401.004

HEADING LINE NO 2 IS -

TECHNICAL DRAINAGE STUDY UPDATE

HEADING LINE NO 3 IS -

OUTLET PIPE

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	-1747.320	2995.400	60	2996.890

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1641.840	3000.790	60	.013	.000	.000	.000	1

ELEMENT NO 3 IS A JUNCTION * * * * * * * *

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	-1641.840	3000.790	60	24	0	.013	7.000	.000	3003.790	.000	90.000	.000

RADIUS	ANGLE
.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1567.320	3004.600	60	.013	.000	.000	.000	1

ELEMENT NO 5 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1480.000	3009.060	60	.013	.000	.000	.000	1

ELEMENT NO 6 IS A JUNCTION * * * * * * * *

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	-1480.000	3009.060	60	36	0	.013	35.000	.000	3011.060	.000	45.000	.000

RADIUS	ANGLE
.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 7 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1415.650	3012.350	60	.013	.000	.000	30.000	1

ELEMENT NO 8 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1294.160	3012.830	60	.013	.000	.000	45.000	1

ELEMENT NO 9 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	-1052.150	3013.800	60	.013	.000	.000	.000	0

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 10 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1052.150	3013.800	60	.000

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
OUTLET PIPE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-1747.320	2995.400	1.554	2996.953	113.00	21.73	7.33	3004.28	.00	3.03	4.63	5.000	.000	.00	1 .0
35.256	.0511					.0414	1.46	1.55	3.61	1.48	.013	.00	.00	PIPE
-1712.063	2997.202	1.583	2998.785	113.00	21.17	6.96	3005.74	.00	3.03	4.65	5.000	.000	.00	1 .0
42.098	.0511					.0374	1.57	1.58	3.48	1.48	.013	.00	.00	PIPE
-1669.966	2999.353	1.638	3000.991	113.00	20.18	6.33	3007.32	.00	3.03	4.69	5.000	.000	.00	1 .0
28.126	.0511					.0327	.92	1.64	3.26	1.48	.013	.00	.00	PIPE
-1641.840	3000.790	1.697	3002.487	113.00	19.24	5.75	3008.24	.00	3.03	4.73	5.000	.000	.00	1 .0
JUNCT STR	.0000					.0352	.00	1.70	3.05		.013	.00	.00	PIPE
-1641.840	3000.790	1.532	3002.321	106.00	20.79	6.71	3009.03	.00	2.93	4.61	5.000	.000	.00	1 .0
15.738	.0511					.0389	.61	1.53	3.48	1.44	.013	.00	.00	PIPE
-1626.102	3001.594	1.549	3003.144	106.00	20.45	6.49	3009.64	.00	2.93	4.62	5.000	.000	.00	1 .0
34.646	.0511					.0357	1.24	1.55	3.40	1.44	.013	.00	.00	PIPE
-1591.457	3003.366	1.604	3004.970	106.00	19.49	5.90	3010.87	.00	2.93	4.67	5.000	.000	.00	1 .0
24.137	.0511					.0313	.75	1.60	3.18	1.44	.013	.00	.00	PIPE
-1567.320	3004.601	1.661	3006.262	106.00	18.59	5.36	3011.63	.00	2.93	4.71	5.000	.000	.00	1 .0
13.852	.0511					.0278	.39	1.66	2.98	1.44	.013	.00	.00	PIPE
-1553.468	3005.308	1.704	3007.012	106.00	17.94	5.00	3012.01	.00	2.93	4.74	5.000	.000	.00	1 .0
15.033	.0511					.0248	.37	1.70	2.83	1.44	.013	.00	.00	PIPE

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
OUTLET PIPE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch

-1538.434	3006.076	1.764	3007.840	106.00	17.11	4.54	3012.39	.00	2.93	4.78	5.000	.000	.00	1	.0
11.948	.0511					.0218	.26	1.76	2.65	1.44	.013	.00	.00	PIPE	
-1526.487	3006.686	1.827	3008.513	106.00	16.31	4.13	3012.65	.00	2.93	4.82	5.000	.000	.00	1	.0
9.679	.0511					.0191	.18	1.83	2.47	1.44	.013	.00	.00	PIPE	
-1516.808	3007.180	1.893	3009.073	106.00	15.55	3.76	3012.83	.00	2.93	4.85	5.000	.000	.00	1	.0
7.965	.0511					.0167	.13	1.89	2.31	1.44	.013	.00	.00	PIPE	
-1508.843	3007.587	1.961	3009.548	106.00	14.83	3.41	3012.96	.00	2.93	4.88	5.000	.000	.00	1	.0
6.553	.0511					.0147	.10	1.96	2.16	1.44	.013	.00	.00	PIPE	
-1502.290	3007.922	2.033	3009.955	106.00	14.14	3.10	3013.06	.00	2.93	4.91	5.000	.000	.00	1	.0
5.454	.0511					.0129	.07	2.03	2.02	1.44	.013	.00	.00	PIPE	
-1496.836	3008.200	2.107	3010.308	106.00	13.48	2.82	3013.13	.00	2.93	4.94	5.000	.000	.00	1	.0
4.517	.0511					.0113	.05	2.11	1.88	1.44	.013	.00	.00	PIPE	
-1492.319	3008.431	2.184	3010.615	106.00	12.85	2.57	3013.18	.00	2.93	4.96	5.000	.000	.00	1	.0
3.702	.0511					.0100	.04	2.18	1.76	1.44	.013	.00	.00	PIPE	
-1488.618	3008.620	2.265	3010.885	106.00	12.26	2.33	3013.22	.00	2.93	4.98	5.000	.000	.00	1	.0
3.001	.0511					.0087	.03	2.27	1.64	1.44	.013	.00	.00	PIPE	
-1485.617	3008.773	2.350	3011.124	106.00	11.69	2.12	3013.24	.00	2.93	4.99	5.000	.000	.00	1	.0
2.392	.0511					.0077	.02	2.35	1.53	1.44	.013	.00	.00	PIPE	

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING

Date: 8-10-2016 Time: 3:46:53

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
OUTLET PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1483.225	3008.896	2.439	3011.335	106.00	11.14	1.93	3013.26	.00	2.93	5.00	5.000	.000	.00	1 .0
1.856	.0511					.0068	.01	2.44	1.42	1.44	.013	.00	.00	PIPE
-1481.369	3008.990	2.532	3011.522	106.00	10.62	1.75	3013.27	.00	2.93	5.00	5.000	.000	.00	1 .0
1.369	.0511					.0060	.01	2.53	1.33	1.44	.013	.00	.00	PIPE
-1480.000	3009.060	2.630	3011.690	106.00	10.13	1.59	3013.28	.00	2.93	4.99	5.000	.000	.00	1 .0
JUNCT STR	.0000					.0166	.00	2.63	1.23		.013	.00	.00	PIPE
-1480.000	3009.060	1.370	3010.431	71.00	16.26	4.10	3014.53	.00	2.38	4.46	5.000	.000	.00	1 .0

10.048	.0511					.0262	.26	1.37	2.89	1.17	.013	.00	.00	PIPE	
-1469.952	3009.574	1.406	3010.980	71.00	15.67	3.81	3014.79	.00	2.38	4.50	5.000	.000	.00	1	.0
10.700	.0511					.0233	.25	1.41	2.75	1.17	.013	.00	.00	PIPE	
-1459.252	3010.121	1.455	3011.576	71.00	14.94	3.47	3015.04	.00	2.38	4.54	5.000	.000	.00	1	.0
8.597	.0511					.0204	.18	1.46	2.57	1.17	.013	.00	.00	PIPE	
-1450.655	3010.561	1.506	3012.067	71.00	14.25	3.15	3015.22	.00	2.38	4.59	5.000	.000	.00	1	.0
7.019	.0511					.0179	.13	1.51	2.41	1.17	.013	.00	.00	PIPE	
-1443.635	3010.919	1.559	3012.479	71.00	13.58	2.86	3015.34	.00	2.38	4.63	5.000	.000	.00	1	.0
5.790	.0511					.0156	.09	1.56	2.25	1.17	.013	.00	.00	PIPE	
-1437.846	3011.216	1.614	3012.830	71.00	12.95	2.60	3015.43	.00	2.38	4.68	5.000	.000	.00	1	.0
4.803	.0511					.0137	.07	1.61	2.11	1.17	.013	.00	.00	PIPE	

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 3:46:53

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
OUTLET PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1433.042	3011.461	1.671	3013.132	71.00	12.35	2.37	3015.50	.00	2.38	4.72	5.000	.000	.00	1	.0
3.994	.0511					.0120	.05	1.67	1.97	1.17	.013	.00	.00	PIPE	
-1429.048	3011.665	1.730	3013.395	71.00	11.77	2.15	3015.55	.00	2.38	4.76	5.000	.000	.00	1	.0
3.316	.0511					.0105	.03	1.73	1.84	1.17	.013	.00	.00	PIPE	
-1425.732	3011.835	1.791	3013.626	71.00	11.23	1.96	3015.58	.00	2.38	4.79	5.000	.000	.00	1	.0
2.694	.0511					.0092	.02	1.79	1.72	1.17	.013	.00	.00	PIPE	
-1423.039	3011.972	1.856	3013.829	71.00	10.70	1.78	3015.61	.00	2.38	4.83	5.000	.000	.00	1	.0
2.224	.0511					.0081	.02	1.86	1.61	1.17	.013	.00	.00	PIPE	
-1420.815	3012.086	1.922	3014.008	71.00	10.20	1.62	3015.63	.00	2.38	4.86	5.000	.000	.00	1	.0
1.749	.0511					.0071	.01	1.92	1.50	1.17	.013	.00	.00	PIPE	
-1419.066	3012.176	1.992	3014.168	71.00	9.73	1.47	3015.64	.00	2.38	4.90	5.000	.000	.00	1	.0
1.373	.0511					.0062	.01	1.99	1.40	1.17	.013	.00	.00	PIPE	
-1417.693	3012.246	2.064	3014.310	71.00	9.28	1.34	3015.65	.00	2.38	4.92	5.000	.000	.00	1	.0

