

**UPDATE TO THE STUDY FOR
Skye Canyon – Detention Basin #2
(for a Stockpile Permit)
City of Las Vegas, Nevada**

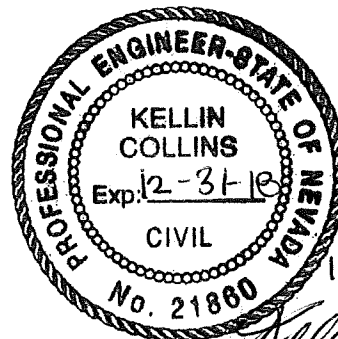
Job No.: OLY1505.000
Date: January 2018

Prepared By:

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1/18/18

Kellin Collins

Kellin Collins, P.E.
NV Professional Engineer No. 21860

Assisted by: Jonathan Rocha, EI

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Skye Canyon Detention Basin 2 (for a Stockpile Permit) Date: January 2018
 Location of Development: a) Descriptive (Cross Streets): North/South: Puli Road
East/West: Iron Mountain Road
 b) Section: 12 6, 7 Township: 19 Range: 59,60
 c) APN: 126-12-101-002

Name of Owner: Section 12, 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: Kellin Collins, P.E. Telephone No.: (702) 284-5300
 *E-mail Address: kcollins@shg-inc.com Fax No.: (702) 284-5399
 Firm: Slater Hanifan Group
 Address: 5740 S. Arville #216 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

☐ Rezoning	☐ Subdivision Map	☐ Clearing and grading Only
☐ Parcel Map	☐ Planned Unit Development	☒ Other (Please specify below)
☐ Large Parcel Map	☐ Building Permit	☒ Stockpile

1. Total Owned Land Area: At Site: 444 +/- acres Being Developed/Disturbed: 34 +/- 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

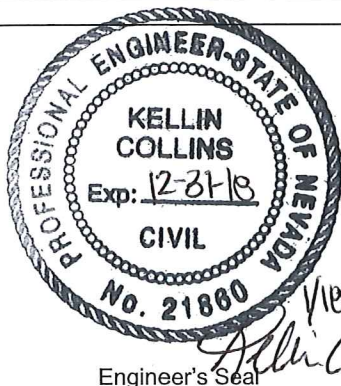
4. Proposed type of development (Residential, Commercial, Etc.): Stockpile

5. Approximate upstream land area which drains to the subject site: 650 +/- acres

6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation: Master Drainage Study for Skye Canyon (DS4420) and Skye Canyon Detention Basin 2 (DS4813)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing washes

8. Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

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:

STANDARD FORM 1

Updated 05/01/2008



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT		
Yes	No	
-	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
-	N/A	Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
X	-	An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. <u>DC</u> by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
X	-	(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
-	N/A	Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
X	-	Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
-	N/A	Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
-	N/A	All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
-	N/A	Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
-	N/A	Back of lot elevations and lot drainage pattern for all lots including common lots.
-	N/A	Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
X	-	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
-	N/A	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
-	N/A	Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
-	N/A	Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
-	N/A	Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
-	N/A	The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
-	N/A	Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
-	N/A	Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
-	N/A	Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
-	N/A	Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

This document is intended as an **aid** in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Skye Canyon Detention Basin 2 (for a Stockpile Permit) Map ID:

Firm Name: Slater Hanifan Group

Engineer: Kellin Collins, P.E.

Address: 5740 S. Arville #216

City: Las Vegas

State: NV

Zip: 89118

Phone Number: (702) 284-5300

Fax Number: (702) 284-5399

Property Owner: Section 12, LLC

Address: 11411 Southern Highlands Parkway, Suite 300

City: Las Vegas

State: NV

Zip: 89141

Reviewed By:

Date Received:

Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT

Yes <u>X</u>	No <u>-</u>	Design Manual Standard Form 1 with the engineer's seal and signature.
<u>X</u>	<u>-</u>	Design Manual Standard Form 4 .
<u>X</u>	<u>-</u>	2 copies of the 24" x 36" Drainage Plan.
<u>-</u>	<u>N/A</u>	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

Yes <u>X</u>	No <u>-</u>	A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
<u>X</u>	<u>-</u>	A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes	No	
<u>X</u>	<u>-</u>	Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
<u>X</u>	<u>-</u>	On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
<u>X</u>	<u>-</u>	Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes	No	
<u>X</u>	<u>-</u>	Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
<u>X</u>	<u>-</u>	Minimum scale: 1" = 60'.
<u>X</u>	<u>-</u>	Project name.
<u>X</u>	<u>-</u>	Vicinity Map with local and major cross streets.
<u>X</u>	<u>-</u>	Revision box.
<u>X</u>	<u>-</u>	North arrow and bar scale.
<u>X</u>	<u>-</u>	Engineer's/consultant's address and phone number.
<u>X</u>	<u>-</u>	Elevation datum and benchmark.
<u>X</u>	<u>-</u>	Legend for symbols and abbreviations.
<u>X</u>	<u>-</u>	Cut/fill scarps, where applicable.
<u>X</u>	<u>-</u>	Street names, grades, widths.
<u>-</u>	<u>N/A</u>	Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.
<u>X</u>	<u>-</u>	Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
<u>-</u>	<u>N/A</u>	Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
<u>-</u>	<u>N/A</u>	Proposed typical street sections.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
-	N/A	Streets with off-set crowns.
X	-	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X	-	Property lines.
X	-	Right-of-way lines and widths, existing and proposed.
X	-	Existing improvements and their elevations.
X	-	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
X	-	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
X	-	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
-	N/A	Location and cross-section of street capacity calculations.
X	-	Cross-sectional detail for channels, including cutoff wall locations.
X	-	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
-	N/A	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
-	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
-	N/A	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
-	N/A	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
-	N/A	Building and/or lot numbers.
X	-	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
X	-	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
-	N/A	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
-	N/A	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
-	N/A	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
-	N/A	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes	No	
X	-	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
X	-	Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X	-	Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X	-	Use of correct precipitation values in and around the McCarran Airport rainfall area.
X	-	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
X	-	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
X	-	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
X	-	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
-	N/A	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
☐	☐ N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
☐	☐ N/A	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
☐	☐ N/A	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
☐	☐ N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
☐	☐ N/A	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
☐	☐ N/A	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
☐	☐ N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
☐	☐ N/A	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
☐	☐ N/A	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
☒	☐	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
☐	☐ N/A	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

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LIST OF APPENDICES

- Appendix A** Drainage Exhibits
- Exhibit A – Location Map
 - Exhibit B – FEMA FIRM Panel Map
 - Exhibit C1 – CCRFCD 2013 MPU Facilities Exhibit
 - Exhibit C2 – CCRFCD 2013 MPU Facilities Inventory
 - Exhibit C3 – CCRFCD 2008 MPU Hydrologic Summary
 - Exhibit D – Proposed Condition Drainage Map
- Appendix B** Hydraulic Computations
- Appendix C** Reference Material:
Technical Drainage Study for Skye Canyon Detention Basin 2
- Approval Letter
 - Referenced Drainage Exhibits
 - Referenced Hydrological Computations
- Appendix D** Reference Material:
Technical Drainage Study for Skye Canyon Phase 3A Infrastructure
- Referenced Drainage Exhibits
 - Referenced Hydrological Computations
- Appendix E** Clark County Dust Mitigation Plan
- Appendix F** Stockpile Plans
- Appendix G** Electronic Files

1 INTRODUCTION

1.1 Study Purpose & Location of Project

This drainage study update is intended to satisfy the City of Las Vegas Stockpile Permit Process for the stockpiles proposed for the Skye Canyon master planned community in association with the Skye Canyon Detention Basin #2. The technical drainage study prepared for Skye Canyon Detention Basin #2 was conditionally approved by the City of Las Vegas on January 11, 2018.

The overall Skye Canyon property boundary encompasses approximately 1,662 acres and spans both sides of U.S. Highway 95 within the corporate limits of the City of Las Vegas, Nevada. The stockpiles are proposed in association with the Skye Canyon Detention Basin #2 earthwork. The following should be noted of the stockpile proposed with this study:

- There is approximately 314,000 CY of dirt generated from the Skye Canyon Skye Canyon Detention Basin #2 improvements that require temporary storage.
- Three (3) stockpiles are to be located south of the Iron Mountain alignment and east of the Red Rock National Conservation Area. The stockpiles are located on APN 126-12-101-002. A location map identifying the proposed stockpile boundaries in relation to major streets in the vicinity has been prepared as Exhibit A, included in Appendix A.
- The approved Clark County Dust Mitigation Plan is provided in Appendix E for reference.
- As outlined in the Clark County Dust Mitigation Plan, the time limit for the stock pile will be twelve (12) months.
- The proposed Stockpile #1 and #3 dimension varies but maintains a maximum height of 4-ft. The stockpile dimensions are illustrated on the stockpile plan provided in Appendix F.
- The proposed Stockpile #2 dimension varies but maintains a maximum height of 10-ft. As a result of the stockpile height being in excess of 4-ft, temporary fencing is provided around the perimeter of the stockpile. The stockpile dimensions are illustrated on the stockpile plan provided in Appendix F.

The purpose of this study is to provide a detailed hydrologic and hydraulic analysis in order to protect the proposed stockpiles and to maintain existing drainage patterns post-stockpile placement. The following discussions provide drainage information on the proposed stockpile site as well as a comparison of pre- and post-stockpile placement drainage patterns.

1.2 FEMA Flood Zone Designation

The proposed stockpile boundaries have been delineated on current FEMA FIRM Panel Map 32003C1750E, dated September 27, 2002, as Exhibit B included in Appendix A. Per the FIRM Panels, the project site is located within a FEMA designated Zone 'X', or outside the 500-year floodplain. A Zone 'X' is located outside a FEMA designated Special Flood Hazard Area (SFHA).

1.3 CCRFCD Facility Information

The proposed stockpile boundaries have been delineated on the current 2013 Clark County Regional Flood Control District (CCRFCD) Las Vegas Valley Flood Control Master Plan Update (2013 MPU) facility figures. The stockpile is adjacent to and crossed by the following planned facilities:

- Moccasin - Iron Mountain Branch (MOIR)
 - MOIR 0052 – identified as a proposed 42" RCP
 - MOIR 0096 – identified as a proposed 30" RCP outlet
 - MOIR 0097 – identified as a proposed 3,310 cfs PMF spillway
 - MOIR 0098 – identified as a 60 ac-ft Moccasin Outfall Detention Basin #3
- Moccasin – Shaumber Branch (MOSR)
 - MOSR 0035 – identified as a proposed natural wash
 - MOSR 0058 – identified as a proposed 27" RCP outlet
 - MOSR 0059 – identified as a proposed 3,145 cfs PMF spillway
 - MOSR 0060 – identified as a proposed 40 ac-ft Moccasin Outfall Detention Basin #2
 - MOSR 0061 – identified as a proposed 30" RCP outlet

Refer to Exhibits C1 and C2 of the MPU facilities in relationship to the proposed stockpiles provided Appendix A. Exhibit C3 illustrates the location of the proposed stockpiles in relationship to the MPU subbasins and is provided in Appendix A.

Please note that there is a MPU Update currently being prepared by Atkins that will adjust the planned facilities in the area to match the current Sky Canyon Master Drainage Study that outlines two Skye Canyon detention basins instead of three. The proposed stockpiles are in conformance with the two detention basins planned by the Skye Canyon Master Drainage Study.

1.4 Referenced Documents

The following documents have been utilized as reference materials in preparation of this drainage study. The referenced documents have been reviewed and portions determined acceptable for reference have been included in the appropriate appendix. Slater Hanifan Group generally concurs with all referenced and adopted hydrologic and hydraulic analysis from the studies and the results established therein unless otherwise stated.

- *Technical Drainage Study for Skye Canyon Detention Basin 2* (by Slater Hanifan Group, hereinafter referred to as the DB2 Study, Reference 3), has been referenced because it provides existing condition flowrates for the drainage basins west of the proposed stock piles. Relevant reference material from the DB2 Study has been included in Appendix C.
- *Technical Drainage Study for Skye Canyon Phase 3A Infrastructure* (by Slater Hanifan Group, hereinafter referred to as the 3A Infra Study, Reference 4), has been referenced because it provides existing condition flowrates for the drainage basins thru and east of the proposed stock piles. Relevant reference material from the 3A Infra Study has been included in Appendix D. Note that the 3A Infra Study is currently under review; therefore, not yet approved by CLV.

2 METHODOLOGY

2.1 Compliance

The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic and Drainage Design Manual (CCRFCD Manual, Reference 2).

2.2 Hydrologic Modeling

No hydrologic basins were analyzed with this study. All basins, with the associated hydrologic analyses, were referenced from the DB2 and 3A Infra Studies and prorated as appropriate to establish flow rates at key locations for the hydraulic analyses performed with this study. The hydrology from the referenced studies remain valid because the precipitation has stayed the same and the curve numbers have stayed the same.

2.3 Hydraulic Modeling

Existing Washes: Natural washes have been analyzed utilizing the Flowmaster Version 7 software by Haestad Methods. The Manning's Roughness Coefficient, n , has been chosen to correspond to the existing earthen sections. The longitudinal slope is based on existing topography.

3 HYDROLOGIC ANALYSES

3.1 Drainage Pattern

Illustrated on Exhibit D are three (3) proposed stockpiles located south of the Iron Mountain alignment and east of the Red Rock National Conservation Area (located near the northwest corner of the Skye Canyon master planned community, west of US-95). Adjacent to the stockpiles are four (4) predominate washes and one (1) minor wash. The proposed stockpiles are located outside of the washes to not impede existing flows. Additionally, the proposed stockpiles are graded to follow existing topography to not redirect runoff from the existing condition.

3.2 Flow Rates

The drainage basins west of the proposed stockpiles have been referenced from the DB2 Study, and the drainage basins thru and east of the stockpiles have been referenced from the 3A Infra Study. Refer to Exhibit D included in Appendix A for a detailed illustration and flowrate summary tables of the referenced basins and the proposed stockpile locations.

All referenced basins, with the exception of Basin *ON2, have been previously analyzed in the current existing conditions with a "desert shrub (poor)" land use. The referenced Basin *ON2 was analyzed with a "newly graded" land use and for this study, it is considered to drain in the natural washes in an easterly direction. The land use for Basin *ON2 is considered conservative; therefore, acceptable for use. Additionally, the adjacent Skye Canyon Detention Basin #1 is existing and serves as a cutoff to a portion of the historical

surface runoff draining into the most southern wash. The referenced drainage basins have been prorated into subbasins to quantify the flowrate at key locations for the hydraulic analyses of the natural washes. The total flow rate in each wash is based on algebraic summation of the subbasin flow rates.

4 HYDRAULIC ANALYSES

4.1 Existing Washes

Refer to Exhibit D included in Appendix A for a detailed illustration of the hydraulic section locations. Natural existing washes convey offsite surface flows in an easterly direction and hydraulic sections were analyzed adjacent to the stockpile locations. The earthen sections were assessed on locations which generated the worst-case flow depth and utilized conservative downstream flowrates during the 100-yr storm event.

The hydraulic analysis has determined the proposed stockpile locations are sufficiently located a minimum distanced of 5-ft from the 100-year inundation elevations generated by the hydraulic sections.

5 CONCLUSIONS & RECOMMENDATIONS

1. The proposed stockpiles are not located within a FEMA designated SFHA. Therefore, notification to FEMA is not required.
2. The proposed stockpiles are adjacent to and crossed by planned CCRFCD regional facilities. However, the stockpiles are temporary in nature and will not require CCRFCD concurrence.
3. The proposed stockpiles do not negatively impact the existing drainage patterns in the area and satisfies the City of Las Vegas Stockpile Permit Process requirements.
4. The Clark county Dust Mitigation Plan in association with the proposed stockpiles are provided in Appendix E.
5. The improvement plans for the proposed stockpiles are provided in Appendix F. These plans support the drainage patterns, hydraulic assessments, and conclusions detailed in this study.
6. The electronic files for this study are provided in Appendix G.