.996	.0511					.0055	.01	2.06	1.31	1.17	.013	.00	.00	PIPE
-1416.697	3012.297	2.140	3014.437	71.00	8.85	1.21	3015.65	.00	2.38	4.95	5.000	.000	.00	1 .0
.679	.0511					.0048	.00	2.14	1.22	1.17	.013	.00	.00	PIPE
-1416.018	3012.331	2.219	3014.550	71.00	8.43	1.10	3015.65	.00	2.38	4.97	5.000	.000	.00	1 .0
.368	.0511					.0042	.00	2.22	1.14	1.17	.013	.00	.00	PIPE

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 3:46:53

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
OUTLET PIPE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1415.650	3012.350	2.302	3014.652	71.00	8.04	1.00	3015.66	.00	2.38	4.98	5.000	.000	.00	1 .0
75.123	.0040					.0040	.30	2.30	1.06	2.30	.013	.00	.00	PIPE
-1340.527	3012.647	2.302	3014.949	71.00	8.04	1.00	3015.95	.00	2.38	4.98	5.000	.000	.00	1 .0
46.367	.0040					.0040	.18	2.30	1.06	2.30	.013	.00	.00	PIPE
-1294.160	3012.830	2.293	3015.123	71.00	8.08	1.01	3016.14	.00	2.38	4.98	5.000	.000	.00	1 .0
215.432	.0040					.0040	.86	2.29	1.07	2.29	.013	.00	.00	PIPE
-1078.728	3013.694	2.293	3015.986	71.00	8.08	1.01	3017.00	.00	2.38	4.98	5.000	.000	.00	1 .0
26.578	.0040					.0038	.10	2.29	1.07	2.29	.013	.00	.00	PIPE
-1052.150	3013.800	2.379	3016.178	71.00	7.71	.92	3017.10	.00	2.38	4.99	5.000	.000	.00	1 .0

SKYE CANYON DETENTION BASIN, OLY1401.004

TECHNICAL DRAINAGE STUDY UPDATE

OUTLET PIPE

-1747.32 .I W C H E . R

-1738.74 . .

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-1730.16 .                                                                .
-1721.57 .                                                                .
-1712.99 .                                                                .
-1704.41 .      I     W     C       H             E                     .   R
-1695.83 .                                                                .
-1687.24 .                                                                .
-1678.66 .                                                                .
-1670.08 .                                                                .
-1661.50 .             I     W     C       H           E                  .   R
-1652.91 .                                                                .
-1644.33 .                                                                .
-1635.75 .                   I     W     C       H         E              .   JX
-1627.17 .                   I     W     C       H             E          .   R
-1618.58 .                      I     W     C       H           E         .   R
-1610.00 .                                                                .
-1601.42 .                                                                .
-1592.84 .                                                                .
-1584.26 .                         I     W     C       H         E       .   R
-1575.67 .                                                                .
-1567.09 .                            I     W    C       H       E       .   R
-1558.51 .                                                                .
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-1549.93   .                 I    W   C     H    E                       .  R
-1541.34   .                                                             .
-1532.76   .                  I    W   C     H   E                       .  R
-1524.18   .                   I    W  C      H  E                       .  R
-1515.60   .                    I    W  C     H E                        .  R
-1507.01   .                     I    W  C     H E                       .  R
-1498.43   .                     I     W  C    HE                        .  R
-1489.85   .                      I    W  C    EH                        .  R
-1481.27   .                      I     W C    E H                       .  R
-1472.68   .                       I     W C    EH                       .  R
-1464.10   .                       I     W C    E H                      .  R
-1455.52   .                       I      W C   E  H                     .  R
-1446.94   .                        I     W C   E  H                     .  R
-1438.36   .                        I      WC   E  H                     .  JX
-1429.77   .                        I   W  C       H E                   .  R
-1421.19   .                         I   W  C        HE                  .  R
-1412.61   .                          I   W  C        EH                 .  R
-1404.03   .                           I   W C        E H                .  R
-1395.44   .                            I   W  C       E H               .  R
-1386.86   .                            I    W C       E  H              .  R
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-1378.28   .                                  I      W  C      E    H          .    R
-1369.70   .                                   I      W  C      E   H          .    R
-1361.11   .                                    I      W  C     E    H         .    R
-1352.53   .                                    I       W C     E     H        .    R
-1343.95   .                                     I       W C    E     H       .    R
-1335.37   .                                     I        WC    E      H      .    R
-1326.79   .                                     I        W C   E      H      .    R
-1318.20   .                                      I        WC   E      H      .    R
-1309.62   .                                      I        WC   E      H      .    R
-1301.04   .                                      I         W   E      H      .    R
-1292.46   .                                       I         W   E       H    .    R
-1283.87   .                                        I         W   E      H     .    R
-1275.29   .                                                                    .
-1266.71   .                                                                    .
-1258.13   .                                                                    .
-1249.54   .                                                                    .
-1240.96   .                                                                    .
-1232.38   .                                                                    .
-1223.80   .                                                                    .
-1215.21   .                                                                    .
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-1206.63
-1198.05
-1189.47
-1180.89
-1172.30
-1163.72
-1155.14
-1146.56
-1137.97
-1129.39
-1120.81
-1112.23
-1103.64
-1095.06
-1086.48
-1077.90
-1069.31
-1060.73
-1052.15
I WC E H R
I W E H. R
2995.400 2997.740 3000.080 3002.420 3004.760 3007.100 3009.440 3011.781 3014.121 3016.461 3018.800

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

Section 1-b
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Section 1-b Natural Wash @ End of Outlet SD
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Channel Slope	4.00	%
Left Side Slope	0.20	H : V
Right Side Slope	0.20	H : V
Bottom Width	8.00	ft
Discharge	113.00	cfs

Results		
Depth	1.49	ft
Flow Area	12.3	ft²
Wetted Perimeter	11.04	ft
Top Width	8.60	ft
Critical Depth	1.81	ft
Critical Slope	2.19	%
Velocity	9.15	ft/s
Velocity Head	1.30	ft
Specific Energy	2.79	ft
Froude Number	1.35	
Flow Type	Supercritical	

→ UTILIZED FOR STARTING WSE IN WSPG & OUTLET PROTECTION GRAPH

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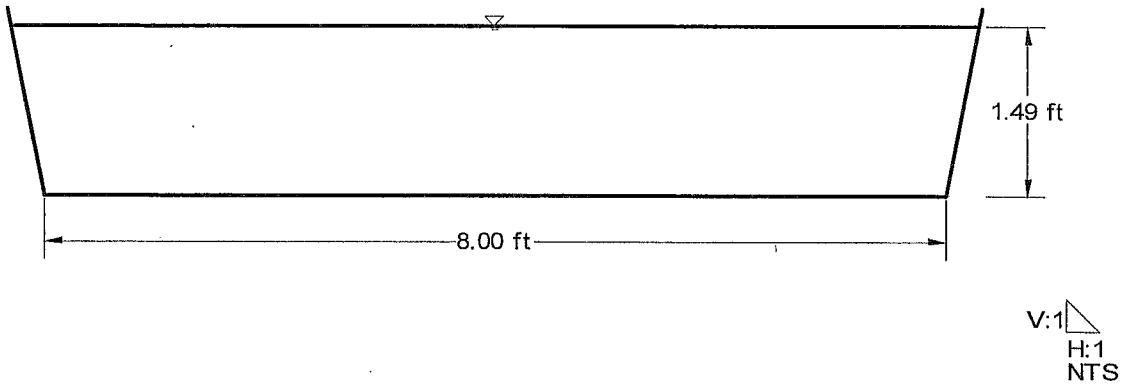
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Section 1-b
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Section 1-b Natural Wash @ End of Outlet SD
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

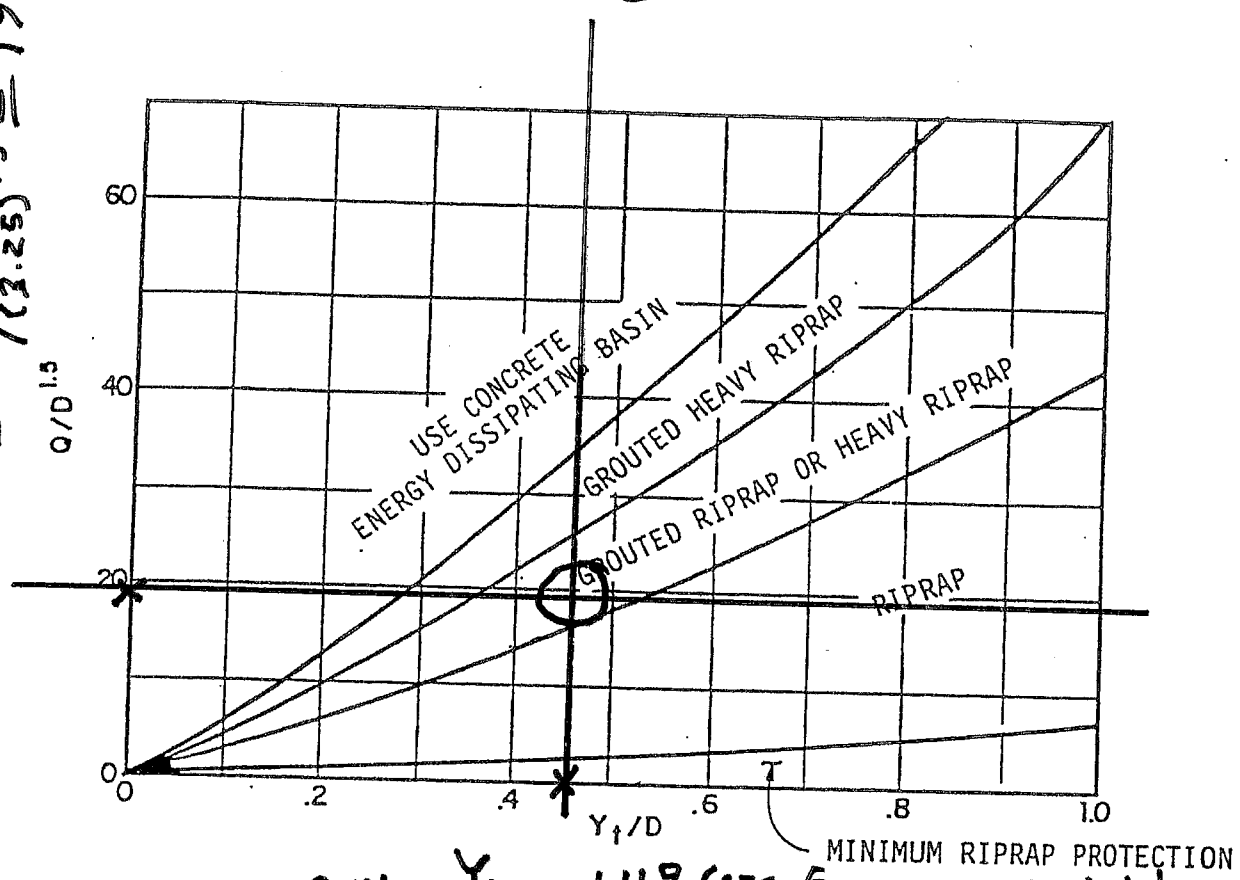
Section Data		
Mannings Coefficient	0.035	
Channel Slope	4.00	%
Depth	1.49	ft
Left Side Slope	0.20	H : V
Right Side Slope	0.20	H : V
Bottom Width	8.00	ft
Discharge	113.00	cfs



RIPRAP EROSION PROTECTION AT CIRCULAR CONDUIT OUTLET

60" RCP @ 113 cfs

$= 113/(3.25)^{1.5} = 19.3$



$0.46 = \frac{Y_t}{D_a} = \frac{1.49}{3.25}$ (SEE FLOWMASTER 1-b)

Notes:

1. Use H_a instead of H whenever culvert has supercritical flow in the barrel.
2. Minimum Riprap Protection: Use Riprap for a distance of 3H downstream for 18" to 36" equivalent round pipe size and 4D downstream for 42" and larger equivalent round pipe size.

$D_a = \frac{1}{2}(D + Y_n) = \frac{1}{2}(5 + 1.48) = 3.25'$

$\frac{Q}{D_a^{2.5}} = \frac{113}{(3.25)^{2.5}} = 5.9 < 6.0 \Rightarrow$ FIG. 712 VALID

CONCRETE UTILIZED IN LIEU; OK

*MAX. 50' EXTENT (10D) PER 707.4.3

Revision	Date

WRC ENGINEERING	REFERENCE: USDCM, DRCOG, March 1969 (with modifications)	FIGURE 712

APPENDIX F

Emergency Spillway Channel Normal Depth Computations

Section 1-a
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Section 1-a Spillway U/S
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.015	
Channel Slope	1.00	%
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	87.00	ft
Discharge	6,025.00	cfs

Results		
Depth	3.15	ft
Flow Area	303.4	ft²
Wetted Perimeter	106.90	ft
Top Width	105.88	ft
Critical Depth	4.99	ft
Critical Slope	0.20	%
Velocity	19.86	ft/s
Velocity Head	6.13	ft
Specific Energy	9.27	ft
Froude Number	2.07	
Flow Type	Supercritical	

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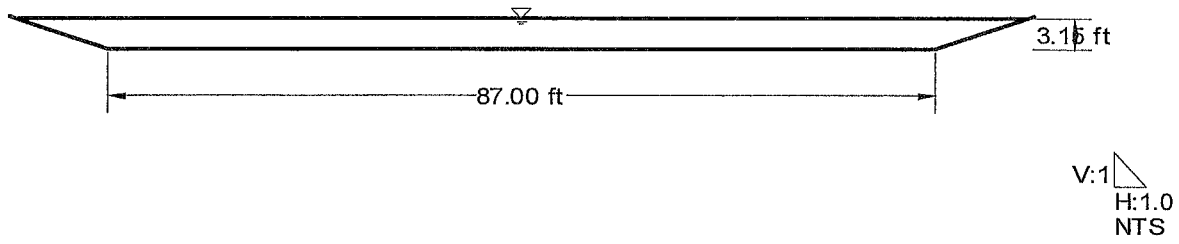
Section 1-a
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Section 1-a Spillway U/S
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	1.00	%
Depth	3.15	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	87.00	ft
Discharge	6,025.00	cfs



Section 1-f
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Section 1-f Spillway D/S
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Channel Slope	3.20	%
Left Side Slope	100.00	H : V
Right Side Slope	100.00	H : V
Bottom Width	87.00	ft
Discharge	6,025.00	cfs

Results		
Depth	1.90	ft
Flow Area	524.0	ft²
Wetted Perimeter	466.05	ft
Top Width	466.03	ft
Critical Depth	2.56	ft
Critical Slope	0.80	%
Velocity	11.50	ft/s
Velocity Head	2.05	ft
Specific Energy	3.95	ft
Froude Number	1.91	
Flow Type	Supercritical	

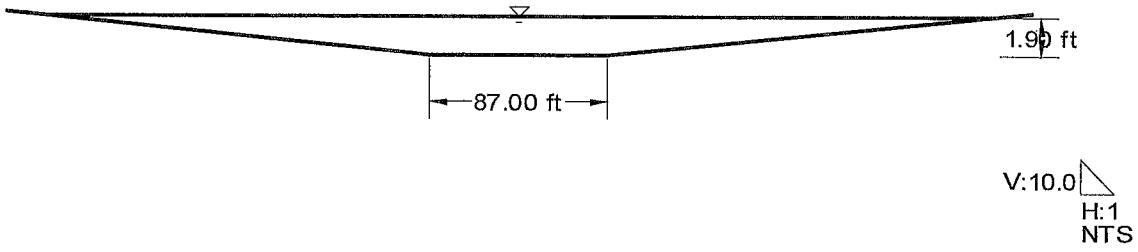
→ ENERGY GRADIENT CONTAINED BY 3034.0'
(3028.0 + 3.95) < 3034.0'

- 3034.0' PERPINDICULAR TO FL; NORTH OF THE 34' CONTOUR, FLOW HAS BEGUN TO TURN & ENERGY GRADIENT IS LESS.

Section 1-f
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Section 1-f Spillway D/S
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Channel Slope	3.20	%
Depth	1.90	ft
Left Side Slope	100.00	H : V
Right Side Slope	100.00	H : V
Bottom Width	87.00	ft
Discharge	6,025.00	cfs



APPENDIX G

Sheep Mountain H&H Calculations

Hydrology Data & HEC-1 Output

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Project Name: Skye Canyon - DB1
Description: Standard Form 4 - Outlet Channel
File Name: OLY1401-004 UP1 SF4.xls
By: JSR
Date: 8/9/2016

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
SM1	D	94.0	0.851	5.77	0.0090	75	17.33	1.50	1280	2.66	3.29	4.99	5.14	6.64	1355	17.528	0.066
SM2	D	94.0	0.851	4.94	0.0077	85	8.24	2.05	2145	2.19	2.99	4.53	8.84	10.89	2230	22.389	0.109
SM3	D	94.0	0.851	2.06	0.0032	35	8.57	1.30	1690	2.72	3.33	5.05	6.43	7.73	1725	19.583	0.077

[1] K = 0.0132 (CN) - 0.39
[2] A = Area/640
[3] Ti = (1.8 (1.1-K) L^0.5)/S^0.33
[4] For Existing Conditions: V1 = 14.8 * (S/100)^0.5
For Developed Conditions: V1 = 20.2 * (S/100)^0.5
[5] For Existing Conditions: V2 = 29.4 * (S/100)^0.5
For Developed Conditions: V2 = 30.6 * (S/100)^0.5
[6] Tt = L/(60*V)
[7] Tc = Ti + Tt
[8] Total L = Initial L + Travel L
[9] Tc = (L/180) + 10
[10] Tlag = (0.6*Tc)/60
[11] Min Tlag =0.05

Note: For Travel Time Calcs: V1 applies to first 500 feet and V2 applies to remaining distance.