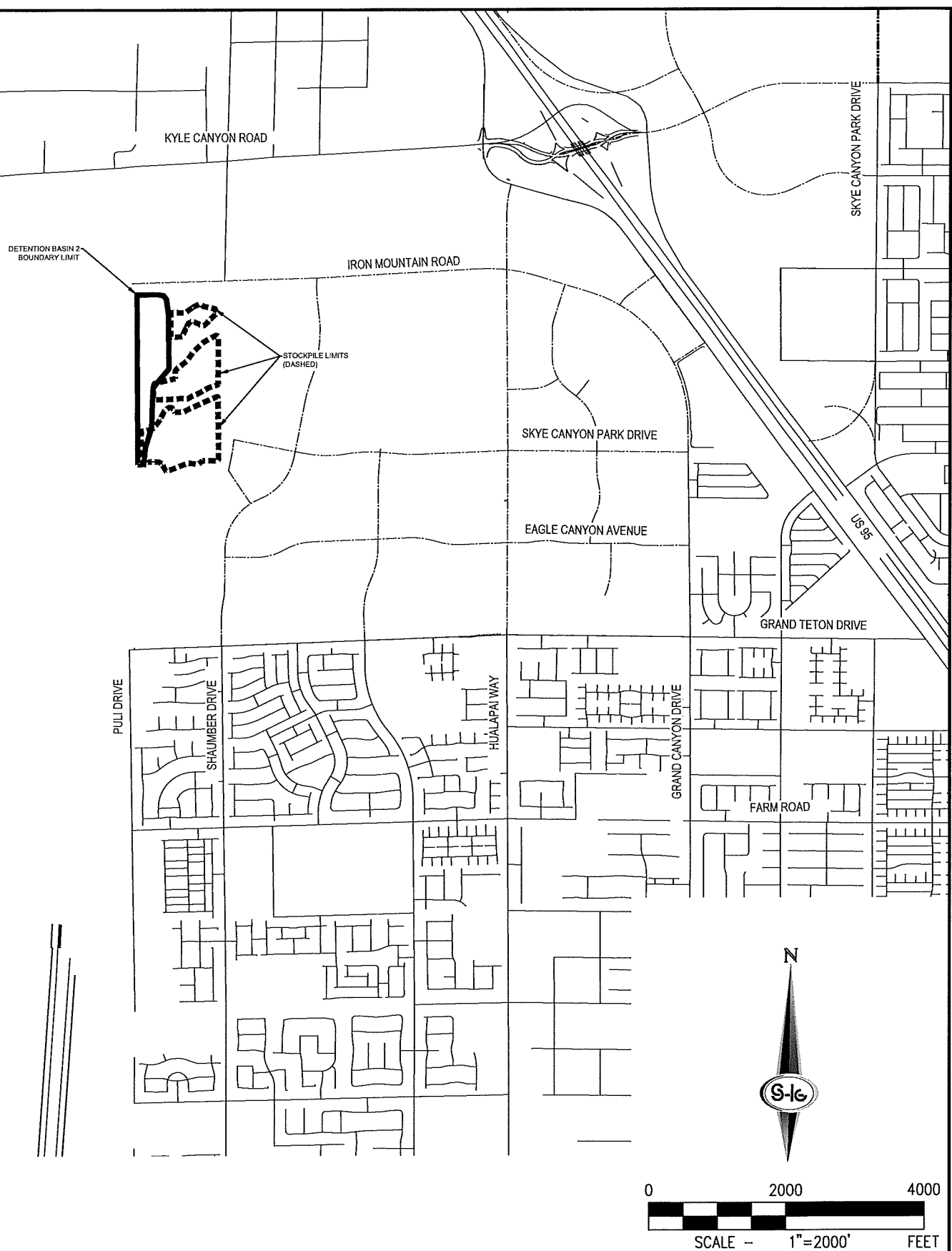
6 REFERENCES

1. *Las Vegas Valley Flood Control Master Plan Update*. PBS&J, Louis Berger Group and Parsons Brinckerhoff, 2013.
2. *Hydrologic Criteria and Drainage Design Manual*. Clark County Regional Flood Control District, 1990.

3. *Technical Drainage Study for Skye Canyon Detention Basin 2.* Slater Hanifan Group, June 2016.
4. *Technical Drainage Study for Skye Canyon Phase 3A Infrastructure.* Slater Hanifan Group, November 2017.

APPENDIX A

Drainage Exhibits



DETENTION BASIN 2-
BOUNDARY LIMIT

BOUNDARY LIMIT

IRON MOUNTAIN ROAD

SKYE CANYON PARK DRIVE

EAGLE CANYON AVENUE

GRAND TETON DRIVE

PULL DRIVE

SHAUMBER DRIVE

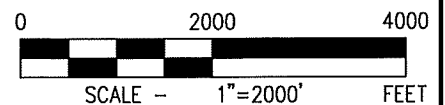
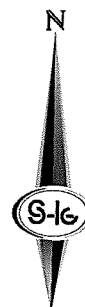
LAPAI WAY

GRAND CANYON DRIVE

FARM ROAD

SKYE CANYON PARK DRIVE

US



**SLATER
HANIFAN
GROUP**
CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NINETY-FIVE MANAGEMENT, LLC.

SKYE CANYON DETENTION BASIN 2 STOCKPILE LOCATION MAP

DATE: DEC 2017

DRAFTER: JSR

DESIGNER: JSR

CHECKED: KC

PROJECT NO.

OLY1505.000

EXHIBIT A

SHEET 1 OF 1

FEDERAL EMERGENCY MANAGEMENT AUTHORITY NATIONAL FLOOD INSURANCE PROGRAM	PANEL 1735 E
	PANEL 1745 E
	PANEL 1750 E

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA AND
INCORPORATED AREAS

PANEL 1750 OF 4090
 SEE MAP BOOK FOR FIRM PANEL LAYOUT

<u>COMMUNITY</u>	<u>ADVERSE PANEL</u>	<u>DATE</u>
WATERBURY, NEW YORK	220-1	8
WATERBURY, NEW YORK	220-2	8

Issued in Accordance With Map Number 32003C-1750 E for the Flood Insurance Rate Map for the Community Number 32003C-1750 E. The map is available for sale at the National Flood Insurance Program, Federal Emergency Management Agency, Washington, D.C. 20543.



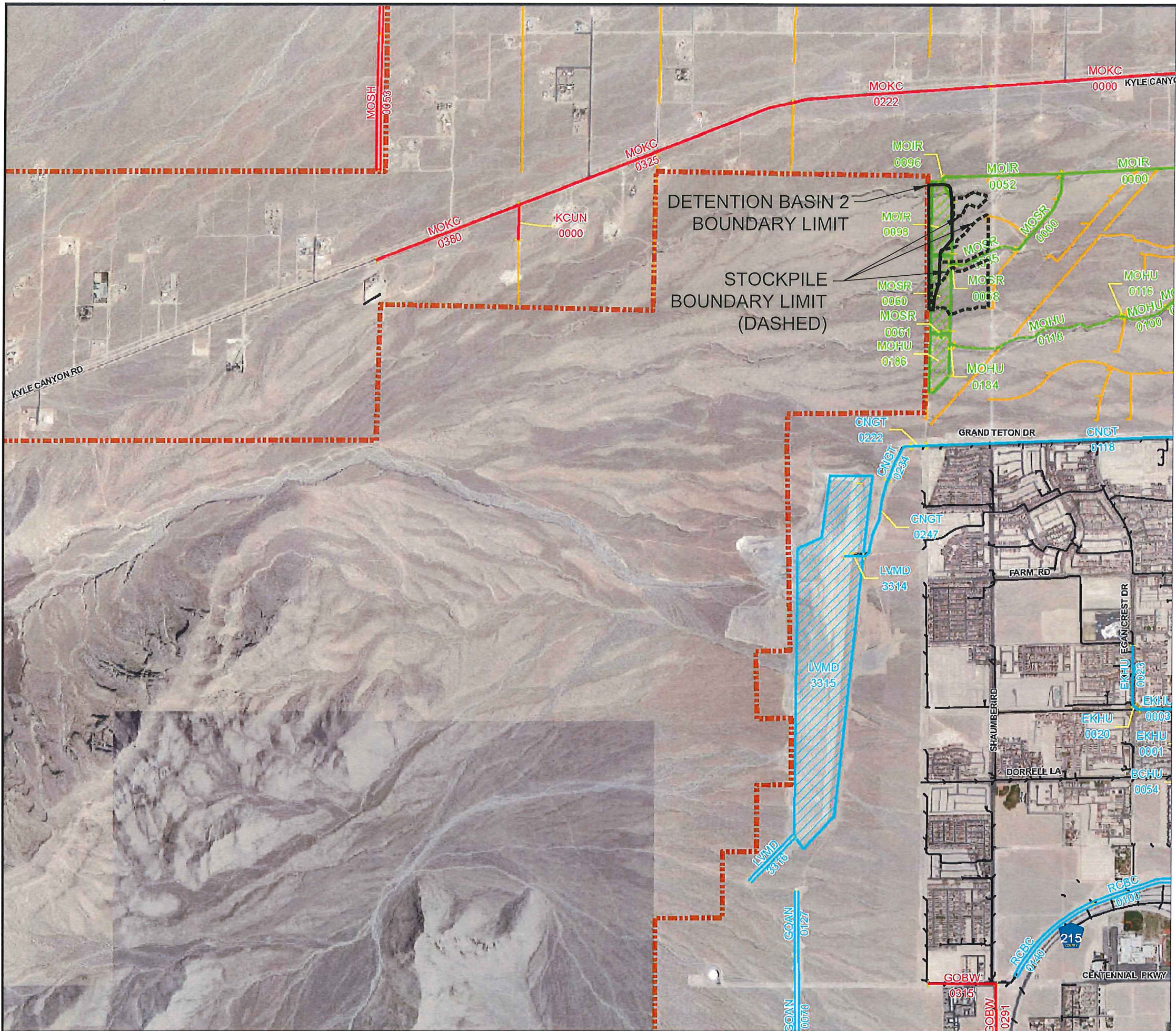
MAP NUMBER
32003C-1750 E

MAP REVISED:
SEPTEMBER 27, 2002

Federal Emergency Management Agency

SKYE C	DATE: DEC 2017
	DRAFTER: JSR
	DESIGNER: JSR
	CHECKED: KC
	PROJECT NO. OLY1505.000
EXHIBIT B SHEET 1 OF ----	

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2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H- 12
HYDROLOGIC SUMMARY

LEGEND

- Ultimate Development Boundary
- Watershed Boundary
- Subbasin Boundary
- Drought Ordinance Boundary
- Flow Arrows

Flood Control Facilities

- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Category A Remove & Replace/Parallel Facilities
- Category B Remove & Replace/Parallel Facilities

Type Hydrologic Soil Groups

- A Low Runoff Potential
- B Moderately Low Runoff Potential
- C Moderately High Runoff Potential
- D High Runoff Potential/Rock Outcrops

Typical Land Use

- 1 Undeveloped Land, Open Desert
- 2 Parks, Golf Courses
- 3 Rural
- 4 / 14* Low Density Residential
- 5 / 15* Medium Density Residential
- 6 / 16* High Density Residential
- 7 / 17* Public Facility, Residential
- 8 / 18* Very High Density Residential
- 9 / 19* Commercial, Retail, Casino, High Rise Condominiums
- 10 / 20* Light Industrial
- 11 / 21* Heavy Industrial
- 12 / 22* Schools
- 13 Lakes

* Drought Ordinance Applied

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

Refer to Figure G-2 for Aerial Source(s)



NINETY-FIVE MANAGEMENT, LLC.

SKYE CANYON DETENTION BASIN 2 STOCKPILE
CCRCD MPU FACILITIES EXHIBIT

SLATER
HANIFAN
GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

DATE: DEC 2017

DRAFTER: JSR

DESIGNER: JSR

CHECKED: KC

PROJECT NO.
OLY1505.000

EXHIBIT C1
SHEET 1 OF 1

L E G E N D	ID (Facility Identifier)	AB
	Parent Stream Name	
	Stream Name	
	River Mile	0000
	Distance Above Confluence with Parent Stream (Miles) Miles in Hundredths	

Existing Facility.....	E	
Proposed or Modified Facility.....	P	Bottom Width.....W
Contingency Level		
Category B.....	P0	Depth.....D
Master Plan.....	P1	
Preliminary Design.....	P2	Side Slope, H:V.....SS
Design.....	P3	

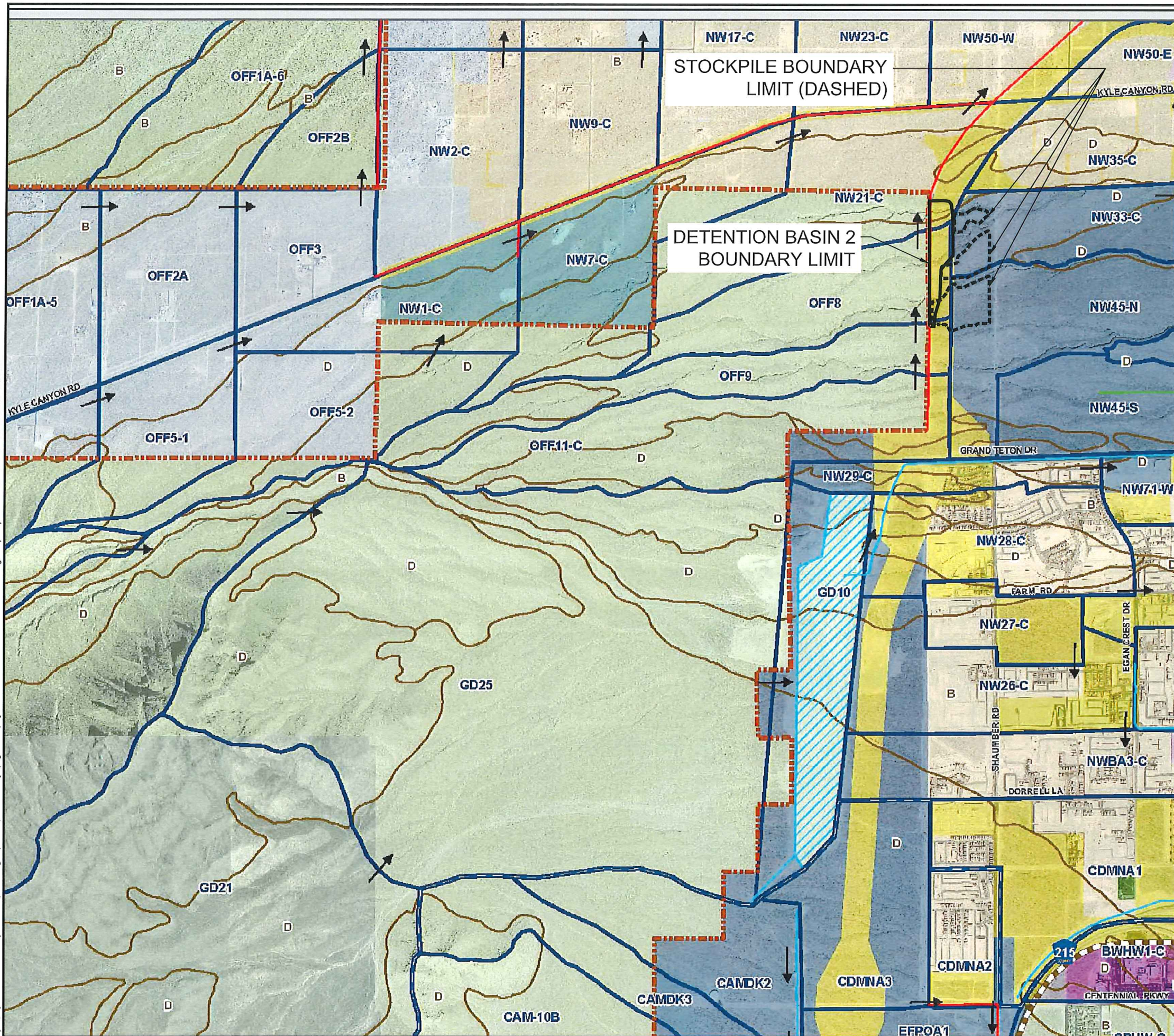
Cast in Place Concrete Pipe.....	CIPCP	Reinforced Concrete Arch Culvert.....	RCAC
Corrugated Metal Arch Pipe Culvert.....	CMAF	Reinforced Concrete Box.....	RCB
Corrugated Metal Pipe Culvert.....	CMPC	Reinforced Concrete Box Culvert.....	RCBC
High Density Polyethylene.....	HDPE	Reinforced Concrete Pipe.....	RCP
Horizontal Elliptical Reinforced Concrete Pipe.....	HERCP	Reinforced Concrete Pipe Culvert.....	RCPC
Reinforced Concrete Arch Pipe.....	RCAP	Storm Sewer Pipe.....	SSP

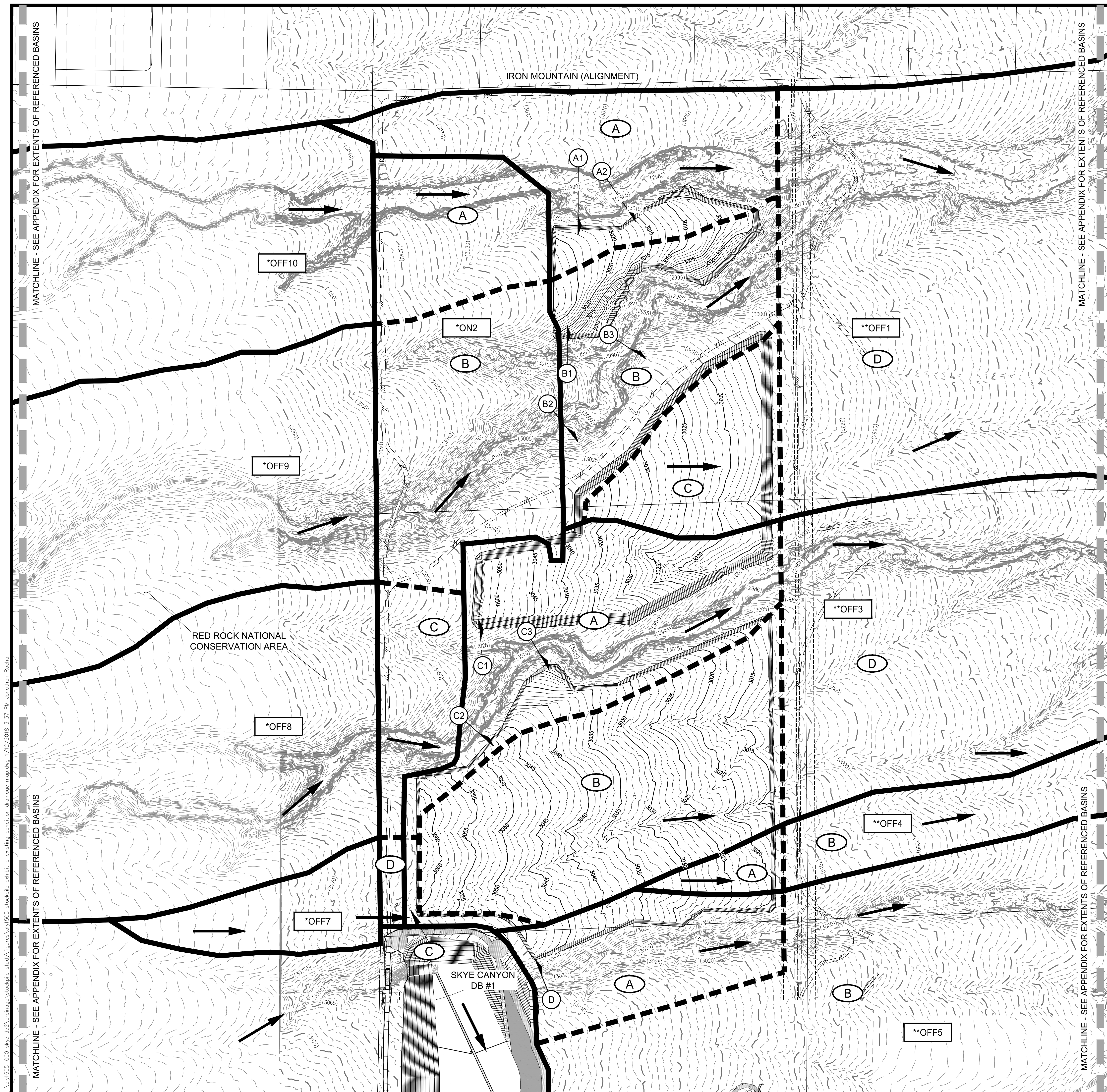
NINETY-FIVE MANAGEMENT, LLC.
SKYE CANYON DETENTION BASIN 2 STOCKPILE
CCRCD MPU FACILITIES INVENTORY

EXHIBIT C2

SHEET 1 OF 1

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APPENDIX B

Hydraulic Computations

Section A1 - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section A1 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	3.68 %
Discharge	533.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	2,990.53 ft
Elevation Range	2,988.75 to 3,014.00
Flow Area	60.7 ft²
Wetted Perimeter	68.46 ft
Top Width	68.35 ft
Actual Depth	1.78 ft
Critical Elevation	2,990.92 ft
Critical Slope	1.28 %
Velocity	8.77 ft/s
Velocity Head	1.20 ft
Specific Energy	2,991.73 ft
Froude Number	1.64
Flow Type	Supercritical

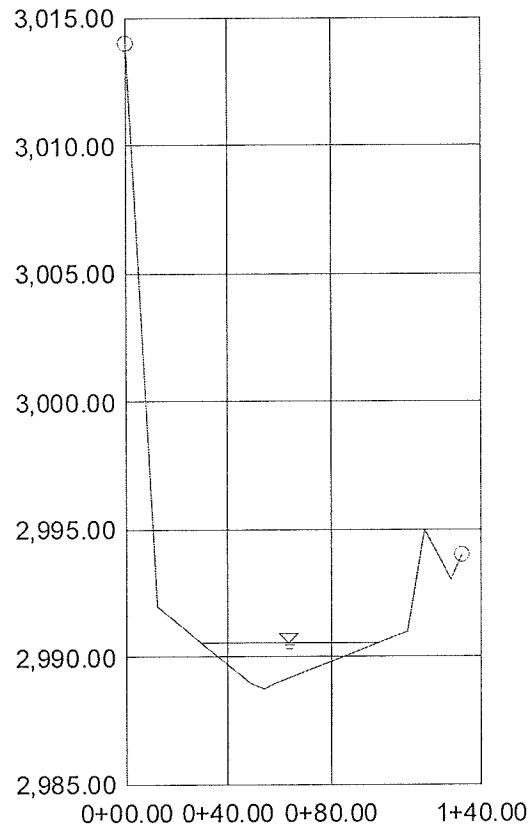
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	1+31.92	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,014.00
0+11.65	2,992.00
0+49.02	2,989.00
0+53.72	2,988.75
0+58.42	2,989.00
1+10.45	2,991.00
1+17.51	2,995.00
1+27.38	2,993.00
1+31.92	2,994.00

Section A1 - Natural Earthen Wash Cross Section for Irregular Channel

Project Description	
Worksheet	Section A1 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	3.68 %
Water Surface Elevation	2,990.53 ft
Elevation Range	2,988.75 to 3,014.00
Discharge	533.00 cfs



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H:1
NTS

Section A2 - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section A2 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	4.11 %
Discharge	533.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	2,985.63 ft
Elevation Range	2,983.70 to 3,000.00
Flow Area	50.7 ft²
Wetted Perimeter	47.37 ft
Top Width	46.41 ft
Actual Depth	1.93 ft
Critical Elevation	2,986.17 ft
Critical Slope	1.20 %
Velocity	10.51 ft/s
Velocity Head	1.72 ft
Specific Energy	2,987.35 ft
Froude Number	1.77
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+72.98	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,000.00
0+07.17	2,988.00
0+13.40	2,986.00
0+50.47	2,984.00
0+61.95	2,984.00
0+63.43	2,983.70
0+65.46	2,984.00
0+72.98	2,995.00

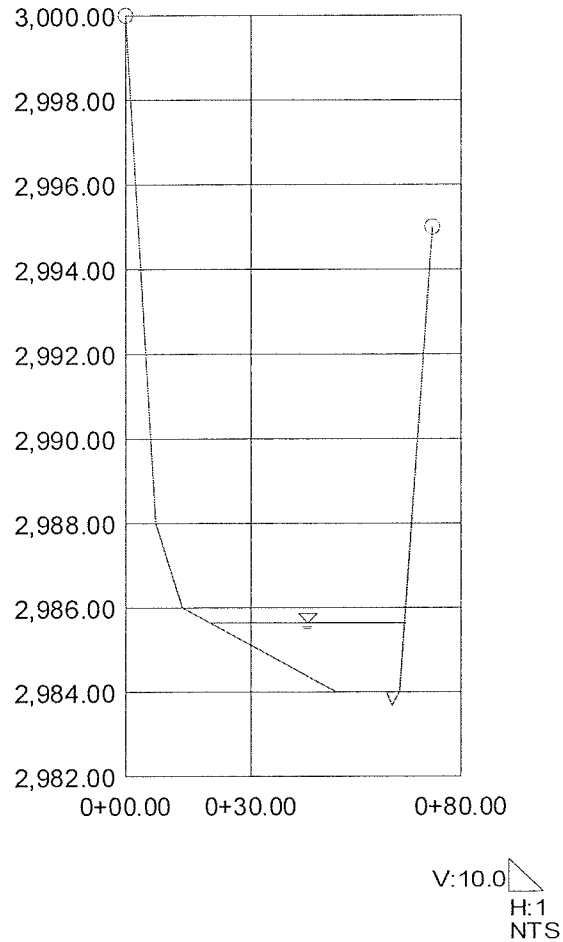
Section A2 - Natural Earthen Wash Cross Section for Irregular Channel

Project Description

Worksheet	Section A2 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.030
Channel Slope	4.11 %
Water Surface Elevation	2,985.63 ft
Elevation Range	2,983.70 to 3,000.00
Discharge	533.00 cfs



Section B1 - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section B1 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	7.35 %
Discharge	205.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	3,000.39 ft
Elevation Range	2,998.50 to 3,005.00
Flow Area	14.2 ft ²
Wetted Perimeter	12.71 ft
Top Width	12.00 ft
Actual Depth	1.89 ft
Critical Elevation	3,001.35 ft
Critical Slope	1.20 %
Velocity	14.45 ft/s
Velocity Head	3.25 ft
Specific Energy	3,003.64 ft
Froude Number	2.34
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+31.29	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,005.00
0+11.88	2,999.00
0+14.96	2,998.50
0+18.04	2,999.00
0+31.29	3,005.00

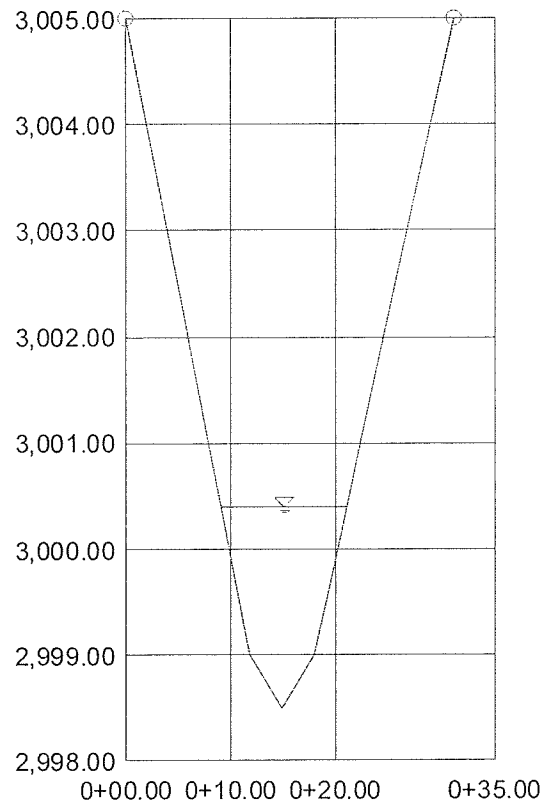
Section B1 - Natural Earthen Wash Cross Section for Irregular Channel

Project Description

Worksheet	Section B1 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.030
Channel Slope	7.35 %
Water Surface Elevation	3,000.39 ft
Elevation Range	2,998.50 to 3,005.00
Discharge	205.00 cfs



V:10.0
H:1
NTS

Section B2 - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section B2 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	2.13 %
Discharge	205.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	3,003.30 ft
Elevation Range	3,000.50 to 3,010.00
Flow Area	28.9 ft²
Wetted Perimeter	29.84 ft
Top Width	28.42 ft
Actual Depth	2.80 ft
Critical Elevation	3,003.46 ft
Critical Slope	1.34 %
Velocity	7.08 ft/s
Velocity Head	0.78 ft
Specific Energy	3,004.07 ft
Froude Number	1.24
Flow Type	Supercritical

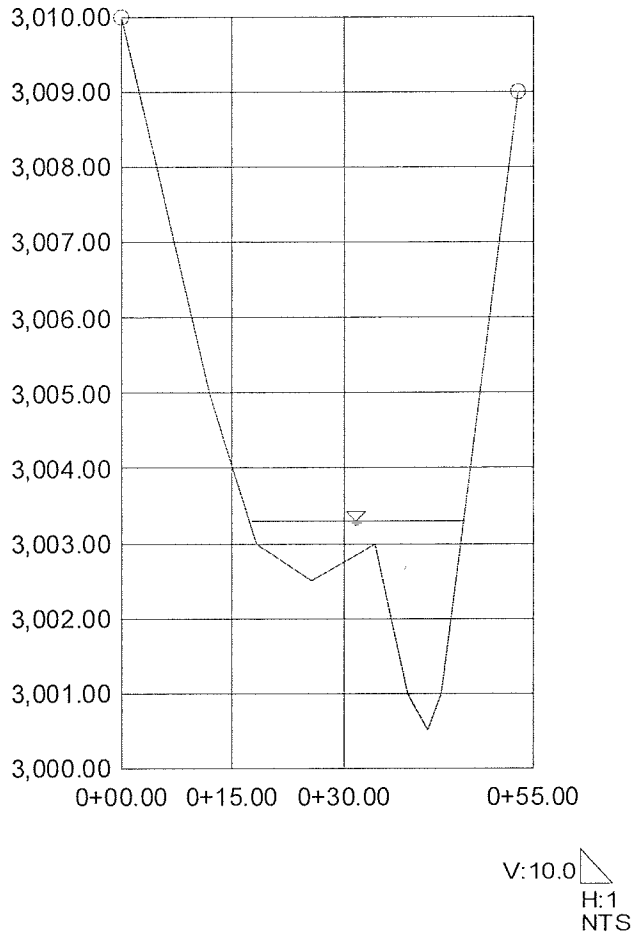
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+52.96	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,010.00
0+11.75	3,005.00
0+18.32	3,003.00
0+25.66	3,002.50
0+34.07	3,003.00
0+38.49	3,001.00
0+41.09	3,000.50
0+42.88	3,001.00
0+52.96	3,009.00

Section B2 - Natural Earthen Wash
Cross Section for Irregular Channel

Project Description	
Worksheet	Section B2 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	2.13 %
Water Surface Elevation	3,003.30 ft
Elevation Range	3,000.50 to 3,010.00
Discharge	205.00 cfs



Section B3 - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section B3 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	2.86 %
Discharge	205.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	2,989.44 ft
Elevation Range	2,987.50 to 2,995.00
Flow Area	26.0 ft²
Wetted Perimeter	28.43 ft
Top Width	28.06 ft
Actual Depth	1.94 ft
Critical Elevation	2,989.73 ft
Critical Slope	1.30 %
Velocity	7.89 ft/s
Velocity Head	0.97 ft
Specific Energy	2,990.41 ft
Froude Number	1.45
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+45.86	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2,995.00
0+12.20	2,989.00
0+17.46	2,988.00
0+19.11	2,987.50
0+22.69	2,988.00
0+45.86	2,990.00

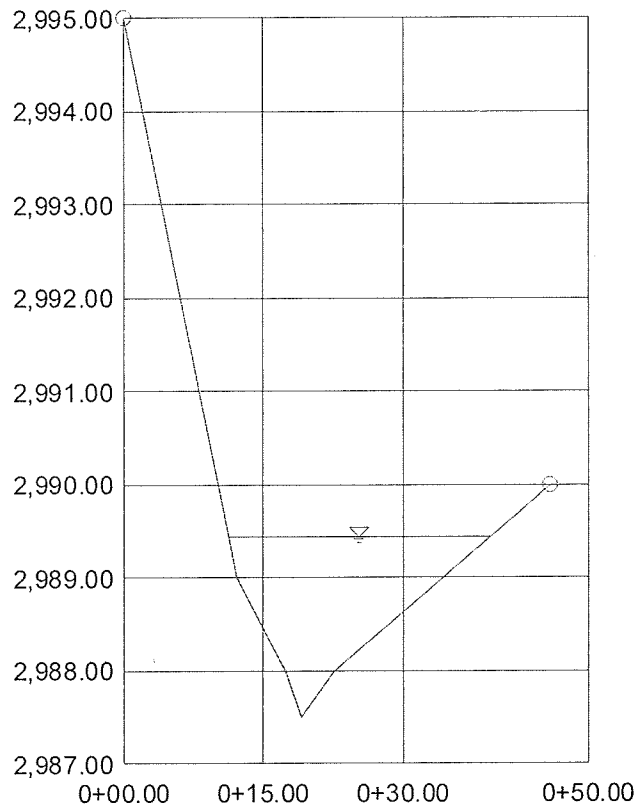
Section B3 - Natural Earthen Wash Cross Section for Irregular Channel

Project Description

Worksheet	Section B3 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.030
Channel Slope	2.86 %
Water Surface Elevation	2,989.44 ft
Elevation Range	2,987.50 to 2,995.00
Discharge	205.00 cfs



V: 10.0
H: 1
NTS

Section C1 - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section C1 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	13.51 %
Discharge	282.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	3,031.48 ft
Elevation Range	3,028.00 to 3,035.00
Flow Area	13.1 ft ²
Wetted Perimeter	10.28 ft
Top Width	7.56 ft
Actual Depth	3.48 ft
Critical Elevation	3,033.30 ft
Critical Slope	1.43 %
Velocity	21.45 ft/s
Velocity Head	7.15 ft
Specific Energy	3,038.63 ft
Froude Number	2.87
Flow Type	Supercritical

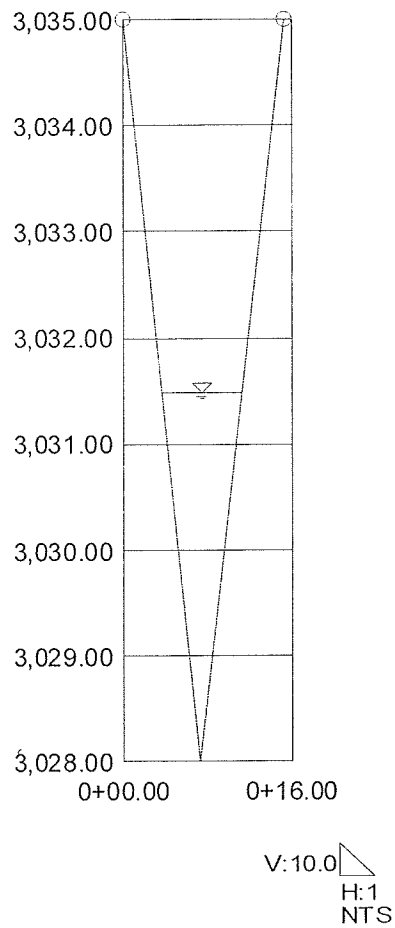
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+15.21	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,035.00
0+07.17	3,028.00
0+15.21	3,035.00