REFERENCE :

STANDARD FORM 4

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   08AUG16  TIME  14:37:33   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                    *DIAGRAM
              1     ID     SLATER HANIFAN GROUP
              2     ID     NINETY-FIVE MANAGEMENT, LLC.
              3     ID     SKYE CANYON - DETENTION BASIN 1
              4     ID     TDS UPDATE - SHEEP MOUNTAIN
              5     ID     GRADED PARKWAY
              6     ID
              7     ID     RETURN PERIOD -------- 100-YEAR
              8     ID     DISTRIBUTION --------- 6-HOUR SDN3
              9     ID     PROJECT NO. ---------- OLY1401.004
             10     ID     FILENAME ------------- STB.HI
             11     ID     DATE ----------------- 8/3/2016
             12     ID     MODELED BY ----------- JSR
             13     ID
             14     ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
             15     ID        DRAINAGE AREA (MI^2)     RATIO
             16     ID        0.0-0.49                 1.00
             17     ID
             18     IT       5       0       0     300
             19     IO       5       0       0
             20     IN       5       0       0
             21     JR    PREC    1.00
                    *
             22     KK     SM1
             23     KM   DISCHARGES INTO OUTLET CHANNEL
             24     PB     3.0
             25     PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
             26     PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
             27     PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
             28     PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
             29     PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
             30     PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
             31     PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
             32     PC   0.998   0.999       1
             33     BA   .0090
             34     LS       0    94.0
             35     UD   0.066
                    *
             36     KK     SM2
             37     KM   DISCHARGES INTO OUTLET CHANNEL
             38     BA   .0077
             39     LS       0    94.0
             40     UD   0.109
                    *
             41     KK     SM3
             42     KM   SWALE FLOW
             43     BA   .0032
             44     LS       0    94.0
             45     UD   0.077
                    *
             46     ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    22         SM1
               .
               .
    36           .         SM2
                 .          .
                 .          .
    41           .          .        SM3

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   08AUG16  TIME  14:37:33   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```


SLATER HANIFAN GROUP
NINETY-FIVE MANAGEMENT, LLC.
SKYE CANYON - DETENTION BASIN 1
TDS UPDATE - SHEEP MOUNTAIN
GRADED PARKWAY

RETURN PERIOD -------- 100-YEAR

```
                        DISTRIBUTION -------- 6-HOUR SDN3
                        PROJECT NO. ---------- OLY1401.004
                        FILENAME ------------ STB.H1
                        DATE ---------------- 8/3/2016
                        MODELED BY ---------- JSR

                           SIX HOUR DEPTH-AREA REDUCTION FACTORS
                           DRAINAGE AREA (MIA2)     RATIO
                           0.0-0.49                 1.00

  19 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                      NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1   0  STARTING DATE
                      ITIME         0000  STARTING TIME
                         NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     2   0  ENDING DATE
                      NDTIME        0055  ENDING TIME
                      ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL      .08 HOURS
                        TOTAL TIME BASE    24.92 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT

     JP          MULTI-PLAN OPTION
                      NPLAN            1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00
1

          PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                              FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                          TIME TO PEAK IN HOURS

                                                                  RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA     PLAN                 RATIO 1
                                                             1.00

 HYDROGRAPH AT
+                  SM1        .01      1    FLOW             20.
                                             TIME           3.50

 HYDROGRAPH AT
+                  SM2        .01      1    FLOW             15.
                                             TIME           3.50

 HYDROGRAPH AT
+                  SM3        .00      1    FLOW              7.
                                             TIME           3.50


 *** NORMAL END OF HEC-1 ***
```

Ditch Hydraulic Calculations

Section 1-c
Worksheet for Triangular Channel

Project Description	
Worksheet	Section 1-c Swale @ Basin SM1
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

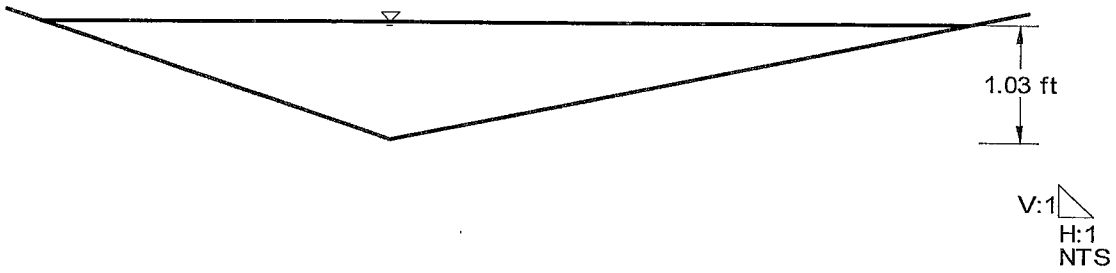
Input Data		
Mannings Coefficient	0.025	
Channel Slope	1.60	%
Left Side Slope	3.00	H : V
Right Side Slope	5.00	H : V
Discharge	20.00	cfs

Results		
Depth	1.03	ft
Flow Area	4.2	ft²
Wetted Perimeter	8.50	ft
Top Width	8.23	ft
Critical Depth	1.09	ft
Critical Slope	1.16	%
Velocity	4.73	ft/s
Velocity Head	0.35	ft
Specific Energy	1.38	ft
Froude Number	1.16	
Flow Type	Supercritical	

Section 1-c
Cross Section for Triangular Channel

Project Description	
Worksheet	Section 1-c Swale @ Basin SM1
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Channel Slope	1.60	%
Depth	1.03	ft
Left Side Slope	3.00	H : V
Right Side Slope	5.00	H : V
Discharge	20.00	cfs



Section 1-d
Worksheet for Triangular Channel

Project Description	
Worksheet	Section 1-d Swale @ Basin SM2
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

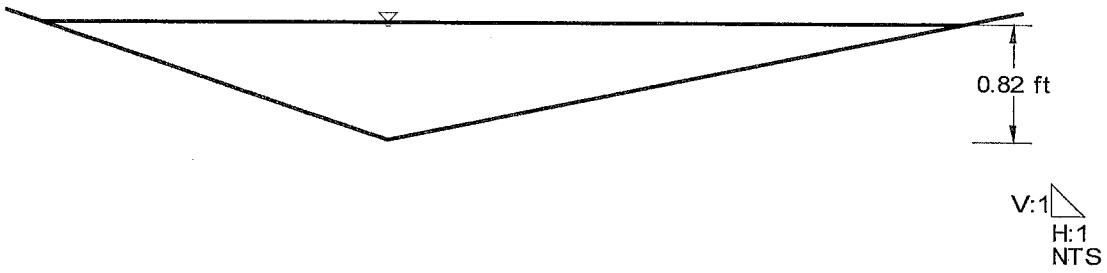
Input Data		
Mannings Coefficient	0.025	
Channel Slope	3.00	%
Left Side Slope	3.00	H : V
Right Side Slope	5.00	H : V
Discharge	15.00	cfs

Results		
Depth	0.82	ft
Flow Area	2.7	ft²
Wetted Perimeter	6.78	ft
Top Width	6.57	ft
Critical Depth	0.97	ft
Critical Slope	1.21	%
Velocity	5.57	ft/s
Velocity Head	0.48	ft
Specific Energy	1.30	ft
Froude Number	1.53	
Flow Type	Supercritical	

Section 1-d
Cross Section for Triangular Channel

Project Description	
Worksheet	Section 1-d Swale @ Basin SM2
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Channel Slope	3.00	%
Depth	0.82	ft
Left Side Slope	3.00	H : V
Right Side Slope	5.00	H : V
Discharge	15.00	cfs



Section 1-e
Worksheet for Triangular Channel

Project Description	
Worksheet	Section 1-e Swale @ Basin SM3
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

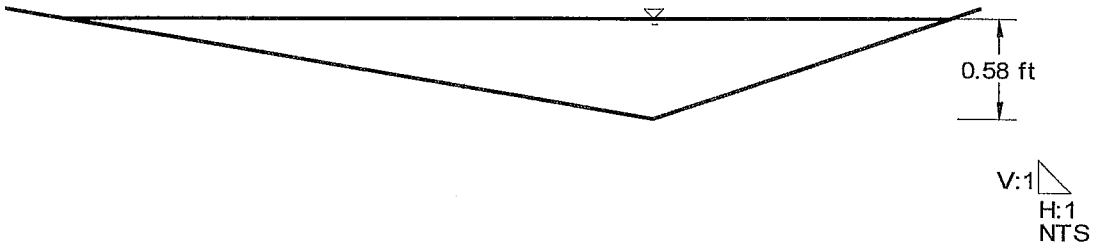
Input Data		
Mannings Coefficient	0.025	
Channel Slope	3.25	%
Left Side Slope	6.00	H : V
Right Side Slope	3.00	H : V
Discharge	7.00	cfs

Results		
Depth	0.58	ft
Flow Area	1.5	ft²
Wetted Perimeter	5.37	ft
Top Width	5.22	ft
Critical Depth	0.68	ft
Critical Slope	1.35	%
Velocity	4.62	ft/s
Velocity Head	0.33	ft
Specific Energy	0.91	ft
Froude Number	1.51	
Flow Type	Supercritical	

Section 1-e
Cross Section for Triangular Channel

Project Description	
Worksheet	Section 1-e Swale @ Basin SM3
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Channel Slope	3.25	%
Depth	0.58	ft
Left Side Slope	6.00	H : V
Right Side Slope	3.00	H : V
Discharge	7.00	cfs



Drop Inlet Calculations

Project Name:	Skye Canyon Detention Basin 1
By:	SMJ
Date:	8/8/2016

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Grate Inlet Headwater Depth Computation

Notes:

Facility ID:	Drop Inlets in Sheep Mountain Parkway
Drainage Condition:	Graded Sheep Mountain Parkway
Source of Flow:	100-yr Flow produced by SM1
Inlet Type:	NDOT Type 2B
Inlet Size:	2-ft x 4-ft (36-inch RCP out)

Known Information:

Q =	Flow (cfs)	20.0
W =	Width of Grate (ft)	4.00
L =	Length of Grate (ft)	2.00
D =	Diameter of Circle (in)	
Cf =	Clogging Factor (%)	50

Weir Conditions:

$$HW = (Q/(Cw*Pc))^{2/3}$$

Cw =	Weir Coefficient	3.00
P =	Perimeter of grate (ft)	12.0
Pc =	Perimeter (w/clogging) (ft)	6.0
HW =	Headwater depth (ft)	1.07