Section C1 - Natural Earthen Wash Cross Section for Irregular Channel

Project Description	
Worksheet	Section C1 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	13.51 %
Water Surface Elevation	3,031.48 ft
Elevation Range	3,028.00 to 3,035.00
Discharge	282.00 cfs



Section C2 - Natural Earthen Wash

Worksheet for Irregular Channel

Project Description	
Worksheet	Section C2 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	5.88 %
Discharge	282.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	3,019.13 ft
Elevation Range	3,017.50 to 3,043.00
Flow Area	22.7 ft ²
Wetted Perimeter	21.56 ft
Top Width	21.16 ft
Actual Depth	1.63 ft
Critical Elevation	3,019.86 ft
Critical Slope	1.18 %
Velocity	12.43 ft/s
Velocity Head	2.40 ft
Specific Energy	3,021.53 ft
Froude Number	2.12
Flow Type	Supercritical

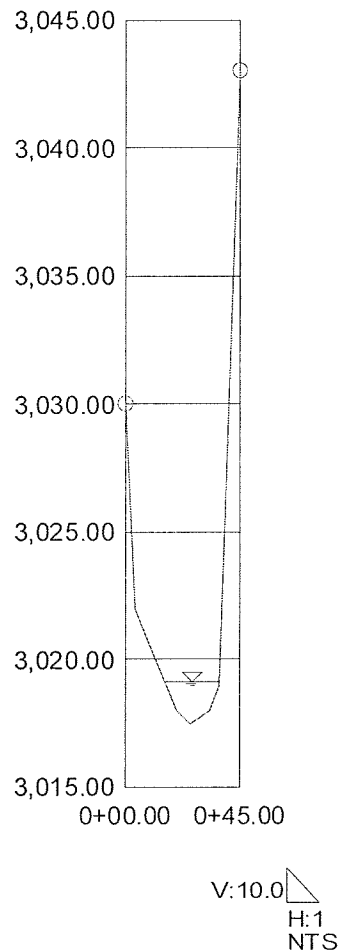
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+44.61	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,030.00
0+03.88	3,022.00
0+19.93	3,018.00
0+25.42	3,017.50
0+32.80	3,018.00
0+36.50	3,019.00
0+44.61	3,043.00

Section C2 - Natural Earthen Wash Cross Section for Irregular Channel

Project Description	
Worksheet	Section C2 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	5.88 %
Water Surface Elevation	3,019.13 ft
Elevation Range	3,017.50 to 3,043.00
Discharge	282.00 cfs



Section C3 - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section C3 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	2.82 %
Discharge	282.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	3,010.34 ft
Elevation Range	3,008.00 to 3,025.00
Flow Area	29.0 ft²
Wetted Perimeter	23.02 ft
Top Width	22.36 ft
Actual Depth	2.34 ft
Critical Elevation	3,010.76 ft
Critical Slope	1.17 %
Velocity	9.71 ft/s
Velocity Head	1.47 ft
Specific Energy	3,011.80 ft
Froude Number	1.50
Flow Type	Supercritical

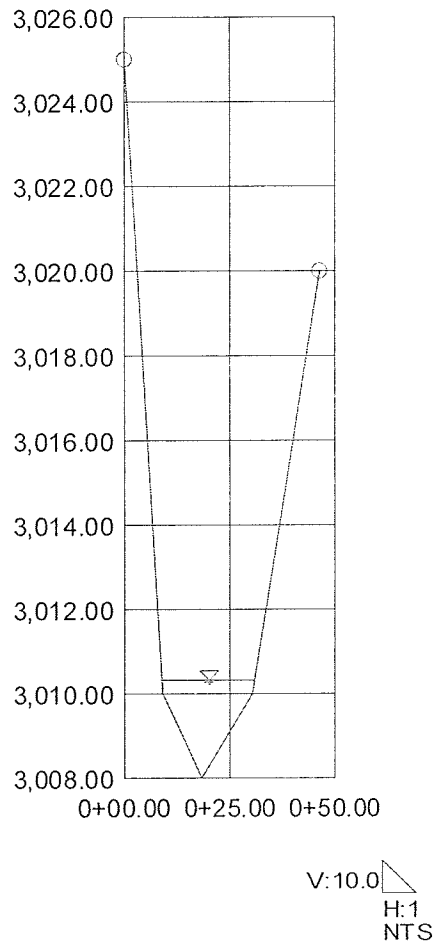
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+46.36	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,025.00
0+08.85	3,010.00
0+18.12	3,008.00
0+30.47	3,010.00
0+46.36	3,020.00

Section C3 - Natural Earthen Wash Cross Section for Irregular Channel

Project Description	
Worksheet	Section C3 - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	2.82 %
Water Surface Elevation	3,010.34 ft
Elevation Range	3,008.00 to 3,025.00
Discharge	282.00 cfs



Section D - Natural Earthen Wash Worksheet for Irregular Channel

Project Description	
Worksheet	Section D - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	3.85 %
Discharge	25.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.030
Water Surface Elevation	3,026.97 ft
Elevation Range	3,025.50 to 3,040.00
Flow Area	3.6 ft ²
Wetted Perimeter	5.79 ft
Top Width	4.85 ft
Actual Depth	1.47 ft
Critical Elevation	3,027.20 ft
Critical Slope	1.76 %
Velocity	7.02 ft/s
Velocity Head	0.77 ft
Specific Energy	3,027.74 ft
Froude Number	1.44
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+78.79	0.030

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3,040.00
0+31.74	3,033.00
0+38.51	3,025.50
0+56.50	3,033.00
0+78.79	3,038.00

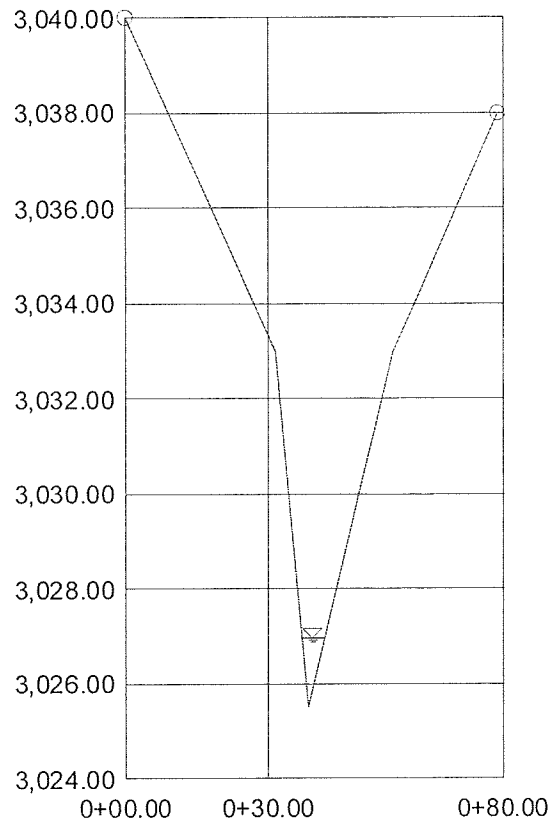
Section D - Natural Earthen Wash Cross Section for Irregular Channel

Project Description

Worksheet	Section D - Natural Earthen Wash
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.030
Channel Slope	3.85 %
Water Surface Elevation	3,026.97 ft
Elevation Range	3,025.50 to 3,040.00
Discharge	25.00 cfs



V: 10.0
H: 1
NTS

APPENDIX C

Reference Material

Technical Drainage Study for Skye Canyon Detention Basin 2

TECHNICAL DRAINAGE STUDY

Skye Canyon

Detention Basin 2

City of Las Vegas, Nevada

Job No.: OLY1505.000

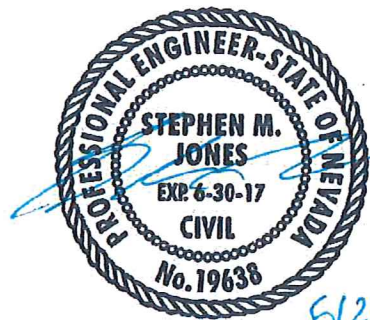
Date: June 2016

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



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

Assisted by: Cameron Bencini, EI

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		January 11, 2018
TO: Land Development Services Department of Building & Safety		FROM: Oh-Sang Kwon, P.E. Flood Control Project Manager Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
	Skye Canyon – Detention Basin # 2	Slater Hanifan Group
Cross Streets:	SEC of Iron Mountain Road & Puli Road	Section 12 LLC/Ninety-Five Manag.
File Number:	F:\Depot\DSMemos\DS4813C.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 #
1 st Submittal	7/7/2016	10/24/2016	Not Approved	\$400.00	370355: \$400
2nd Submittal	6/22/2017	10/09/2017	Not Approved	\$400.00	488303: \$400
3rd Submittal & Supplemental	12/6/2017 & 12/20/2017	1/11/2018	Conditionally Approved	\$400.00	491970: \$400
			TOTAL FEES (LDDRS):	\$1,200.00	----

REMARKS: A Flood Control Master Plan Amendment (MPA) is required for the Skye Canyon Master Plan Development prior to submitting residential 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:

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

1. The detention basin outfall has been extended within the Iron Mountain alignment to east of the future Sheep Mountain Parkway. The interim Sheep Mountain Parkway Grading Plans by SHG dated 11/20/2017 shows grading encroachment that eliminates the access to the storm drain outfall. Provide a new maintenance access road for the outlet structure and include the dedication with the storm drain facilities.
2. The Phasing of the overall Master Plan connectivity to the Moccasin MPU facility alignment is shown to be constructed with Phase 3B/3C per the provided Phasing Exhibit. The connectivity of the outfall from Skye Canyon DB # 2 to a downstream Regional facility has been conceptually shown for the Ultimate Condition based upon the Overall Skye Canyon Master Plan. The interim DB #2 outfall is no longer intended to discharge flow east of US 95 toward the Iron Mountain alignment. The City understands the concept of the proposed interim solution is to collect the flow west of US95 and discharge into the existing MPU Facilities constructed with the Horse Interchange (CLV Plan # 107V3759). This connection to the existing MPU facility meets the intent of providing interim Master

Plan connectivity for the Detention Basin #2 outfall until the Overall Skye Canyon MPU facilities are constructed.

3. The concept of the detention basin outfall being located outside of the Iron Mountain Road Right-of-Way is acceptable provided the roadway shift is approved by the City and the appropriate half-street improvements are provided by the Developer per the Approved Street Plan. Coordinate roadway approvals with the Transportation Engineering.
4. The proposed sedimentation basin, pipe & channel system is shown within a Public Drainage Easement. As an interim facility, this shall be privately maintained by the Master Developer and needs to be reflected as such on the plans and easements.
5. The ability to access Detention Basin # 2 from the Iron Mountain and Shaumber alignments is of critical concern to the City. This Addendum #2 specifies that the access will be provided with the interim Sheep Mountain Parkway improvements. This access is shown on the interim Sheep Mountain Parkway Grading Plans by SHG dated 11/20/2017.
6. Flood Control understands that the developer may request an early grading permit, similar to DB # 1. Coordinate the early grading permit process with the Building Department and verify the Bonding requirements and the required Special Inspection requirements. Flood Control requires that a hold be placed on **any** early grading permit approval for Detention Basin # 2 until the State of Nevada, Division of Water Resources, Dam Safety approval has been provided to Flood Control.
7. The proposed *Skye Canyon Detention Basin # 2* must be approved by the *State of Nevada, Division of Water Resources Dam Safety (DWR)* prior to the issuance of **any** construction permits, including any request for early grading.
8. The subject ***Skye Canyon Detention Basin #2*** is a facility proposed in the new MPA that covers the Skye Canyon Development. These changes to the identified Master Plan facilities require the submittal and approval of an MPA based upon CCRFCD requirements before final completion of the basin.
9. No further Building Permits will be issued for the downstream residential developments within ***Skye Canyon*** beyond ***Phase 2***. The permits will be released upon substantial completion of these drainage facilities.
10. The ***Skye Canyon Master Drainage Study*** must be fully approved prior to the final approval of the subject drainage study.
11. *NV Energy's* concurrence or approval of any proposed drainage facilities (such as *DB # 2 grading, access and the storm drain outfall*) within their existing easements shall be obtained prior to the final approval of the subject drainage study. The proposed NVE access goes through the bottom of the detention basin and may not provide adequate access post storm events as the basin will be wet and not accessible by NVE equipment. Provide letter of concurrence prior to the final approval of the subject drainage study.
12. The site is proposed as a *Clark County Regional Flood Control District (CCRFCD)* master planned facility and is also adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District (CCRFCD)* master planned facility. Therefore, *CCRFCD* concurrence is required prior to final approval of the drainage study.
13. The proposed detention basin is adjacent to the jurisdiction of *Clark County* to the west. *Clark County Public Works Department* concurrence must be obtained prior to the final approval of the drainage study.

14. 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.
15. The intent of the Master Developer is to construct the Detention Basin #2 with the associated collection facilities as CCRFCD Master Plan facilities and to then dedicate them to the City of Las Vegas in the future. Detention Basin # 2 shall be dedicated to the City as *Flood Control Right-of-Way*. 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. A 1.0 acre staging area has been provided.
16. The current design has identified the limits of the Proposed Drainage Easement and Future Detention Basin Dedication as Flood Control Right-of-Way. The provided plans show a 25-foot buffer past the Toe of Embankment and Top of Cut projections to provide for the proper long term Maintenance and Safety of the Detention Basin. Provide an exhibit of the proposed drainage easement with the easement documents that incorporates this 25-foot buffer upon approval of the Technical Drainage Study.
17. 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.
18. The westerly 76-feet and the northerly 102-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. Provide *NV Energy* approval of the new access road prior to final approval of the drainage study.
19. Sheet SD-4 & SB-1: The provided energy dissipation and erosion protection at the 48" outfall requires the rip-rap be extended 16-feet downstream of the outlets. Revise the plans accordingly.
20. Deep manholes are shown as 60-inch and are required to be 72-inch diameter.
21. Access roads shown for City use shall be dedicated access easements. Review and verify access locations for Flood review prior to submittal of easements. The easements shall be dedicated prior to acceptance of the facilities by the City.
22. 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* shall be provided prior to final approval of the drainage study.
23. The Detention Basin # 2 design includes 4:1 slopes and the soil cement lining of the proposed 3:1 slopes.
24. Provide complete *Plans and Project Specifications* for approval by the *City of Las Vegas*. Provide a copy of the Geotechnical Report for the detention basin. The Structural Plans and Details shall be a part of the Civil Improvement Plan set. This project is considered as a *Capital Improvement Project* (CIP) with developer funding.
25. Structural plans for the proposed storm drain improvements and pertinent flood control facilities must be submitted for review. Provide a soils report, structural calculations and specifications, two wet stamped structural sets, and a grading plan to the *Building Department* for processing. The engineer

must provide a copy of *Building Department* approval of the structures to CCRFCD before they will issue concurrence.

26. All proposed improvements associated with *Detention Basin 2* shall be bonded and inspected. This project, as a MPU facility, shall require that the inspection personnel be approved by the City. The project shall also require Special Inspection. Coordinate the requirements of and the Agreements needed for Special Inspection with the Building Department.
27. 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.
28. Once this drainage study is approved, provide a legal description and exhibit for the easement dedication of the detention basin and collection facilities. This easement shall be recorded and would be subsequently replaced with the dedication of the facilities as Flood Control Right-of-Way. Coordinate the easement submittal with Flood Control. The easement shall record prior to issuance of the permits for the construction of the detention basin.
29. Prior to the adoption of the detention basin as a regional facility by the *City of Las Vegas City Council* and the final inspection and acceptance by the *City of Las Vegas Public Works Department*, the proposed *Detention Basin 2* shall remain a private facility owned and maintained by the master developer.
30. 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 Public Works Department*.
31. The proposed improvements show drainage facilities of a size that must be reviewed for access and maintenance concerns in the future after the *City* takes over the detention basin. The engineer must submit an extra set of improvement plans to the *City Streets & Sanitation Department* for their review and comments. *Streets & Sanitation Department's* approval must be secured prior to the subject drainage study approval.
32. 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.

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
PBJ

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

Approval Letter

Referenced Drainage Exhibits

Referenced Hydrological Computations

Soil & Curve Number Computation

Project Name: SKYE CANYON - DETENTION BASIN 2

Date: Jun-16

File Name: OLY1505-000 TDS DB2 CNs.xlsx

By: CWB

Data:

Reference:

Soil Type & Description		A	B	C	D
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	0%	0%	0%	100%
400	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

Exhibit D
NRCS Soil Data

PROPOSED CONDITION

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
OFF7	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	3.72	88.00
TOTAL PERCENT								TOTAL AREA				3.72	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
OFF8	155	91.3%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	124.00	80.36
	400	8.7%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	11.79	7.64
TOTAL PERCENT								TOTAL AREA				135.79	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
OFF9	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	72.78	88.00
TOTAL PERCENT								TOTAL AREA				72.78	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
OFF10	155	36.7%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	152.63	32.28
	400	63.3%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	263.47	55.72
TOTAL PERCENT								TOTAL AREA				416.10	88.00

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
ON2	155	78.2%	Newly Graded	0%	0%	0%	100%	77	86	91	94	15.77	73.53
	400	21.8%	Newly Graded	0%	0%	0%	100%	77	86	91	94	4.39	20.47
TOTAL PERCENT								TOTAL AREA				20.16	94.00

HIGHLIGHTED DENOTES
REFERENCED BASINS

44 LS 0 88.0
45 UD 0.299
*

HEC-1 INPUT

PAGE 2

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

46 KK CP2
47 KM COMBINE OFF7, AND OFF8
48 HC 2
*

49 KK OFF9
50 KM EXISTING OFFSITE DRAINAGE BASIN
51 KM DISCHARGES INTO DETENTION BASIN "DB2"
52 KO 3
53 BA .1137
54 LS 0 88.0
55 UD 0.200
*

56 KK CP2a
57 KM COMBINE CP2, AND OFF9
58 HC 2
*

59 KK OFF10
60 KM EXISTING OFFSITE DRAINAGE BASIN
61 KM DISCHARGES INTO DETENTION BASIN "DB2"
62 KO 3
63 BA .6502
64 LS 0 88.0
65 UD 0.613
*

66 KK ON2
67 KM PROPOSED ONSITE DRAINAGE BASIN
68 BA .0315
69 LS 0 94.0
70 UD 0.083
*

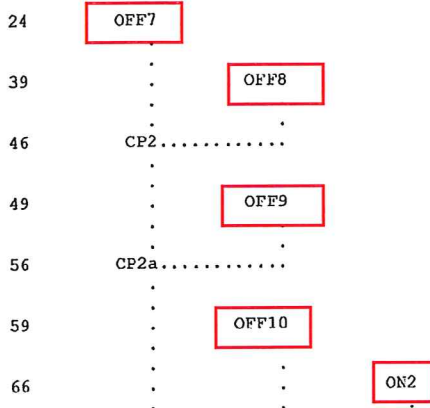
71 KK DB2
72 KM COMBINE CP2a, OFF10 AND ON2
73 KO 1
74 HC 3
*

HIGHLIGHTED DENOTES
REFERENCED BASINS

75 KK RDB2
76 KM OUTLET = 25" ORIFICE @ INVERT ELEVATION = 2984.21-FT
77 KO 1
78 RS 1 ELEV 2992.0
79 SV 0.00 2.34 7.60 24.30 46.28 73.78 107.11 146.75 193.03
80 SE 2992.0 2993.0 2995.0 3000.0 3005.0 3010.0 3015.0 3020.0 3025.0
81 SQ 0.00 44.44 51.05 64.70 83.84 99.36 520.9 3465.5 7888.4
82 SE 2992.0 2993.0 2995.0 3000.0 3009.0 3018.0 3019.0 3022.0 3025.0
*
83 ZZ

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW



71 DB2.....
V
V
75 RDB2

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 18JUN17 TIME 15:05:36 *
*

*
* 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 2
TECHNICAL DRAINAGE STUDY
PROPOSED DRAINAGE CONDITION

RETURN PERIOD ----- 100-YEAR
DISTRIBUTION ----- 6-HOUR SDN3
PROJECT NO. ----- OLY1505.000
FILENAME ----- PRO2.H1
DATE ----- 5/23/2016
MODELED BY ----- EM/SJ/CB

SIX HOUR DEPTH-AREA REDUCTION FACTORS
DRAINAGE AREA (MI^2) RATIO
0.0-0.49 1.00
0.5-0.99 0.98
1.0-1.99 0.97

21 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 .97

*** **

*
* OFF8 *
*

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
 TAREA .21 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 .27 INITIAL ABSTRACTION
 CRVNR 88.00 CURVE NUMBER
 RTIMP .00 PERCENT IMPERVIOUS AREA

45 UD SCS DIMENSIONLESS UNITGRAPH
 TLAG .30 LAG

UNIT HYDROGRAPH
 20 END-OF-PERIOD ORDINATES

42.	137.	259.	301.	276.	215.	136.	91.	62.	42.
28.	19.	13.	8.	6.	4.	3.	2.	1.	0.

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

PEAK FLOW	TIME	6-HR	24-HR	72-HR	24.92-HR
(CFS)	(HR)	(CFS)			
+	244.	3.75	41.	10.	10.
			(INCHES)	1.816	1.818
			(AC-FT)	21.	21.
			CUMULATIVE AREA =	.21 SQ MI	

HYDROGRAPH AT STATION OFF8
 FOR PLAN 1, RATIO = 1.00

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

PEAK FLOW	TIME	6-HR	24-HR	72-HR	24.92-HR
(CFS)	(HR)	(CFS)			
+	244.	3.75	41.	10.	10.
			(INCHES)	1.816	1.818
			(AC-FT)	21.	21.
			CUMULATIVE AREA =	.21 SQ MI	

HYDROGRAPH AT STATION OFF8
 FOR PLAN 1, RATIO = .98

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

PEAK FLOW	TIME	6-HR	24-HR	72-HR	24.92-HR
(CFS)	(HR)	(CFS)			
+	237.	3.75	40.	10.	10.
			(INCHES)	1.763	1.765
			(AC-FT)	20.	20.
			CUMULATIVE AREA =	.21 SQ MI	

HYDROGRAPH AT STATION OFF8
FOR PLAN 1, RATIO = .97

TOTAL RAINFALL = 2.91, TOTAL LOSS = 1.17, TOTAL EXCESS = 1.74

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)			
+ 234.	3.75	40.	10.	10.	10.
		(INCHES)	1.738	1.738	1.738
		(AC-FT)	20.	20.	20.
CUMULATIVE AREA =			.21 SQ MI		

*** **

```

*****
*                                     *
49 KK      *      OFF9      *
*                                     *
*****

```

```

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

```

SUBBASIN RUNOFF DATA

53 BA SUBBASIN CHARACTERISTICS
TAREA .11 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	.01	.00	.01	.01	.01	.01
	.01	.00	.00	.00	.00	.01	.02	.01	.00
	.01	.01	.01	.00	.00	.01	.03	.03	.06
	.09	.12	.03	.04	.03	.01	.02	.02	.00
	.01	.01	.01	.02	.02	.01	.01	.02	.01
	.00	.00	.00	.00	.00	.00	.00	.00	.00
	.00	.00							

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

55 UD SCS DIMENSIONLESS UNITGRAPH
 TLAG .20 LAG

UNIT HYDROGRAPH
14 END-OF-PERIOD ORDINATES

55.	183.	227.	181.	101.	58.	33.	19.	11.	6.
3.	2.	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)			
+ 153.	3.58	22.	6.	5.	5.
	(INCHES)	1.817	1.818	1.818	1.818
	(AC-FT)	11.	11.	11.	11.
CUMULATIVE AREA =			.11 SQ MI		

HYDROGRAPH AT STATION OFF9
FOR PLAN 1, RATIO = 1.00

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

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	153.	3.58	22.	6.	5.	5.
		(INCHES)	1.817	1.818	1.818	1.818
		(AC-FT)	11.	11.	11.	11.
		CUMULATIVE AREA =	.11	SQ MI		

HYDROGRAPH AT STATION OFF9
FOR PLAN 1, RATIO = .98

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

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	149.	3.58	22.	5.	5.	5.
		(INCHES)	1.764	1.765	1.765	1.765
		(AC-FT)	11.	11.	11.	11.
		CUMULATIVE AREA =	.11	SQ MI		

HYDROGRAPH AT STATION OFF9
FOR PLAN 1, RATIO = .97

TOTAL RAINFALL = 2.91, TOTAL LOSS = 1.17, TOTAL EXCESS = 1.74

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	147.	3.58	21.	5.	5.	5.
		(INCHES)	1.738	1.738	1.738	1.738
		(AC-FT)	11.	11.	11.	11.
		CUMULATIVE AREA =	.11	SQ MI		

*
*
59 KK OFF10 *
*

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

SUBBASIN RUNOFF DATA

63 BA SUBBASIN CHARACTERISTICS
TAREA .65 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								

64 LS SCS LOSS RATE

STRTL .27 INITIAL ABSTRACTION
CRVNBR 88.00 CURVE NUMBER
RTIMP .00 PERCENT IMPERVIOUS AREA

65 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .61 LAG

UNIT HYDROGRAPH									
39 END-OF-PERIOD ORDINATES									
24.	72.	138.	234.	345.	427.	473.	479.	462.	422.
374.	311.	242.	193.	156.	128.	106.	86.	69.	57.
46.	37.	30.	24.	20.	16.	13.	11.	9.	7.
6.	5.	4.	3.	3.	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)				
+	508.	4.08	127.	32.	31.
			(INCHES)	1.810	1.818
			(AC-FT)	63.	63.
		CUMULATIVE AREA =	.65 SQ MI		

HYDROGRAPH AT STATION OFF10
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)				
+	508.	4.08	127.	32.	31.
			(INCHES)	1.810	1.818
			(AC-FT)	63.	63.
		CUMULATIVE AREA =	.65 SQ MI		

HYDROGRAPH AT STATION OFF10
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)				
+	494.	4.08	123.	31.	30.
			(INCHES)	1.757	1.765
			(AC-FT)	61.	61.
		CUMULATIVE AREA =	.65 SQ MI		

HYDROGRAPH AT STATION OFF10
FOR PLAN 1, RATIO = .97

TOTAL RAINFALL = 2.91, TOTAL LOSS = 1.17, TOTAL EXCESS = 1.74

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)				
+	486.	4.08	121.	30.	29.
			(INCHES)	1.731	1.738
			(AC-FT)	60.	60.
		CUMULATIVE AREA =	.65 SQ MI		

 * *
 71 KK DB2 *
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73 KO OUTPUT CONTROL VARIABLES
 IPRNT 1 PRINT CONTROL
 IPL0T 0 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

74 HC HYDROGRAPH COMBINATION
 ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION DB2
 SUM OF 3 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	0615	76	43.	*	1	1230	151	0.	*	1	1845	226	0.					
1	0005	2	0.	*	1	0620	77	36.	*	1	1235	152	0.	*	1	1850	227	0.					
1	0010	3	0.	*	1	0625	78	30.	*	1	1240	153	0.	*	1	1855	228	0.					
1	0015	4	1.	*	1	0630	79	25.	*	1	1245	154	0.	*	1	1900	229	0.					
1	0020	5	2.	*	1	0635	80	20.	*	1	1250	155	0.	*	1	1905	230	0.					
1	0025	6	4.	*	1	0640	81	17.	*	1	1255	156	0.	*	1	1910	231	0.					
1	0030	7	6.	*	1	0645	82	13.	*	1	1300	157	0.	*	1	1915	232	0.					
1	0035	8	7.	*	1	0650	83	11.	*	1	1305	158	0.	*	1	1920	233	0.					
1	0040	9	7.	*	1	0655	84	9.	*	1	1310	159	0.	*	1	1925	234	0.					
1	0045	10	7.	*	1	0700	85	7.	*	1	1315	160	0.	*	1	1930	235	0.					
1	0050	11	7.	*	1	0705	86	6.	*	1	1320	161	0.	*	1	1935	236	0.					
1	0055	12	7.	*	1	0710	87	4.	*	1	1325	162	0.	*	1	1940	237	0.					
1	0100	13	6.	*	1	0715	88	4.	*	1	1330	163	0.	*	1	1945	238	0.					
1	0105	14	6.	*	1	0720	89	3.	*	1	1335	164	0.	*	1	1950	239	0.					
1	0110	15	8.	*	1	0725	90	2.	*	1	1340	165	0.	*	1	1955	240	0.					
1	0115	16	8.	*	1	0730	91	2.	*	1	1345	166	0.	*	1	2000	241	0.					
1	0120	17	10.	*	1	0735	92	1.	*	1	1350	167	0.	*	1	2005	242	0.					
1	0125	18	13.	*	1	0740	93	1.	*	1	1355	168	0.	*	1	2010	243	0.					
1	0130	19	18.	*	1	0745	94	1.	*	1	1400	169	0.	*	1	2015	244	0.					
1	0135	20	23.	*	1	0750	95	1.	*	1	1405	170	0.	*	1	2020	245	0.					
1	0140	21	29.	*	1	0755	96	0.	*	1	1410	171	0.	*	1	2025	246	0.					
1	0145	22	34.	*	1	0800	97	0.	*	1	1415	172	0.	*	1	2030	247	0.					
1	0150	23	36.	*	1	0805	98	0.	*	1	1420	173	0.	*	1	2035	248	0.					
1	0155	24	36.	*	1	0810	99	0.	*	1	1425	174	0.	*	1	2040	249	0.					
1	0200	25	35.	*	1	0815	100	0.	*	1	1430	175	0.	*	1	2045	250	0.					
1	0205	26	34.	*	1	0820	101	0.	*	1	1435	176	0.	*	1	2050	251	0.					
1	0210	27	36.	*	1	0825	102	0.	*	1	1440	177	0.	*	1	2055	252	0.					
1	0215	28	42.	*	1	0830	103	0.	*	1	1445	178	0.	*	1	2100	253	0.					
1	0220	29	49.	*	1	0835	104	0.	*	1	1450	179	0.	*	1	2105	254	0.					
1	0225	30	56.	*	1	0840	105	0.	*	1	1455	180	0.	*	1	2110	255	0.					
1	0230	31	58.	*	1	0845	106	0.	*	1	1500	181	0.	*	1	2115	256	0.					
1	0235	32	59.	*	1	0850	107	0.	*	1	1505	182	0.	*	1	2120	257	0.					
1	0240	33	64.	*	1	0855	108	0.	*	1	1510	183	0.	*	1	2125	258	0.					
1	0245	34	69.	*	1	0900	109	0.	*	1	1515	184	0.	*	1	2130	259	0.					
1	0250	35	71.	*	1	0905	110	0.	*	1	1520	185	0.	*	1	2135	260	0.					
1	0255	36	71.	*	1	0910	111	0.	*	1	1525	186	0.	*	1	2140	261	0.					
1	0300	37	73.	*	1	0915	112	0.	*	1	1530	187	0.	*	1	2145	262	0.					
1	0305	38	85.	*	1	0920	113	0.	*	1	1535	188	0.	*	1	2150	263	0.					
1	0310	39	107.	*	1	0925	114	0.	*	1	1540	189	0.	*	1	2155	264	0.					
1	0315	40	149.	*	1	0930	115	0.	*	1	1545	190	0.	*	1	2200	265	0.					
1	0320	41	229.	*	1	0935	116	0.	*	1	1550	191	0.	*	1	2205	266	0.					
1	0325	42	343.	*	1	0940	117	0.	*	1	1555	192	0.	*	1	2210	267	0.					
1	0330	43	494.	*	1	0945	118	0.	*	1	1600	193	0.	*	1	2215	268	0.					
1	0335	44	625.	*	1	0950	119	0.	*	1	1605	194	0.	*	1	2220	269	0.					
1	0340	45	710.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.					
1	0345	46	762.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.					
1	0350	47	774.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.					
1	0355	48	760.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.					
1	0400	49	731.	*	1	1015	124.	0.	*	1	1630	199	0.	*	1	2245	274	0.					
1	0405	50	690.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.					
1	0410	51	636.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.					
1	0415	52	574.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.					
1	0420	53	512.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.					
1	0425	54	454.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.					
1	0430	55	411.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.					
1	0435	56	383.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.					
1	0440	57	361.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.					
1	0445	58	342.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.					

1	0450	59	332.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	321.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	305.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	286.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	263.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	239.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	213.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	189.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	166.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	143.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	123.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	107.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	92.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	79.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	68.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	59.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	51.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
+	774.	3.83				
		(CFS)	199.	50.	48.	48.
		(INCHES)	1.824	1.835	1.835	1.835
		(AC-FT)	99.	99.	99.	99.