Orifice Conditions:

$$HW = (Q/(Co*Ac))^2/2*g$$

Co =	Orifice Coefficient	0.65
Ag =	Grate Area (ft^2)	8.00
Gf =	Grate Opening Factor	0.67
Ac =	Grate Open Area (w/ clogging) (ft^2)	2.68
g =	Gravity (fps)	32.20
HW =	Headwater depth (ft)	2.05

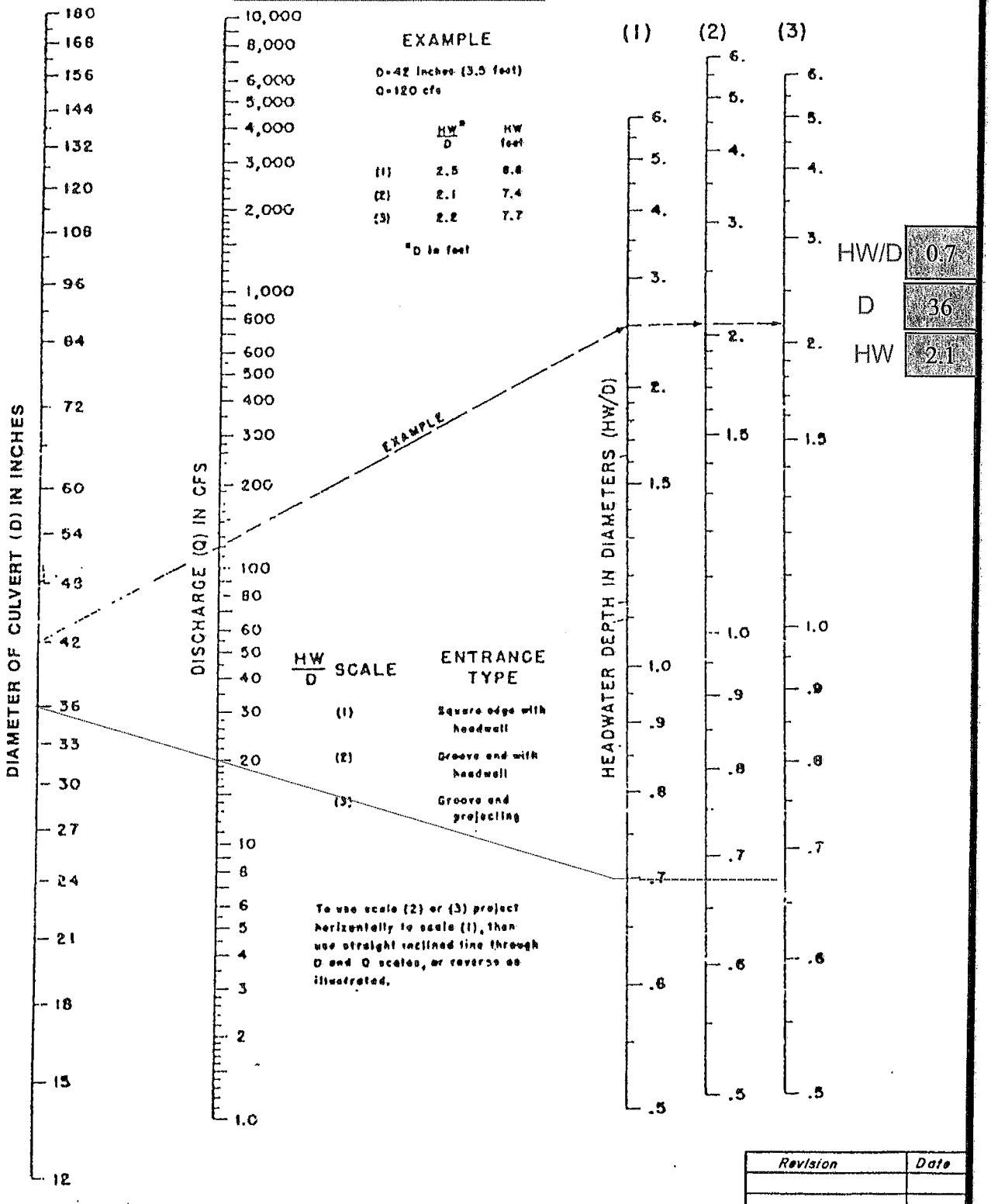
Output:

Worst Case Scenario Occurs Under Orifice Conditions

Headwater Depth = 2.0 ft with grate

NOMOGRAPH – INLET CONTROL RCP

SM1 LATERAL Q=20 CFS



Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Project Name:	Skye Canyon Detention Basin 1
By:	SMJ
Date:	8/8/2016

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Grate Inlet Headwater Depth Computation

Notes:

Facility ID:	Drop Inlets in Sheep Mountain Parkway
Drainage Condition:	Graded Sheep Mountain Parkway
Source of Flow:	100-yr Flow produced by SM2
Inlet Type:	NDOT Type 2B
Inlet Size:	2-ft x 3.5-ft (30-inch RCP out)

Known Information:

Q =	Flow (cfs)	15.0
W =	Width of Grate (ft)	3.50
L =	Length of Grate (ft)	2.00
D =	Diameter of Circle (in)	
Cf =	Clogging Factor (%)	50

Weir Conditions:

$$HW = (Q/(Cw*Pc))^{2/3}$$

Cw =	Weir Coefficient	3.00
P =	Perimeter of grate (ft)	11.0
Pc =	Perimeter (w/clogging) (ft)	5.5
HW =	Headwater depth (ft)	0.94

Orifice Conditions:

$$HW = (Q/(Co*Ac))^2/2*g$$

Co =	Orifice Coefficient	0.65
Ag =	Grate Area (ft^2)	7.00
Gf =	Grate Opening Factor	0.67
Ac =	Grate Open Area (w/ clogging) (ft^2)	2.35
g =	Gravity (fps)	32.20
HW =	Headwater depth (ft)	1.50

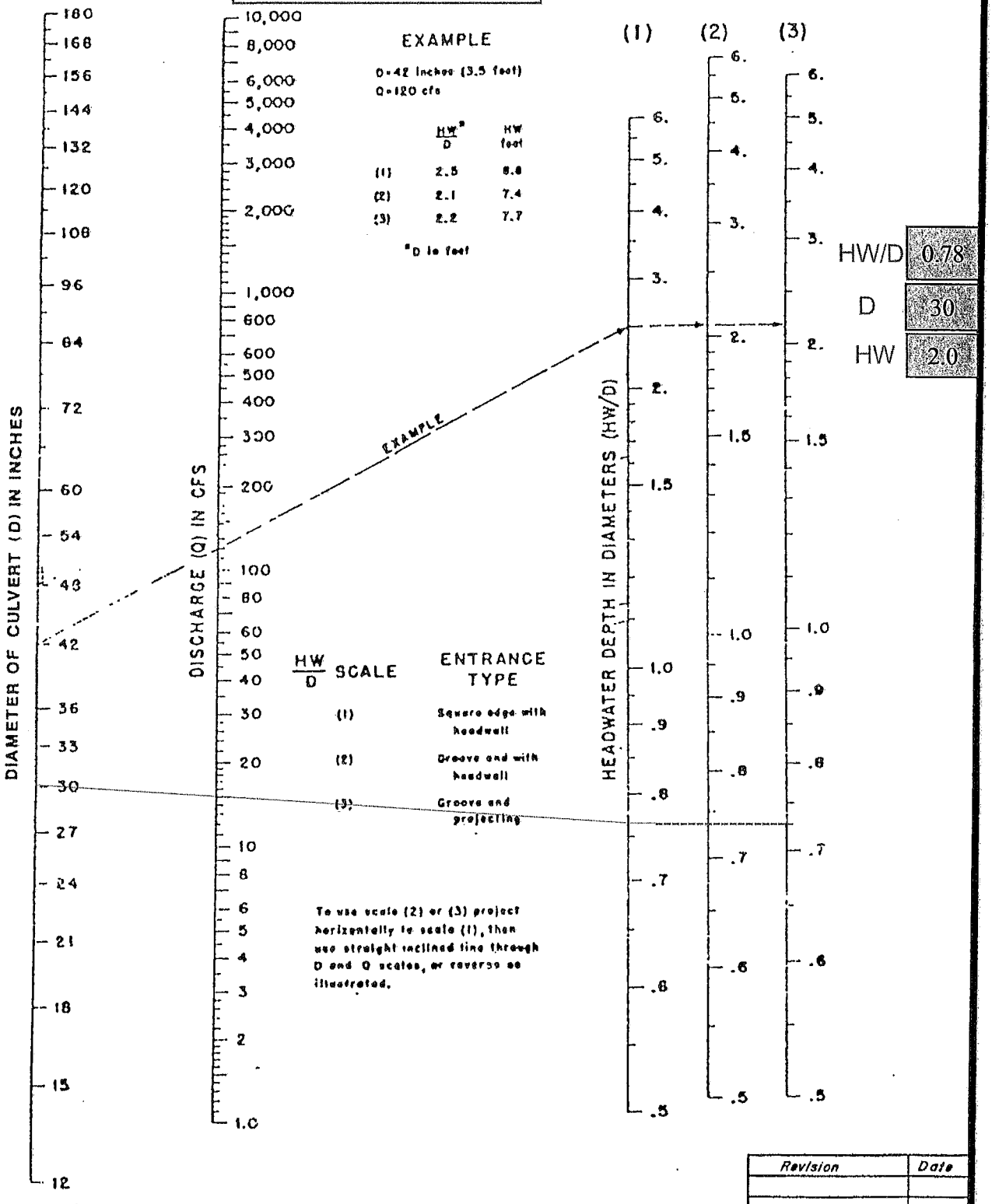
Output:

Worst Case Scenario Occurs Under Orifice Conditions

Headwater Depth = 1.5 ft with grate

NOMOGRAPH - INLET CONTROL RCP

SM2 LATERAL: Q=15 CFS



Revision	Date

WRC ENGINEERING

REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Project Name:	**Skye Canyon Detention Basin 1**
By:	**SMJ**
Date:	**8/8/2016**

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Grate Inlet Headwater Depth Computation

Notes:

Facility ID:	Drop Inlets in Sheep Mountain Parkway
Drainage Condition:	Graded Sheep Mountain Parkway
Source of Flow:	100-yr Flow produced by SM3
Inlet Type:	NDOT Type 2B
Inlet Size:	2-ft x 3-ft (24-inch RCP out)

Known Information:

Q =	Flow (cfs)	7.0
W =	Width of Grate (ft)	3.00
L =	Length of Grate (ft)	2.00
D =	Diameter of Circle (in)	
Cf =	Clogging Factor (%)	50

Weir Conditions:

$$HW = (Q/(Cw*Pc))^{2/3}$$

Cw =	Weir Coefficient	3.00
P =	Perimeter of grate (ft)	10.0
Pc =	Perimeter (w/clogging) (ft)	5.0
HW =	Headwater depth (ft)	0.60

Orifice Conditions:

$$HW = (Q/(Co*Ac))^2/2*g$$

Co =	Orifice Coefficient	0.65
Ag =	Grate Area (ft^2)	6.00
Gf =	Grate Opening Factor	0.67
Ac =	Grate Open Area (w/ clogging) (ft^2)	2.01
g =	Gravity (fps)	32.20
HW =	Headwater depth (ft)	0.45

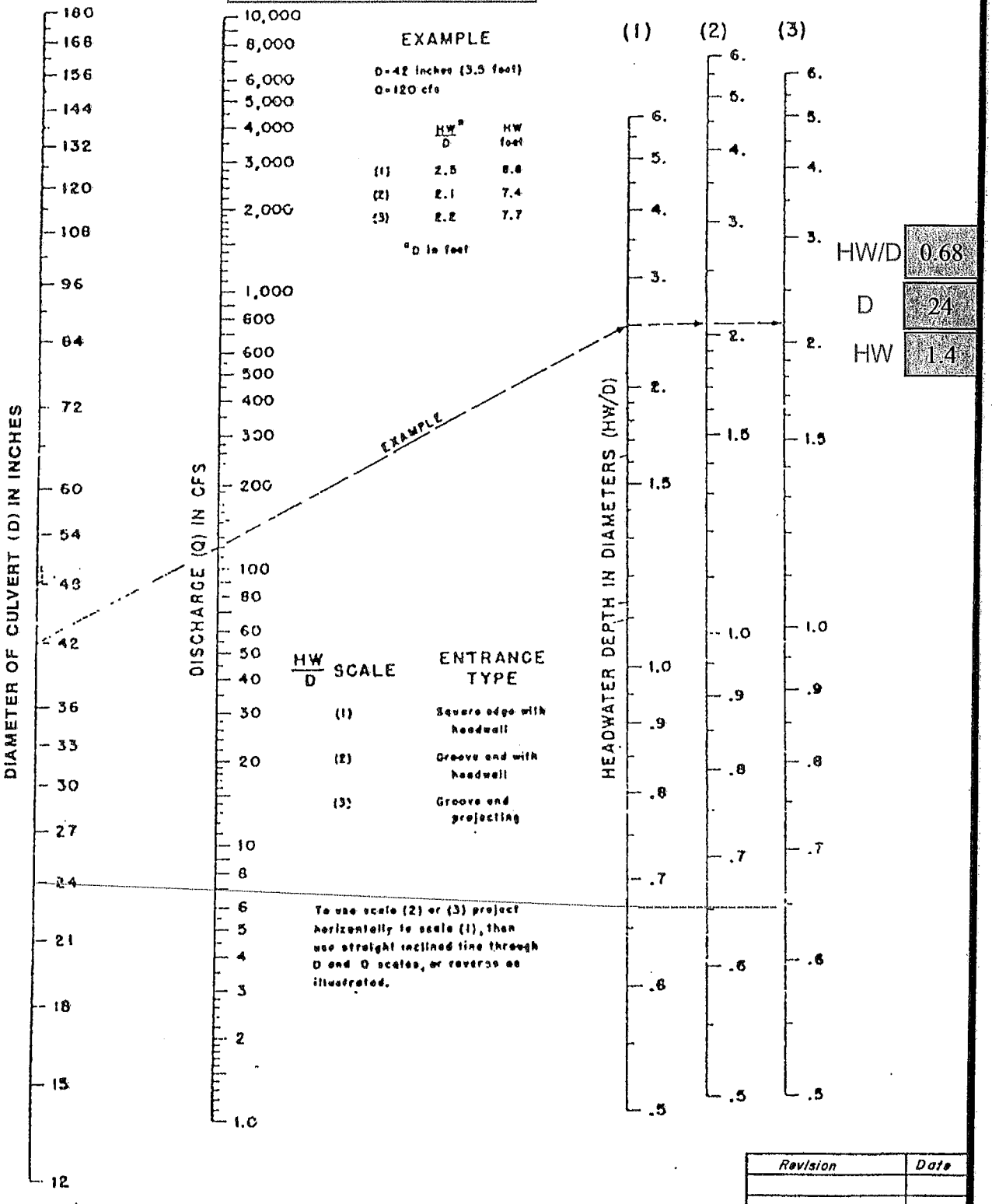
Output:

Worst Case Scenario Occurs Under Weir Conditions

Headwater Depth = 0.6 ft with grate

NOMOGRAPH – INLET CONTROL RCP

SM3 LATERAL: Q=7 CFS



Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Storm Drain WSPG Hydraulic Analyses
(Laterals to Trunk Outlet Pipe)

```
T1 SKYE CANYON DETENTION BASIN, OLY1401.004
T2 TECHNICAL DRAINAGE STUDY UPDATE
T3 LATERAL FOR SM1
SO  -1074.3503011.060 36                          3014.060
R   -1050.3503011.260 36      .013
JX  -1050.3503011.260 36 30   .013   15.0            3011.76          90.
R   -1038.3503011.460 36      .013
SH  -1038.3503011.460 36      .013
CD  30  4   1    .000   2.5       .000  .000  .000   .00
CD  36  4   1    .000   3.0       .000  .000  .000   .00
Q            20.000   .0
```

* STARTING WSE (3014.06') ASSUMED TOP OF PIPE, DUE TO TRUNK HGL NOT PRODUCING TAILWATER.

FILE: sm1.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 8-10-2016 Time: 1:28:47

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	30	4	1		2.500														
CD	36	4	1		3.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON DETENTION BASIN, OLY1401.004

HEADING LINE NO 2 IS -

TECHNICAL DRAINAGE STUDY UPDATE

HEADING LINE NO 3 IS -

LATERAL FOR SM1

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1074.350	3011.060	36	3014.060

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1050.350	3011.260	36	.013	.000	.000	.000	0

ELEMENT NO 3 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	-1050.350	3011.260	36	30	0	.013	15.000	.000	3011.760	.000	90.000	.000

RADIUS	ANGLE
.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1038.350	3011.460	36	.013	.000	.000	.000	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1038.350	3011.460	36	.000

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
LATERAL FOR SM1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-1074.350	3011.060	3.000	3014.060	35.00	4.95	.38	3014.44	.00	1.92	.00	3.000	.000	.00	1 .0
.000	.0083					.0027	.00	3.00	.00	1.63	.013	.00	.00	PIPE
-1074.350	3011.060	3.000	3014.060	35.00	4.95	.38	3014.44	.00	1.92	.00	3.000	.000	.00	1 .0
24.000	.0083					.0025	.06	3.00	.00	1.63	.013	.00	.00	PIPE
-1050.350	3011.260	2.845	3014.105	35.00	5.05	.40	3014.50	.00	1.92	1.33	3.000	.000	.00	1 .0
JUNCT STR	.0000					.0016	.00	2.84	.39		.013	.00	.00	PIPE
-1050.350	3011.260	3.378	3014.638	20.00	2.83	.12	3014.76	.00	1.44	.00	3.000	.000	.00	1 .0
12.000	.0167					.0009	.01	3.38	.00	.98	.013	.00	.00	PIPE
-1038.350	3011.460	3.189	3014.649	20.00	2.83	.12	3014.77	.00	1.44	.00	3.000	.000	.00	1 .0

STARTING WSE FOR SM2

SKYE CANYON DETENTION BASIN, OLY1401.004

TECHNICAL DRAINAGE STUDY UPDATE

LATERAL FOR SM1

-1074.35 .I C H E . R

-1073.62 .I C H E . R

-1072.88 . .

-1072.15 . .

-1071.41 .

-1070.68 .

-1069.94 .

-1069.21 .

-1068.47 .

-1067.74 .

-1067.00 .

-1066.27 .

-1065.53 .

-1064.80 .

-1064.06 .

-1063.33 .

-1062.59 .

-1061.86 .

-1061.13 .

-1060.39 .

-1059.66 .

-1058.92 .