CUMULATIVE AREA = 1.01 SQ MI

HYDROGRAPH AT STATION DB2
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .98

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	0615	76	42.	*	1	1230	151	0.	*	1	1845	226	0.				
1	0005	2	0.	*	1	0620	77	35.	*	1	1235	152	0.	*	1	1850	227	0.				
1	0010	3	0.	*	1	0625	78	29.	*	1	1240	153	0.	*	1	1855	228	0.				
1	0015	4	1.	*	1	0630	79	24.	*	1	1245	154	0.	*	1	1900	229	0.				
1	0020	5	2.	*	1	0635	80	20.	*	1	1250	155	0.	*	1	1905	230	0.				
1	0025	6	4.	*	1	0640	81	16.	*	1	1255	156	0.	*	1	1910	231	0.				
1	0030	7	6.	*	1	0645	82	13.	*	1	1300	157	0.	*	1	1915	232	0.				
1	0035	8	7.	*	1	0650	83	10.	*	1	1305	158	0.	*	1	1920	233	0.				
1	0040	9	7.	*	1	0655	84	8.	*	1	1310	159	0.	*	1	1925	234	0.				
1	0045	10	6.	*	1	0700	85	7.	*	1	1315	160	0.	*	1	1930	235	0.				
1	0050	11	6.	*	1	0705	86	5.	*	1	1320	161	0.	*	1	1935	236	0.				
1	0055	12	6.	*	1	0710	87	4.	*	1	1325	162	0.	*	1	1940	237	0.				
1	0100	13	5.	*	1	0715	88	4.	*	1	1330	163	0.	*	1	1945	238	0.				
1	0105	14	5.	*	1	0720	89	3.	*	1	1335	164	0.	*	1	1950	239	0.				
1	0110	15	7.	*	1	0725	90	2.	*	1	1340	165	0.	*	1	1955	240	0.				
1	0115	16	8.	*	1	0730	91	2.	*	1	1345	166	0.	*	1	2000	241	0.				
1	0120	17	9.	*	1	0735	92	1.	*	1	1350	167	0.	*	1	2005	242	0.				
1	0125	18	12.	*	1	0740	93	1.	*	1	1355	168	0.	*	1	2010	243	0.				
1	0130	19	17.	*	1	0745	94	1.	*	1	1400	169	0.	*	1	2015	244	0.				
1	0135	20	22.	*	1	0750	95	1.	*	1	1405	170	0.	*	1	2020	245	0.				
1	0140	21	27.	*	1	0755	96	0.	*	1	1410	171	0.	*	1	2025	246	0.				
1	0145	22	32.	*	1	0800	97	0.	*	1	1415	172	0.	*	1	2030	247	0.				
1	0150	23	34.	*	1	0805	98	0.	*	1	1420	173	0.	*	1	2035	248	0.				
1	0155	24	34.	*	1	0810	99	0.	*	1	1425	174	0.	*	1	2040	249	0.				
1	0200	25	34.	*	1	0815	100	0.	*	1	1430	175	0.	*	1	2045	250	0.				
1	0205	26	33.	*	1	0820	101	0.	*	1	1435	176	0.	*	1	2050	251	0.				
1	0210	27	34.	*	1	0825	102	0.	*	1	1440	177	0.	*	1	2055	252	0.				
1	0215	28	40.	*	1	0830	103	0.	*	1	1445	178	0.	*	1	2100	253	0.				
1	0220	29	47.	*	1	0835	104	0.	*	1	1450	179	0.	*	1	2105	254	0.				
1	0225	30	53.	*	1	0840	105	0.	*	1	1455	180	0.	*	1	2110	255	0.				
1	0230	31	56.	*	1	0845	106	0.	*	1	1500	181	0.	*	1	2115	256	0.				
1	0235	32	57.	*	1	0850	107	0.	*	1	1505	182	0.	*	1	2120	257	0.				
1	0240	33	61.	*	1	0855	108	0.	*	1	1510	183	0.	*	1	2125	258	0.				
1	0245	34	66.	*	1	0900	109	0.	*	1	1515	184	0.	*	1	2130	259	0.				
1	0250	35	68.	*	1	0905	110	0.	*	1	1520	185	0.	*	1	2135	260	0.				
1	0255	36	68.	*	1	0910	111	0.	*	1	1525	186	0.	*	1	2140	261	0.				
1	0300	37	70.	*	1	0915	112	0.	*	1	1530	187	0.	*	1	2145	262	0.				
1	0305	38	82.	*	1	0920	113	0.	*	1	1535	188	0.	*	1	2150	263	0.				
1	0310	39	103.	*	1	0925	114	0.	*	1	1540	189	0.	*	1	2155	264	0.				
1	0315	40	144.	*	1	0930	115	0.	*	1	1545	190	0.	*	1	2200	265	0.				
1	0320	41	222.	*	1	0935	116	0.	*	1	1550	191	0.	*	1	2205	266	0.				
1	0325	42	332.	*	1	0940	117	0.	*	1	1555	192	0.	*	1	2210	267	0.				
1	0330	43	479.	*	1	0945	118	0.	*	1	1600	193	0.	*	1	2215	268	0.				
1	0335	44	607.	*	1	0950	119	0.	*	1	1605	194	0.	*	1	2220	269	0.				
1	0340	45	689.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.				

1	0345	46	740.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.
1	0350	47	752.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.
1	0355	48	739.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.
1	0400	49	711.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.
1	0405	50	671.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.
1	0410	51	619.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.
1	0415	52	558.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.
1	0420	53	498.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.
1	0425	54	441.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.
1	0430	55	400.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.
1	0435	56	373.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	352.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	333.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	324.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	313.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	297.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	279.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	257.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	233.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	208.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	185.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	162.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	140.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	120.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	104.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	90.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	77.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	67.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	58.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	49.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
+	752.	3.83				
		(CFS)	193.	49.	47.	47.
		(INCHES)	1.772	1.781	1.781	1.781
		(AC-FT)	96.	96.	96.	96.
CUMULATIVE AREA =			1.01 SQ MI			

HYDROGRAPH AT STATION DB2
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .97

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	0615	76	41.	*	1	1230	151	0.	*	1	1845	226	0.					
1	0005	2	0.	*	1	0620	77	35.	*	1	1235	152	0.	*	1	1850	227	0.					
1	0010	3	0.	*	1	0625	78	29.	*	1	1240	153	0.	*	1	1855	228	0.					
1	0015	4	1.	*	1	0630	79	24.	*	1	1245	154	0.	*	1	1900	229	0.					
1	0020	5	2.	*	1	0635	80	20.	*	1	1250	155	0.	*	1	1905	230	0.					
1	0025	6	4.	*	1	0640	81	16.	*	1	1255	156	0.	*	1	1910	231	0.					
1	0030	7	6.	*	1	0645	82	13.	*	1	1300	157	0.	*	1	1915	232	0.					
1	0035	8	6.	*	1	0650	83	10.	*	1	1305	158	0.	*	1	1920	233	0.					
1	0040	9	6.	*	1	0655	84	8.	*	1	1310	159	0.	*	1	1925	234	0.					
1	0045	10	6.	*	1	0700	85	7.	*	1	1315	160	0.	*	1	1930	235	0.					
1	0050	11	6.	*	1	0705	86	5.	*	1	1320	161	0.	*	1	1935	236	0.					
1	0055	12	5.	*	1	0710	87	4.	*	1	1325	162	0.	*	1	1940	237	0.					
1	0100	13	5.	*	1	0715	88	4.	*	1	1330	163	0.	*	1	1945	238	0.					
1	0105	14	5.	*	1	0720	89	3.	*	1	1335	164	0.	*	1	1950	239	0.					
1	0110	15	6.	*	1	0725	90	2.	*	1	1340	165	0.	*	1	1955	240	0.					
1	0115	16	7.	*	1	0730	91	2.	*	1	1345	166	0.	*	1	2000	241	0.					
1	0120	17	9.	*	1	0735	92	1.	*	1	1350	167	0.	*	1	2005	242	0.					
1	0125	18	11.	*	1	0740	93	1.	*	1	1355	168	0.	*	1	2010	243	0.					
1	0130	19	16.	*	1	0745	94	1.	*	1	1400	169	0.	*	1	2015	244	0.					
1	0135	20	21.	*	1	0750	95	1.	*	1	1405	170	0.	*	1	2020	245	0.					
1	0140	21	26.	*	1	0755	96	0.	*	1	1410	171	0.	*	1	2025	246	0.					
1	0145	22	31.	*	1	0800	97	0.	*	1	1415	172	0.	*	1	2030	247	0.					
1	0150	23	33.	*	1	0805	98	0.	*	1	1420	173	0.	*	1	2035	248	0.					
1	0155	24	33.	*	1	0810	99	0.	*	1	1425	174	0.	*	1	2040	249	0.					
1	0200	25	33.	*	1	0815	100	0.	*	1	1430	175	0.	*	1	2045	250	0.					
1	0205	26	32.	*	1	0820	101	0.	*	1	1435	176	0.	*	1	2050	251	0.					
1	0210	27	33.	*	1	0825	102	0.	*	1	1440	177	0.	*	1	2055	252	0.					
1	0215	28	39.	*	1	0830	103	0.	*	1	1445	178	0.	*	1	2100	253	0.					
1	0220	29	46.	*	1	0835	104	0.	*	1	1450	179	0.	*	1	2105	254	0.					
1	0225	30	52.	*	1	0840	105	0.	*	1	1455	180	0.	*	1	2110	255	0.					
1	0230	31	54.	*	1	0845	106	0.	*	1	1500	181	0.	*	1	2115	256	0.					
1	0235	32	55.	*	1	0850	107	0.	*	1	1505	182	0.	*	1	2120	257	0.					

1	0240	33	59.	*	1	0855	108	0.	*	1	1510	183	0.	*	1	2125	258	0.
1	0245	34	65.	*	1	0900	109	0.	*	1	1515	184	0.	*	1	2130	259	0.
1	0250	35	67.	*	1	0905	110	0.	*	1	1520	185	0.	*	1	2135	260	0.
1	0255	36	67.	*	1	0910	111	0.	*	1	1525	186	0.	*	1	2140	261	0.
1	0300	37	69.	*	1	0915	112	0.	*	1	1530	187	0.	*	1	2145	262	0.
1	0305	38	80.	*	1	0920	113	0.	*	1	1535	188	0.	*	1	2150	263	0.
1	0310	39	101.	*	1	0925	114	0.	*	1	1540	189	0.	*	1	2155	264	0.
1	0315	40	141.	*	1	0930	115	0.	*	1	1545	190	0.	*	1	2200	265	0.
1	0320	41	218.	*	1	0935	116	0.	*	1	1550	191	0.	*	1	2205	266	0.
1	0325	42	327.	*	1	0940	117	0.	*	1	1555	192	0.	*	1	2210	267	0.
1	0330	43	472.	*	1	0945	118	0.	*	1	1600	193	0.	*	1	2215	268	0.
1	0335	44	597.	*	1	0950	119	0.	*	1	1605	194	0.	*	1	2220	269	0.
1	0340	45	679.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.
1	0345	46	729.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.
1	0350	47	741.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.
1	0355	48	728.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.
1	0400	49	701.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.
1	0405	50	662.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.
1	0410	51	610.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.
1	0415	52	550.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.
1	0420	53	491.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.
1	0425	54	435.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.
1	0430	55	394.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.
1	0435	56	368.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	347.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	329.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	319.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	309.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	294.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	275.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	253.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	230.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	205.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	182.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	160.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	138.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	119.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	103.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	89.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	76.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	66.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	57.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	49.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)					
+	741.	3.83	190.	48.	46.	46.
		(INCHES)	1.745	1.755	1.755	1.755
		(AC-FT)	94.	95.	95.	95.

CUMULATIVE AREA = 1.01 SQ MI

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75 KK RDB2 *
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77 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLST 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

78 RS	STORAGE ROUTING									
	NSTPS	1	NUMBER OF SUBREACHES							
	ITYP	ELEV	TYPE OF INITIAL CONDITION							
	RSVRIC	2992.00	INITIAL CONDITION							
	X	.00	WORKING R AND D COEFFICIENT							
79 SV	STORAGE	.0	2.3	7.6	24.3	46.3	73.8	107.1	146.8	193.0
80 SE	ELEVATION	2992.00	2993.00	2995.00	3000.00	3005.00	3010.00	3015.00	3020.00	3025.00
81 SQ	DISCHARGE	0.	44.	51.	65.	84.	99.	521.	3466.	7888.

82 SE ELEVATION 2992.00 2993.00 2995.00 3000.00 3009.00 3018.00 3019.00 3022.00 3025.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	2.34	7.60	24.30	46.28	68.28	73.78	107.11	130.89	138.82
OUTFLOW	.00	44.44	51.05	64.70	75.33	83.84	85.56	94.19	99.36	520.90
ELEVATION	2992.00	2993.00	2995.00	3000.00	3005.00	3009.00	3010.00	3015.00	3018.00	3019.00
STORAGE	146.75	165.26	193.03							
OUTFLOW	1502.43	3465.50	7888.40							
ELEVATION	3020.00	3022.00	3025.00							

HYDROGRAPH AT STATION RDB2
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	0.	.0	2992.0	*	1	0820	101	81.	61.2	3007.7	*	1	1640	201	56.	13.3	2996.7	
1	0005	2	0.	.0	2992.0	*	1	0825	102	81.	60.6	3007.6	*	1	1645	202	55.	12.9	2996.6	
1	0010	3	0.	.0	2992.0	*	1	0830	103	81.	60.1	3007.5	*	1	1650	203	55.	12.5	2996.5	
1	0015	4	0.	.0	2992.0	*	1	0835	104	80.	59.5	3007.4	*	1	1655	204	55.	12.1	2996.4	
1	0020	5	0.	.0	2992.0	*	1	0840	105	80.	59.0	3007.3	*	1	1700	205	54.	11.8	2996.2	
1	0025	6	1.	.0	2992.0	*	1	0845	106	80.	58.4	3007.2	*	1	1705	206	54.	11.4	2996.1	
1	0030	7	1.	.1	2992.0	*	1	0850	107	80.	57.9	3007.1	*	1	1710	207	54.	11.0	2996.0	
1	0035	8	2.	.1	2992.0	*	1	0855	108	80.	57.3	3007.0	*	1	1715	208	54.	10.7	2995.9	
1	0040	9	3.	.1	2992.1	*	1	0900	109	79.	56.8	3006.9	*	1	1720	209	53.	10.3	2995.8	
1	0045	10	3.	.2	2992.1	*	1	0905	110	79.	56.2	3006.8	*	1	1725	210	53.	9.9	2995.7	
1	0050	11	4.	.2	2992.1	*	1	0910	111	79.	55.7	3006.7	*	1	1730	211	53.	9.6	2995.6	
1	0055	12	4.	.2	2992.1	*	1	0915	112	79.	55.1	3006.6	*	1	1735	212	52.	9.2	2995.5	
1	0100	13	4.	.2	2992.1	*	1	0920	113	79.	54.6	3006.5	*	1	1740	213	52.	8.8	2995.4	
1	0105	14	4.	.2	2992.1	*	1	0925	114	78.	54.1	3006.4	*	1	1745	214	52.	8.5	2995.3	
1	0110	15	5.	.3	2992.1	*	1	0930	115	78.	53.5	3006.3	*	1	1750	215	51.	8.1	2995.2	
1	0115	16	5.	.3	2992.1	*	1	0935	116	78.	53.0	3006.2	*	1	1755	216	51.	7.8	2995.0	
1	0120	17	6.	.3	2992.1	*	1	0940	117	78.	52.5	3006.1	*	1	1800	217	51.	7.4	2994.9	
1	0125	18	6.	.3	2992.1	*	1	0945	118	78.	51.9	3006.0	*	1	1805	218	50.	7.1	2994.8	
1	0130	19	7.	.4	2992.2	*	1	0950	119	77.	51.4	3005.9	*	1	1810	219	50.	6.7	2994.7	
1	0135	20	9.	.5	2992.2	*	1	0955	120	77.	50.9	3005.8	*	1	1815	220	50.	6.4	2994.5	
1	0140	21	11.	.6	2992.3	*	1	1000	121	77.	50.3	3005.7	*	1	1820	221	49.	6.0	2994.4	
1	0145	22	14.	.7	2992.3	*	1	1005	122	77.	49.8	3005.6	*	1	1825	222	49.	5.7	2994.3	
1	0150	23	16.	.9	2992.4	*	1	1010	123	76.	49.3	3005.5	*	1	1830	223	48.	5.4	2994.2	
1	0155	24	19.	1.0	2992.4	*	1	1015	124	76.	48.7	3005.4	*	1	1835	224	48.	5.0	2994.0	
1	0200	25	21.	1.1	2992.5	*	1	1020	125	76.	48.2	3005.4	*	1	1840	225	47.	4.7	2993.9	
1	0205	26	23.	1.2	2992.5	*	1	1025	126	76.	47.7	3005.3	*	1	1845	226	47.	4.4	2993.8	
1	0210	27	24.	1.3	2992.5	*	1	1030	127	76.	47.2	3005.2	*	1	1850	227	47.	4.1	2993.7	
1	0215	28	26.	1.4	2992.6	*	1	1035	128	75.	46.6	3005.1	*	1	1855	228	46.	3.7	2993.5	
1	0220	29	28.	1.5	2992.6	*	1	1040	129	75.	46.1	3005.0	*	1	1900	229	46.	3.4	2993.4	
1	0225	30	31.	1.6	2992.7	*	1	1045	130	75.	45.6	3004.8	*	1	1905	230	45.	3.1	2993.3	
1	0230	31	34.	1.8	2992.8	*	1	1050	131	75.	45.1	3004.7	*	1	1910	231	45.	2.8	2993.2	
1	0235	32	37.	2.0	2992.8	*	1	1055	132	75.	44.6	3004.6	*	1	1915	232	45.	2.5	2993.1	
1	0240	33	40.	2.1	2992.9	*	1	1100	133	74.	44.1	3004.5	*	1	1920	233	42.	2.2	2992.9	
1	0245	34	44.	2.3	2993.0	*	1	1105	134	74.	43.6	3004.4	*	1	1925	234	37.	1.9	2992.8	
1	0250	35	45.	2.5	2993.0	*	1	1110	135	74.	43.1	3004.3	*	1	1930	235	32.	1.7	2992.7	
1	0255	36	45.	2.7	2993.1	*	1	1115	136	74.	42.5	3004.1	*	1	1935	236	28.	1.5	2992.6	
1	0300	37	45.	2.8	2993.2	*	1	1120	137	73.	42.0	3004.0	*	1	1940	237	25.	1.3	2992.6	
1	0305	38	45.	3.1	2993.3	*	1	1125	138	73.	41.5	3003.9	*	1	1945	238	22.	1.1	2992.5	
1	0310	39	46.	3.4	2993.4	*	1	1130	139	73.	41.0	3003.8	*	1	1950	239	19.	1.0	2992.4	
1	0315	40	47.	4.0	2993.6	*	1	1135	140	73.	40.5	3003.7	*	1	1955	240	17.	.9	2992.4	
1	0320	41	48.	5.0	2994.0	*	1	1140	141	72.	40.0	3003.6	*	1	2000	241	15.	.8	2992.3	
1	0325	42	50.	6.6	2994.6	*	1	1145	142	72.	39.5	3003.5	*	1	2005	242	13.	.7	2992.3	
1	0330	43	52.	9.1	2995.5	*	1	1150	143	72.	39.0	3003.4	*	1	2010	243	11.	.6	2992.3	
1	0335	44	55.	12.6	2996.5	*	1	1155	144	72.	38.5	3003.2	*	1	2015	244	10.	.5	2992.2	
1	0340	45	59.	16.8	2997.8	*	1	1200	145	71.	38.1	3003.1	*	1	2020	245	9.	.5	2992.2	
1	0345	46	62.	21.5	2999.2	*	1	1205	146	71.	37.6	3003.0	*	1	2025	246	8.	.4	2992.2	
1	0350	47	66.	26.3	3000.5	*	1	1210	147	71.	37.1	3002.9	*	1	2030	247	7.	.4	2992.1	
1	0355	48	68.	31.1	3001.6	*	1	1215	148	71.	36.6	3002.8	*	1	2035	248	6.	.3	2992.1	
1	0400	49	70.	35.8	3002.6	*	1	1220	149	70.	36.1	3002.7	*	1	2040	249	5.	.3	2992.1	
1	0405	50	72.	40.2	3003.6	*	1	1225	150	70.	35.6	3002.6	*	1	2045	250	4.	.2	2992.1	
1	0410	51	74.	44.3	3004.5	*	1	1230	151	70.	35.1	3002.5	*	1	2050	251	4.	.2	2992.1	
1	0415	52	76.	47.9	3005.3	*	1	1235	152	70.	34.7	3002.4	*	1	2055	252	3.	.2	2992.1	
1	0420	53	77.	51.1	3005.9	*	1	1240	153	69.	34.2	3002.2	*	1	2100	253	3.	.2	2992.1	
1	0425	54	78.	53.9	3006.4	*	1	1245	154	69.	33.7	3002.1	*	1	2105	254	3.	.1	2992.1	
1	0430	55	79.	56.3	3006.8	*	1	1250	155	69.	33.2	3002.0	*	1	2110	255	2.	.1	2992.1	
1	0435	56	80.	58.5	3007.2	*	1	1255	156	69.	32.7	3001.9	*	1	2115	256	2.	.1	2992.0	
1	0440	57	81.	60.5	3007.6	*	1	1300	157	69.	32.3	3001.8	*	1	2120	257	2.	.1	2992.0	
1	0445	58	82.	62.4	3007.9	*	1	1305	158	68.	31.8	3001.7	*	1	2125	258	2.	.1	2992.0	
1	0450	59	82.	64.2	3008.2	*	1	1310	159	68.	31.3	3001.6	*	1	2130	259	1.	.1	2992.0	
1	0455	60	83.	65.8	3008.6	*	1	1315	160	68.	30.9	3001.5	*	1	2135	260	1.	.1	2992.0	
1	0500	61	84.	67.4	3008.8	*	1	1320	161	68.	30.4	3001.4	*	1	2140	261	1.	.1	2992.0	
1	0505	62	84.	68.9	3009.1	*	1	1325	162	67.	29.9	3001.3	*	1	2145	262	1.	.0	2992.0	