-1058.19 .

```
-1057.45   .                                                                                .
-1056.72   .                                                                                .
-1055.98   .                                                                                .
-1055.25   .                                                                                .
-1054.51   .                                                                                .
-1053.78   .                                                                                .
-1053.04   .                                                                                .
-1052.31   .                                                                                .
-1051.57   .                                                                                .
-1050.84   .                                                                                .
-1050.11   .  I                                             C                   W  H    E   .   JX
-1049.37   .  I                                   C                                H     W E.   R
-1048.64   .                                                                                .
-1047.90   .                                                                                .
-1047.17   .                                                                                .
-1046.43   .                                                                                .
-1045.70   .                                                                                .
-1044.96   .                                                                                .
-1044.23   .                                                                                .
```

```
  -1043.49    .                                                                .
  -1042.76    .                                                                .
  -1042.02    .                                                                .
  -1041.29    .                                                                .
  -1040.55    .                                                                .
  -1039.82    .                                                                .
  -1039.08    .                                                                .
  -1038.35    .          I                          C                      H    W  E .    R
            3011.060  3011.431  3011.803  3012.174  3012.545  3012.917  3013.288  3013.659  3014.031  3014.402  3014.773
```

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

```
T1 SKYE CANYON DETENTION BASIN, OLY1401.004
T2 TECHNICAL DRAINAGE STUDY UPDATE
T3 LATERAL FOR SM2
SO  -1037.0003011.760 30                              3014.11
R   -1015.0003011.880 30       .013
SH  -1015.0003011.880 30       .013
CD  30  4   1    .000   2.5        .000  .000  .000   .00
Q             15.000   .0
```

FILE: SM2.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 8-10-2016 Time: 1:31: 6

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	30	4	1		2.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SKYE CANYON DETENTION BASIN, OLY1401.004

HEADING LINE NO 2 IS -
TECHNICAL DRAINAGE STUDY UPDATE

HEADING LINE NO 3 IS -
LATERAL FOR SM2

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1037.000	3011.760	30	3014.110

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1015.000	3011.880	30	.013	.000	.000	.000	0

ELEMENT NO 3 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1015.000	3011.880	30	.000

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
LATERAL FOR SM2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1037.000	3011.760	2.350	3014.110	15.00	3.13	.15	3014.26	.00	1.31	1.19	2.500	.000	.00	1 .0
22.000	.0054					.0012	.03	2.35	.27	1.24	.013	.00	.00	PIPE
-1015.000	3011.880	2.247	3014.126	15.00	3.23	.16	3014.29	.00	1.31	1.51	2.500	.000	.00	1 .0

♀
** WARNING NO. 22 ** - NO PLOT GENERATED, BAD DATA OR NOT ENOUGH POINTS, 3 OR LESS

```
T1 SKYE CANYON DETENTION BASIN, OLY1401.004
T2 TECHNICAL DRAINAGE STUDY UPDATE
T3 LATERAL FOR SM2
SO  -1050.0003003.790 24                              3005.79
R   -1030.0003009.790 24       .013
SH  -1030.0003009.790 24       .013
CD  24  4   1    .000   2.0        .000  .000  .000   .00
Q              7.000   .0
```

* STARTING WSE (3005.79') ASSUMED TOP OF PIPE, DUE TO TRUNK HGL NOT PRODUCING TAILWATER.

FILE: SM3.WSW W S P G W - EDIT LISTING - Version 14.06 Date: 8-10-2016 Time: 1:31: 0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	24	4	1		2.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SKYE CANYON DETENTION BASIN, OLY1401.004

HEADING LINE NO 2 IS -
TECHNICAL DRAINAGE STUDY UPDATE

HEADING LINE NO 3 IS -
LATERAL FOR SM2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1050.000	3003.790	24	3005.790

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	-1030.000	3009.790	24	.013	.000	.000	.000	0

ELEMENT NO 3 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	-1030.000	3009.790	24	.000

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
-1050.000	3003.790	.365	3004.155	7.00	17.85	4.95	3009.10	.00	.94	1.54	2.000	.000	.00	1 .0
1.325	.3000					.1766	.23	.36	6.24	.32	.013	.00	.00	PIPE
-1048.676	3004.187	.369	3004.556	7.00	17.53	4.77	3009.33	.00	.94	1.55	2.000	.000	.00	1 .0
3.029	.3000					.1611	.49	.37	6.09	.32	.013	.00	.00	PIPE
-1045.646	3005.096	.382	3005.478	7.00	16.71	4.34	3009.81	.00	.94	1.57	2.000	.000	.00	1 .0
2.396	.3000					.1409	.34	.38	5.71	.32	.013	.00	.00	PIPE
-1043.250	3005.815	.395	3006.210	7.00	15.93	3.94	3010.15	.00	.94	1.59	2.000	.000	.00	1 .0
1.952	.3000					.1231	.24	.40	5.35	.32	.013	.00	.00	PIPE
-1041.298	3006.400	.408	3006.809	7.00	15.19	3.58	3010.39	.00	.94	1.61	2.000	.000	.00	1 .0
1.620	.3000					.1075	.17	.41	5.01	.32	.013	.00	.00	PIPE
-1039.678	3006.886	.422	3007.308	7.00	14.48	3.26	3010.57	.00	.94	1.63	2.000	.000	.00	1 .0
1.370	.3000					.0939	.13	.42	4.69	.32	.013	.00	.00	PIPE
-1038.309	3007.297	.436	3007.733	7.00	13.81	2.96	3010.70	.00	.94	1.65	2.000	.000	.00	1 .0
1.167	.3000					.0821	.10	.44	4.39	.32	.013	.00	.00	PIPE
-1037.142	3007.647	.451	3008.098	7.00	13.17	2.69	3010.79	.00	.94	1.67	2.000	.000	.00	1 .0
1.007	.3000					.0718	.07	.45	4.12	.32	.013	.00	.00	PIPE
-1036.135	3007.949	.466	3008.415	7.00	12.56	2.45	3010.86	.00	.94	1.69	2.000	.000	.00	1 .0
.870	.3000					.0627	.05	.47	3.85	.32	.013	.00	.00	PIPE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch

-1035.265	3008.210	.482	3008.693	7.00	11.97	2.23	3010.92	.00	.94	1.71	2.000	.000	.00	1	.0
.756	.3000					.0549	.04	.48	3.61	.32	.013	.00	.00	PIPE	
-1034.509	3008.437	.499	3008.936	7.00	11.41	2.02	3010.96	.00	.94	1.73	2.000	.000	.00	1	.0
.662	.3000					.0480	.03	.50	3.38	.32	.013	.00	.00	PIPE	
-1033.847	3008.636	.516	3009.152	7.00	10.88	1.84	3010.99	.00	.94	1.75	2.000	.000	.00	1	.0
.578	.3000					.0420	.02	.52	3.16	.32	.013	.00	.00	PIPE	
-1033.269	3008.809	.534	3009.344	7.00	10.38	1.67	3011.02	.00	.94	1.77	2.000	.000	.00	1	.0
.505	.3000					.0367	.02	.53	2.96	.32	.013	.00	.00	PIPE	
-1032.763	3008.961	.553	3009.514	7.00	9.89	1.52	3011.03	.00	.94	1.79	2.000	.000	.00	1	.0
.445	.3000					.0322	.01	.55	2.77	.32	.013	.00	.00	PIPE	
-1032.318	3009.094	.572	3009.667	7.00	9.43	1.38	3011.05	.00	.94	1.81	2.000	.000	.00	1	.0
.388	.3000					.0281	.01	.57	2.59	.32	.013	.00	.00	PIPE	
-1031.930	3009.211	.592	3009.803	7.00	8.99	1.26	3011.06	.00	.94	1.83	2.000	.000	.00	1	.0
.342	.3000					.0246	.01	.59	2.43	.32	.013	.00	.00	PIPE	
-1031.588	3009.313	.612	3009.926	7.00	8.58	1.14	3011.07	.00	.94	1.84	2.000	.000	.00	1	.0
.294	.3000					.0216	.01	.61	2.27	.32	.013	.00	.00	PIPE	
-1031.294	3009.402	.634	3010.036	7.00	8.18	1.04	3011.07	.00	.94	1.86	2.000	.000	.00	1	.0
.257	.3000					.0189	.00	.63	2.12	.32	.013	.00	.00	PIPE	

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 1:31: 2

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
LATERAL FOR SM2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1031.037	3009.479	.656	3010.135	7.00	7.80	.94	3011.08	.00	.94	1.88	2.000	.000	.00	1 .0
.222	.3000					.0165	.00	.66	1.99	.32	.013	.00	.00	PIPE
-1030.815	3009.545	.679	3010.224	7.00	7.43	.86	3011.08	.00	.94	1.89	2.000	.000	.00	1 .0
.186	.3000					.0145	.00	.68	1.86	.32	.013	.00	.00	PIPE
-1030.630	3009.601	.704	3010.305	7.00	7.09	.78	3011.08	.00	.94	1.91	2.000	.000	.00	1 .0
.160	.3000					.0127	.00	.70	1.74	.32	.013	.00	.00	PIPE
-1030.470	3009.649	.729	3010.378	7.00	6.76	.71	3011.09	.00	.94	1.93	2.000	.000	.00	1 .0

.133	.3000					.0111	.00	.73	1.62	.32	.013	.00	.00	PIPE			
-1030.337	3009.689	.755	3010.444	7.00	6.44	.64	3011.09	.00	.94	1.94	2.000	.000	.00	1	.0		
.109	.3000					.0098	.00	.76	1.52	.32	.013	.00	.00	PIPE			
-1030.228	3009.721	.782	3010.503	7.00	6.14	.59	3011.09	.00	.94	1.95	2.000	.000	.00	1	.0		
.083	.3000					.0086	.00	.78	1.42	.32	.013	.00	.00	PIPE			
-1030.144	3009.746	.811	3010.557	7.00	5.86	.53	3011.09	.00	.94	1.96	2.000	.000	.00	1	.0		
.066	.3000					.0075	.00	.81	1.32	.32	.013	.00	.00	PIPE			
-1030.078	3009.766	.840	3010.606	7.00	5.58	.48	3011.09	.00	.94	1.97	2.000	.000	.00	1	.0		
.044	.3000					.0066	.00	.84	1.24	.32	.013	.00	.00	PIPE			
-1030.034	3009.780	.871	3010.651	7.00	5.32	.44	3011.09	.00	.94	1.98	2.000	.000	.00	1	.0		
.027	.3000					.0058	.00	.87	1.15	.32	.013	.00	.00	PIPE			