1	0510	63	84.	70.2	3009.3	*	1	1330	163	67.	29.5	3001.2	*	1	2150	263	1.	.0	2992.0
1	0515	64	85.	71.3	3009.6	*	1	1335	164	67.	29.0	3001.1	*	1	2155	264	1.	.0	2992.0
1	0520	65	85.	72.3	3009.7	*	1	1340	165	67.	28.5	3001.0	*	1	2200	265	1.	.0	2992.0
1	0525	66	85.	73.1	3009.9	*	1	1345	166	67.	28.1	3000.9	*	1	2205	266	1.	.0	2992.0
1	0530	67	86.	73.7	3010.0	*	1	1350	167	66.	27.6	3000.8	*	1	2210	267	0.	.0	2992.0
1	0535	68	86.	74.2	3010.1	*	1	1355	168	66.	27.2	3000.7	*	1	2215	268	0.	.0	2992.0
1	0540	69	86.	74.5	3010.1	*	1	1400	169	66.	26.7	3000.6	*	1	2220	269	0.	.0	2992.0
1	0545	70	86.	74.7	3010.1	*	1	1405	170	66.	26.3	3000.4	*	1	2225	270	0.	.0	2992.0
1	0550	71	86.	74.8	3010.2	*	1	1410	171	65.	25.8	3000.3	*	1	2230	271	0.	.0	2992.0
1	0555	72	86.	74.8	3010.2	*	1	1415	172	65.	25.4	3000.2	*	1	2235	272	0.	.0	2992.0
1	0600	73	86.	74.7	3010.1	*	1	1420	173	65.	24.9	3000.1	*	1	2240	273	0.	.0	2992.0
1	0605	74	86.	74.6	3010.1	*	1	1425	174	65.	24.5	3000.0	*	1	2245	274	0.	.0	2992.0
1	0610	75	86.	74.4	3010.1	*	1	1430	175	64.	24.0	2999.9	*	1	2250	275	0.	.0	2992.0
1	0615	76	86.	74.1	3010.1	*	1	1435	176	64.	23.6	2999.8	*	1	2255	276	0.	.0	2992.0
1	0620	77	86.	73.8	3010.0	*	1	1440	177	64.	23.1	2999.7	*	1	2300	277	0.	.0	2992.0
1	0625	78	85.	73.4	3009.9	*	1	1445	178	63.	22.7	2999.5	*	1	2305	278	0.	.0	2992.0
1	0630	79	85.	73.0	3009.9	*	1	1450	179	63.	22.3	2999.4	*	1	2310	279	0.	.0	2992.0
1	0635	80	85.	72.6	3009.8	*	1	1455	180	63.	21.8	2999.3	*	1	2315	280	0.	.0	2992.0
1	0640	81	85.	72.1	3009.7	*	1	1500	181	62.	21.4	2999.1	*	1	2320	281	0.	.0	2992.0
1	0645	82	85.	71.7	3009.6	*	1	1505	182	62.	21.0	2999.0	*	1	2325	282	0.	.0	2992.0
1	0650	83	85.	71.2	3009.5	*	1	1510	183	62.	20.6	2998.9	*	1	2330	283	0.	.0	2992.0
1	0655	84	85.	70.6	3009.4	*	1	1515	184	61.	20.1	2998.8	*	1	2335	284	0.	.0	2992.0
1	0700	85	84.	70.1	3009.3	*	1	1520	185	61.	19.7	2998.6	*	1	2340	285	0.	.0	2992.0
1	0705	86	84.	69.6	3009.2	*	1	1525	186	61.	19.3	2998.5	*	1	2345	286	0.	.0	2992.0
1	0710	87	84.	69.0	3009.1	*	1	1530	187	60.	18.9	2998.4	*	1	2350	287	0.	.0	2992.0
1	0715	88	84.	68.5	3009.0	*	1	1535	188	60.	18.5	2998.3	*	1	2355	288	0.	.0	2992.0
1	0720	89	84.	67.9	3008.9	*	1	1540	189	60.	18.0	2998.1	*	2	0000	289	0.	.0	2992.0
1	0725	90	83.	67.4	3008.8	*	1	1545	190	59.	17.6	2998.0	*	2	0005	290	0.	.0	2992.0
1	0730	91	83.	66.8	3008.7	*	1	1550	191	59.	17.2	2997.9	*	2	0010	291	0.	.0	2992.0
1	0735	92	83.	66.3	3008.6	*	1	1555	192	59.	16.8	2997.8	*	2	0015	292	0.	.0	2992.0
1	0740	93	83.	65.7	3008.5	*	1	1600	193	58.	16.4	2997.6	*	2	0020	293	0.	.0	2992.0
1	0745	94	83.	65.1	3008.4	*	1	1605	194	58.	16.0	2997.5	*	2	0025	294	0.	.0	2992.0
1	0750	95	82.	64.6	3008.3	*	1	1610	195	58.	15.6	2997.4	*	2	0030	295	0.	.0	2992.0
1	0755	96	82.	64.0	3008.2	*	1	1615	196	57.	15.2	2997.3	*	2	0035	296	0.	.0	2992.0
1	0800	97	82.	63.4	3008.1	*	1	1620	197	57.	14.8	2997.2	*	2	0040	297	0.	.0	2992.0
1	0805	98	82.	62.9	3008.0	*	1	1625	198	57.	14.4	2997.0	*	2	0045	298	0.	.0	2992.0
1	0810	99	82.	62.3	3007.9	*	1	1630	199	56.	14.1	2996.9	*	2	0050	299	0.	.0	2992.0
1	0815	100	81.	61.8	3007.8	*	1	1635	200	56.	13.7	2996.8	*	2	0055	300	0.	.0	2992.0

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR	
+	(CFS)	(HR)					
+	86.	5.83	(CFS)	82.	50.	48.	48.
			(INCHES)	.752	1.835	1.835	1.835
			(AC-FT)	41.	99.	99.	99.

PEAK STORAGE	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(AC-FT)	(HR)				
	75.	5.83	64.	26.	25.	25.

PEAK STAGE	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(FEET)	(HR)				
	3010.16	5.83	3008.18	2999.20	2998.93	2998.93

CUMULATIVE AREA = 1.01 SQ MI

HYDROGRAPH AT STATION RDB2
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	0.	.0	2992.0	*	1		0820	101	80.	58.8	3007.3	*	1		1640	201	54.	11.7	2996.2
1		0005	2	0.	.0	2992.0	*	1		0825	102	80.	58.3	3007.2	*	1		1645	202	54.	11.3	2996.1
1		0010	3	0.	.0	2992.0	*	1		0830	103	80.	57.7	3007.1	*	1		1650	203	54.	10.9	2996.0
1		0015	4	0.	.0	2992.0	*	1		0835	104	80.	57.2	3007.0	*	1		1655	204	53.	10.5	2995.9
1		0020	5	0.	.0	2992.0	*	1		0840	105	79.	56.6	3006.9	*	1		1700	205	53.	10.2	2995.8
1		0025	6	1.	.0	2992.0	*	1		0845	106	79.	56.1	3006.8	*	1		1705	206	53.	9.8	2995.7
1		0030	7	1.	.1	2992.0	*	1		0850	107	79.	55.5	3006.7	*	1		1710	207	53.	9.5	2995.6
1		0035	8	2.	.1	2992.0	*	1		0855	108	79.	55.0	3006.6	*	1		1715	208	52.	9.1	2995.4
1		0040	9	2.	.1	2992.1	*	1		0900	109	78.	54.5	3006.5	*	1		1720	209	52.	8.7	2995.3
1		0045	10	3.	.1	2992.1	*	1		0905	110	78.	53.9	3006.4	*	1		1725	210	52.	8.4	2995.2
1		0050	11	3.	.2	2992.1	*	1		0910	111	78.	53.4	3006.3	*	1		1730	211	51.	8.0	2995.1
1		0055	12	4.	.2	2992.1	*	1		0915	112	78.	52.8	3006.2	*	1		1735	212	51.	7.7	2995.0
1		0100	13	4.	.2	2992.1	*	1		0920	113	78.	52.3	3006.1	*	1		1740	213	51.	7.3	2994.9
1		0105	14	4.	.2	2992.1	*	1		0925	114	77.	51.8	3006.0	*	1		1745	214	50.	7.0	2994.8
1		0110	15	4.	.2	2992.1	*	1		0930	115	77.	51.2	3005.9	*	1		1750	215	50.	6.6	2994.6