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 8-10-2016 Time: 1:31: 2

SKYE CANYON DETENTION BASIN, OLY1401.004
TECHNICAL DRAINAGE STUDY UPDATE
LATERAL FOR SM2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1030.006	3009.788	.903	3010.691	7.00	5.08	.40	3011.09	.00	.94	1.99	2.000	.000	.00	1 .0
.006	.3000					.0051	.00	.90	1.08	.32	.013	.00	.00	PIPE
-1030.000	3009.790	.939	3010.729	7.00	4.83	.36	3011.09	.00	.94	2.00	2.000	.000	.00	1 .0

SKYE CANYON DETENTION BASIN, OLY1401.004

TECHNICAL DRAINAGE STUDY UPDATE

LATERAL FOR SM2

-1050.00 .I W C H E . R

-1049.65 .

```
-1049.30   .                                                                .
-1048.95   .                                                                .
-1048.60   .   I   W     C          H                    E                  .   R
-1048.25   .                                                                .
-1047.89   .                                                                .
-1047.54   .                                                                .
-1047.19   .                                                                .
-1046.84   .                                                                .
-1046.49   .                                                                .
-1046.14   .                                                                .
-1045.79   .                                                                .
-1045.44   .             I   W     C          H                    E        .   R
-1045.09   .                                                                .
-1044.74   .                                                                .
-1044.39   .                                                                .
-1044.04   .                                                                .
-1043.68   .                                                                .
-1043.33   .                                                                .
-1042.98   .                   I   W     C          H                    E  .   R
-1042.63   .                                                                .
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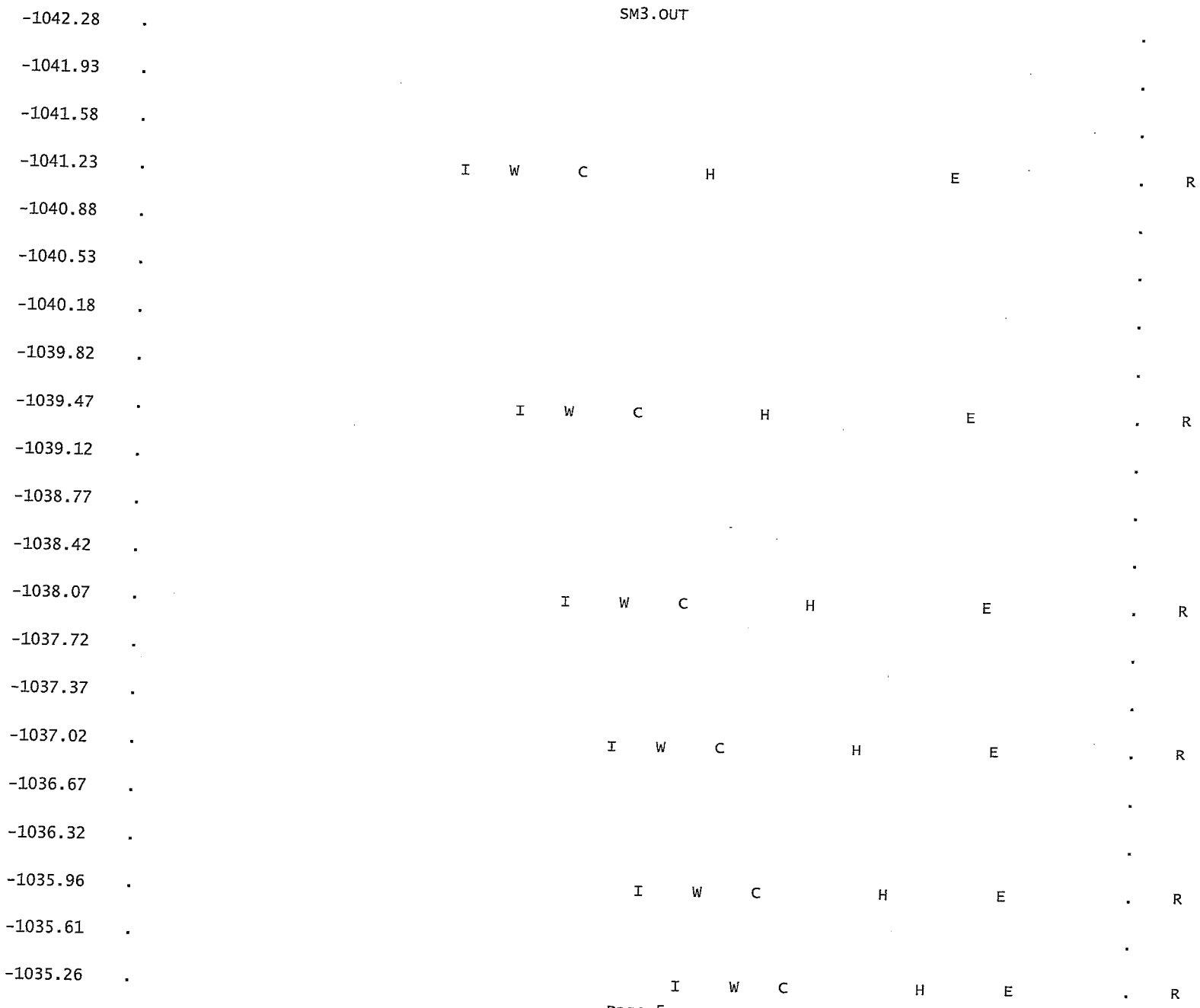
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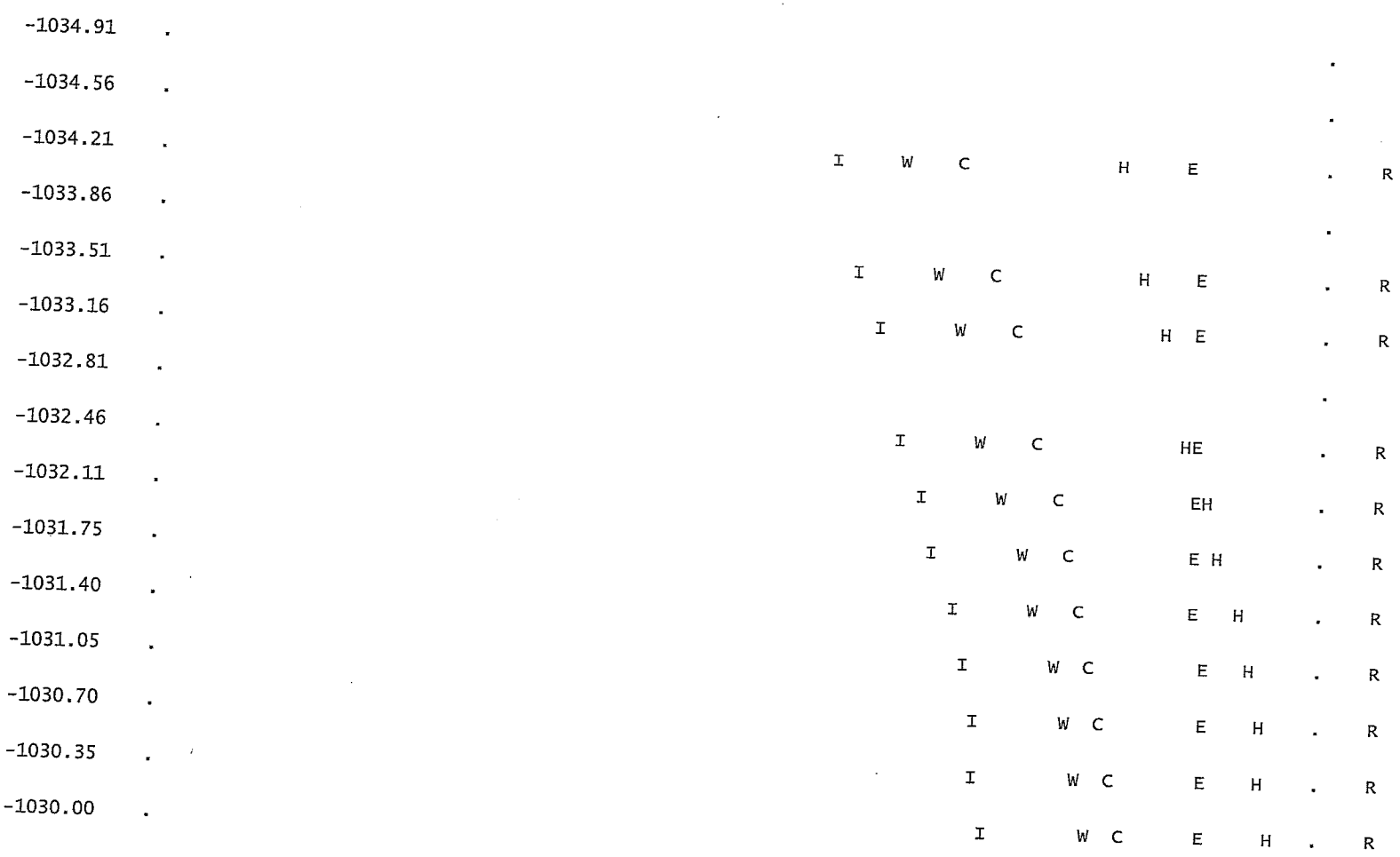

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   S = SUPER-ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER

B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

APPENDIX H

Updated Drainage Exhibits