1	0115	16	5.	.2	2992.1	*	1	0935	116	77.	50.7	3005.8	*	1	1755	216	49.	6.3	2994.5
1	0120	17	5.	.3	2992.1	*	1	0940	117	77.	50.2	3005.7	*	1	1800	217	49.	5.9	2994.4
1	0125	18	6.	.3	2992.1	*	1	0945	118	77.	49.6	3005.6	*	1	1805	218	49.	5.6	2994.2
1	0130	19	7.	.4	2992.2	*	1	0950	119	76.	49.1	3005.5	*	1	1810	219	48.	5.3	2994.1
1	0135	20	8.	.4	2992.2	*	1	0955	120	76.	48.6	3005.4	*	1	1815	220	48.	4.9	2994.0
1	0140	21	10.	.5	2992.2	*	1	1000	121	76.	48.1	3005.3	*	1	1820	221	47.	4.6	2993.9
1	0145	22	13.	.7	2992.3	*	1	1005	122	76.	47.5	3005.2	*	1	1825	222	47.	4.3	2993.7
1	0150	23	15.	.8	2992.3	*	1	1010	123	76.	47.0	3005.1	*	1	1830	223	46.	4.0	2993.6
1	0155	24	17.	.9	2992.4	*	1	1015	124	75.	46.5	3005.0	*	1	1835	224	46.	3.7	2993.5
1	0200	25	20.	1.0	2992.4	*	1	1020	125	75.	46.0	3004.9	*	1	1840	225	46.	3.3	2993.4
1	0205	26	21.	1.1	2992.5	*	1	1025	126	75.	45.5	3004.8	*	1	1845	226	45.	3.0	2993.3
1	0210	27	23.	1.2	2992.5	*	1	1030	127	75.	45.0	3004.7	*	1	1850	227	45.	2.7	2993.1
1	0215	28	24.	1.3	2992.5	*	1	1035	128	74.	44.4	3004.6	*	1	1855	228	45.	2.4	2993.0
1	0220	29	27.	1.4	2992.6	*	1	1040	129	74.	43.9	3004.5	*	1	1900	229	40.	2.1	2992.9
1	0225	30	30.	1.6	2992.7	*	1	1045	130	74.	43.4	3004.3	*	1	1905	230	35.	1.9	2992.8
1	0230	31	33.	1.7	2992.7	*	1	1050	131	74.	42.9	3004.2	*	1	1910	231	31.	1.6	2992.7
1	0235	32	35.	1.9	2992.8	*	1	1055	132	73.	42.4	3004.1	*	1	1915	232	27.	1.4	2992.6
1	0240	33	38.	2.0	2992.9	*	1	1100	133	73.	41.9	3004.0	*	1	1920	233	24.	1.3	2992.5
1	0245	34	41.	2.2	2992.9	*	1	1105	134	73.	41.4	3003.9	*	1	1925	234	21.	1.1	2992.5
1	0250	35	44.	2.3	2993.0	*	1	1110	135	73.	40.9	3003.8	*	1	1930	235	18.	1.0	2992.4
1	0255	36	45.	2.5	2993.1	*	1	1115	136	72.	40.4	3003.7	*	1	1935	236	16.	.8	2992.4
1	0300	37	45.	2.7	2993.1	*	1	1120	137	72.	39.9	3003.5	*	1	1940	237	14.	.7	2992.3
1	0305	38	45.	2.9	2993.2	*	1	1125	138	72.	39.4	3003.4	*	1	1945	238	12.	.7	2992.3
1	0310	39	46.	3.2	2993.3	*	1	1130	139	72.	38.9	3003.3	*	1	1950	239	11.	.6	2992.2
1	0315	40	46.	3.7	2993.5	*	1	1135	140	72.	38.4	3003.2	*	1	1955	240	10.	.5	2992.2
1	0320	41	47.	4.7	2993.9	*	1	1140	141	71.	37.9	3003.1	*	1	2000	241	8.	.4	2992.2
1	0325	42	49.	6.3	2994.5	*	1	1145	142	71.	37.4	3003.0	*	1	2005	242	7.	.4	2992.2
1	0330	43	52.	8.7	2995.3	*	1	1150	143	71.	36.9	3002.9	*	1	2010	243	6.	.3	2992.1
1	0335	44	55.	12.1	2996.3	*	1	1155	144	71.	36.5	3002.8	*	1	2015	244	6.	.3	2992.1
1	0340	45	58.	16.1	2997.6	*	1	1200	145	70.	36.0	3002.7	*	1	2020	245	5.	.3	2992.1
1	0345	46	62.	20.7	2998.9	*	1	1205	146	70.	35.5	3002.5	*	1	2025	246	4.	.2	2992.1
1	0350	47	65.	25.4	3000.2	*	1	1210	147	70.	35.0	3002.4	*	1	2030	247	4.	.2	2992.1
1	0355	48	67.	30.0	3001.3	*	1	1215	148	70.	34.5	3002.3	*	1	2035	248	3.	.2	2992.1
1	0400	49	70.	34.6	3002.3	*	1	1220	149	69.	34.0	3002.2	*	1	2040	249	3.	.2	2992.1
1	0405	50	72.	38.8	3003.3	*	1	1225	150	69.	33.6	3002.1	*	1	2045	250	3.	.1	2992.1
1	0410	51	74.	42.8	3004.2	*	1	1230	151	69.	33.1	3002.0	*	1	2050	251	2.	.1	2992.1
1	0415	52	75.	46.3	3005.0	*	1	1235	152	69.	32.6	3001.9	*	1	2055	252	2.	.1	2992.0
1	0420	53	77.	49.4	3005.6	*	1	1240	153	68.	32.1	3001.8	*	1	2100	253	2.	.1	2992.0
1	0425	54	78.	52.1	3006.1	*	1	1245	154	68.	31.7	3001.7	*	1	2105	254	2.	.1	2992.0
1	0430	55	79.	54.5	3006.5	*	1	1250	155	68.	31.2	3001.6	*	1	2110	255	1.	.1	2992.0
1	0435	56	79.	56.6	3006.9	*	1	1255	156	68.	30.7	3001.5	*	1	2115	256	1.	.1	2992.0
1	0440	57	80.	58.6	3007.2	*	1	1300	157	68.	30.3	3001.4	*	1	2120	257	1.	.1	2992.0
1	0445	58	81.	60.4	3007.6	*	1	1305	158	67.	29.8	3001.3	*	1	2125	258	1.	.0	2992.0
1	0450	59	81.	62.1	3007.9	*	1	1310	159	67.	29.3	3001.1	*	1	2130	259	1.	.0	2992.0
1	0455	60	82.	63.7	3008.2	*	1	1315	160	67.	28.9	3001.0	*	1	2135	260	1.	.0	2992.0
1	0500	61	83.	65.2	3008.4	*	1	1320	161	67.	28.4	3000.9	*	1	2140	261	1.	.0	2992.0
1	0505	62	83.	66.6	3008.7	*	1	1325	162	66.	28.0	3000.8	*	1	2145	262	1.	.0	2992.0
1	0510	63	84.	67.9	3008.9	*	1	1330	163	66.	27.5	3000.7	*	1	2150	263	0.	.0	2992.0
1	0515	64	84.	69.0	3009.1	*	1	1335	164	66.	27.0	3000.6	*	1	2155	264	0.	.0	2992.0
1	0520	65	84.	70.0	3009.3	*	1	1340	165	66.	26.6	3000.5	*	1	2200	265	0.	.0	2992.0
1	0525	66	85.	70.7	3009.4	*	1	1345	166	66.	26.1	3000.4	*	1	2205	266	0.	.0	2992.0
1	0530	67	85.	71.3	3009.6	*	1	1350	167	65.	25.7	3000.3	*	1	2210	267	0.	.0	2992.0
1	0535	68	85.	71.8	3009.6	*	1	1355	168	65.	25.2	3000.2	*	1	2215	268	0.	.0	2992.0
1	0540	69	85.	72.1	3009.7	*	1	1400	169	65.	24.8	3000.1	*	1	2220	269	0.	.0	2992.0
1	0545	70	85.	72.3	3009.7	*	1	1405	170	65.	24.3	3000.0	*	1	2225	270	0.	.0	2992.0
1	0550	71	85.	72.4	3009.7	*	1	1410	171	64.	23.9	2999.9	*	1	2230	271	0.	.0	2992.0
1	0555	72	85.	72.4	3009.7	*	1	1415	172	64.	23.5	2999.7	*	1	2235	272	0.	.0	2992.0
1	0600	73	85.	72.3	3009.7	*	1	1420	173	64.	23.0	2999.6	*	1	2240	273	0.	.0	2992.0
1	0605	74	85.	72.1	3009.7	*	1	1425	174	63.	22.6	2999.5	*	1	2245	274	0.	.0	2992.0
1	0610	75	85.	71.9	3009.7	*	1	1430	175	63.	22.1	2999.4	*	1	2250	275	0.	.0	2992.0
1	0615	76	85.	71.6	3009.6	*	1	1435	176	63.	21.7	2999.2	*	1	2255	276	0.	.0	2992.0
1	0620	77	85.	71.3	3009.6	*	1	1440	177	62.	21.3	2999.1	*	1	2300	277	0.	.0	2992.0
1	0625	78	85.	70.9	3009.5	*	1	1445	178	62.	20.9	2999.0	*	1	2305	278	0.	.0	2992.0
1	0630	79	85.	70.5	3009.4	*	1	1450	179	62.	20.4	2998.8	*	1	2310	279	0.	.0	2992.0
1	0635	80	84.	70.1	3009.3	*	1	1455	180	61.	20.0	2998.7	*	1	2315	280	0.	.0	2992.0
1	0640	81	84.	69.7	3009.3	*	1	1500	181	61.	19.6	2998.6	*	1	2320	281	0.	.0	2992.0
1	0645	82	84.	69.2	3009.2	*	1	1505	182	61.	19.2	2998.5	*	1	2325	282	0.	.0	2992.0
1	0650	83	84.	68.7	3009.1	*	1	1510	183	60.	18.8	2998.3	*	1	2330	283	0.	.0	2992.0
1	0655	84	84.	68.2	3009.0	*	1	1515	184	60.	18.3	2998.2	*	1	2335	284	0.	.0	2992.0
1	0700	85	84.	67.6	3008.9	*	1	1520	185	59.	17.9	2998.1	*	1	2340	285	0.	.0	2992.0
1	0705	86	83.	67.1	3008.8	*	1	1525	186	59.	17.5	2998.0	*	1	2345	286	0.	.0	2992.0
1	0710	87	83.	66.6	3008.7	*	1	1530	187	59.	17.1	2997.8	*	1	2350	287	0.	.0	2992.0
1	0715	88	83.	66.0	3008.6	*	1	1535	188	58.	16.7	2997.7	*	1	2355	288	0.	.0	2992.0
1	0720	89	83.	65.5	3008.5	*	1	1540	189	58.	16.3	2997.6	*	2	0000	289	0.	.0	2992.0
1	0725	90	83.	64.9	3008.4	*	1	1545	190	58.	15.9	2997.5	*	2	0005	290	0.	.0	2992.0
1	0730	91	82.	64.4	3008.3	*	1	1550	191	58.	15.5	2997.4	*	2	0010	291	0.	.0	2992.0
1	0735	92	82.	63.8	3008.2	*	1	1555	192	57.	15.1	2997.3	*	2	0015	292	0.	.0	2992.0
1	0740	93	82.	63.3	3008.1	*	1	1600	193	57.	14.7	2997.1	*	2	0020	293	0.	.0	2992.0
1	0745	94	82.	62.7	3008.0	*	1	1605	194	57.	14.3	29							

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	85.	5.83	81.	49.	47.	47.
		(INCHES)	.744	1.781	1.781	1.781
		(AC-FT)	40.	96.	96.	96.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	72.	5.83	61.	25.	24.	24.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
(FEET)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	3009.74	5.83	3007.76	2998.88	2998.63	2998.63

CUMULATIVE AREA = 1.01 SQ MI

HYDROGRAPH AT STATION RDR2
PLAN 1, RATIO = .97

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000	1	0.	.0	2992.0	*	1	0820	101	80.	57.6	3007.1	*	1	1640	201	54.	10.9	2996.0			
1	0005	2	0.	.0	2992.0	*	1	0825	102	80.	57.1	3007.0	*	1	1645	202	53.	10.5	2995.9			
1	0010	3	0.	.0	2992.0	*	1	0830	103	79.	56.5	3006.9	*	1	1650	203	53.	10.1	2995.8			
1	0015	4	0.	.0	2992.0	*	1	0835	104	79.	56.0	3006.8	*	1	1655	204	53.	9.8	2995.6			
1	0020	5	0.	.0	2992.0	*	1	0840	105	79.	55.5	3006.7	*	1	1700	205	53.	9.4	2995.5			
1	0025	6	1.	.0	2992.0	*	1	0845	106	79.	54.9	3006.6	*	1	1705	206	52.	9.0	2995.4			
1	0030	7	1.	.1	2992.0	*	1	0850	107	78.	54.4	3006.5	*	1	1710	207	52.	8.7	2995.3			
1	0035	8	2.	.1	2992.0	*	1	0855	108	78.	53.8	3006.4	*	1	1715	208	52.	8.3	2995.2			
1	0040	9	2.	.1	2992.1	*	1	0900	109	78.	53.3	3006.3	*	1	1720	209	51.	8.0	2995.1			
1	0045	10	3.	.1	2992.1	*	1	0905	110	78.	52.8	3006.2	*	1	1725	210	51.	7.6	2995.0			
1	0050	11	3.	.2	2992.1	*	1	0910	111	78.	52.2	3006.1	*	1	1730	211	51.	7.3	2994.9			
1	0055	12	3.	.2	2992.1	*	1	0915	112	77.	51.7	3006.0	*	1	1735	212	50.	6.9	2994.7			
1	0100	13	4.	.2	2992.1	*	1	0920	113	77.	51.2	3005.9	*	1	1740	213	50.	6.6	2994.6			
1	0105	14	4.	.2	2992.1	*	1	0925	114	77.	50.6	3005.8	*	1	1745	214	49.	6.2	2994.5			
1	0110	15	4.	.2	2992.1	*	1	0930	115	77.	50.1	3005.7	*	1	1750	215	49.	5.9	2994.4			
1	0115	16	4.	.2	2992.1	*	1	0935	116	77.	49.6	3005.6	*	1	1755	216	48.	5.6	2994.2			
1	0120	17	5.	.3	2992.1	*	1	0940	117	76.	49.0	3005.5	*	1	1800	217	48.	5.2	2994.1			
1	0125	18	5.	.3	2992.1	*	1	0945	118	76.	48.5	3005.4	*	1	1805	218	48.	4.9	2994.0			
1	0130	19	6.	.3	2992.1	*	1	0950	119	76.	48.0	3005.3	*	1	1810	219	47.	4.6	2993.8			
1	0135	20	8.	.4	2992.2	*	1	0955	120	76.	47.5	3005.2	*	1	1815	220	47.	4.2	2993.7			
1	0140	21	10.	.5	2992.2	*	1	1000	121	76.	47.0	3005.1	*	1	1820	221	46.	3.9	2993.6			
1	0145	22	12.	.6	2992.3	*	1	1005	122	75.	46.4	3005.0	*	1	1825	222	46.	3.6	2993.5			
1	0150	23	15.	.8	2992.3	*	1	1010	123	75.	45.9	3004.9	*	1	1830	223	46.	3.3	2993.4			
1	0155	24	17.	.9	2992.4	*	1	1015	124	75.	45.4	3004.8	*	1	1835	224	45.	3.0	2993.2			
1	0200	25	19.	1.0	2992.4	*	1	1020	125	75.	44.9	3004.7	*	1	1840	225	45.	2.7	2993.1			
1	0205	26	20.	1.1	2992.5	*	1	1025	126	74.	44.4	3004.6	*	1	1845	226	44.	2.4	2993.0			
1	0210	27	22.	1.2	2992.5	*	1	1030	127	74.	43.9	3004.4	*	1	1850	227	39.	2.1	2992.9			
1	0215	28	24.	1.2	2992.5	*	1	1035	128	74.	43.3	3004.3	*	1	1855	228	35.	1.8	2992.8			
1	0220	29	26.	1.4	2992.6	*	1	1040	129	74.	42.8	3004.2	*	1	1900	229	30.	1.6	2992.7			
1	0225	30	29.	1.5	2992.6	*	1	1045	130	73.	42.3	3004.1	*	1	1905	230	27.	1.4	2992.6			
1	0230	31	32.	1.7	2992.7	*	1	1050	131	73.	41.8	3004.0	*	1	1910	231	23.	1.2	2992.5			
1	0235	32	35.	1.8	2992.8	*	1	1055	132	73.	41.3	3003.9	*	1	1915	232	20.	1.1	2992.5			
1	0240	33	37.	2.0	2992.8	*	1	1100	133	73.	40.8	3003.8	*	1	1920	233	18.	.9	2992.4			
1	0245	34	40.	2.1	2992.9	*	1	1105	134	72.	40.3	3003.6	*	1	1925	234	16.	.8	2992.4			
1	0250	35	44.	2.3	2993.0	*	1	1110	135	72.	39.8	3003.5	*	1	1930	235	14.	.7	2992.3			
1	0255	36	45.	2.4	2993.0	*	1	1115	136	72.	39.3	3003.4	*	1	1935	236	12.	.6	2992.3			
1	0300	37	45.	2.6	2993.1	*	1	1120	137	72.	38.8	3003.3	*	1	1940	237	11.	.6	2992.2			
1	0305	38	45.	2.8	2993.2	*	1	1125	138	71.	38.3	3003.2	*	1	1945	238	9.	.5	2992.2			
1	0310	39	45.	3.1	2993.3	*	1	1130	139	71.	37.8	3003.1	*	1	1950	239	8.	.4	2992.2			
1	0315	40	46.	3.6	2993.5	*	1	1135	140	71.	37.4	3003.0	*	1	1955	240	7.	.4	2992.2			
1	0320	41	47.	4.6	2993.8	*	1	1140	141	71.	36.9	3002.9	*	1	2000	241	6.	.3	2992.1			
1	0325	42	49.	6.1	2994.4	*	1	1145	142	71.	36.4	3002.7	*	1	2005	242	6.	.3	2992.1			
1	0330	43	52.	8.5	2995.3	*	1	1150	143	70.	35.9	3002.6	*	1	2010	243	5.	.3	2992.1			
1	0335	44	54.	11.8	2996.3	*	1	1155	144	70.	35.4	3002.5	*	1	2015	244	4.	.2	2992.1			
1	0340	45	58.	15.8	2997.5	*	1	1200	145	70.	34.9	3002.4	*	1	2020	245	4.	.2	2992.1			
1	0345	46	61.	20.3	2998.8	*	1	1205	146	70.	34.5	3002.3	*	1	2025	246	3.	.2	2992.1			
1	0350	47	65.	24.9	3000.1	*	1	1210	147	69.	34.0	3002.2	*	1	2030	247	3.	.2	2992.1			
1	0355	48	67.	29.5	3001.2	*	1	1215	148	69.	33.5	3002.1	*	1	2035	248	3.	.1	2992.1			
1	0400	49	69.	33.9	3002.2	*	1	1220	149	69.	33.0	3002.0	*	1	2040	249	2.	.1	2992.0			
1	0405	50	71.	38.2	3003.2	*	1	1225	150	69.	32.5	3001.9	*	1	2045	250	2.	.1	2992.0			
1	0410	51	73.	42.0	3004.0	*	1	1230	151	68.	32.1	3001.8	*	1	2050	251	2.	.1	2992.0			
1	0415	52	75.	45.5	3004.8	*	1	1235	152	68.	31.6	3001.7	*	1	2055	252	1.	.1	2992.0			
1	0420	53	76.	48.6	3005.4	*	1	1240	153	68.	31.1	3001.6	*	1	2100	253	1.	.1	2992.0			
1	0425	54	77.	51.2	3005.9	*	1	1245	154	68.	30.7	3001.4	*	1	2105	254	1.	.1	2992.0			

1	0430	55	78.	53.6	3006.3	*	1	1250	155	68.	30.2	3001.3	*	1	2110	255	1.	.1	2992.0
1	0435	56	79.	55.7	3006.7	*	1	1255	156	67.	29.7	3001.2	*	1	2115	256	1.	.0	2992.0
1	0440	57	80.	57.6	3007.1	*	1	1300	157	67.	29.3	3001.1	*	1	2120	257	1.	.0	2992.0
1	0445	58	80.	59.3	3007.4	*	1	1305	158	67.	28.8	3001.0	*	1	2125	258	1.	.0	2992.0
1	0450	59	81.	61.0	3007.7	*	1	1310	159	67.	28.4	3000.9	*	1	2130	259	1.	.0	2992.0
1	0455	60	82.	62.6	3008.0	*	1	1315	160	66.	27.9	3000.8	*	1	2135	260	1.	.0	2992.0
1	0500	61	82.	64.1	3008.2	*	1	1320	161	66.	27.4	3000.7	*	1	2140	261	0.	.0	2992.0
1	0505	62	83.	65.5	3008.5	*	1	1325	162	66.	27.0	3000.6	*	1	2145	262	0.	.0	2992.0
1	0510	63	83.	66.8	3008.7	*	1	1330	163	66.	26.5	3000.5	*	1	2150	263	0.	.0	2992.0
1	0515	64	84.	67.9	3008.9	*	1	1335	164	66.	26.1	3000.4	*	1	2155	264	0.	.0	2992.0
1	0520	65	84.	68.8	3009.1	*	1	1340	165	65.	25.6	3000.3	*	1	2200	265	0.	.0	2992.0
1	0525	66	84.	69.5	3009.2	*	1	1345	166	65.	25.2	3000.2	*	1	2205	266	0.	.0	2992.0
1	0530	67	84.	70.1	3009.3	*	1	1350	167	65.	24.7	3000.1	*	1	2210	267	0.	.0	2992.0
1	0535	68	85.	70.6	3009.4	*	1	1355	168	65.	24.3	3000.0	*	1	2215	268	0.	.0	2992.0
1	0540	69	85.	70.9	3009.5	*	1	1400	169	64.	23.8	2999.9	*	1	2220	269	0.	.0	2992.0
1	0545	70	85.	71.1	3009.5	*	1	1405	170	64.	23.4	2999.7	*	1	2225	270	0.	.0	2992.0
1	0550	71	85.	71.1	3009.5	*	1	1410	171	64.	23.0	2999.6	*	1	2230	271	0.	.0	2992.0
1	0555	72	85.	71.1	3009.5	*	1	1415	172	63.	22.5	2999.5	*	1	2235	272	0.	.0	2992.0
1	0600	73	85.	71.0	3009.5	*	1	1420	173	63.	22.1	2999.3	*	1	2240	273	0.	.0	2992.0
1	0605	74	85.	70.9	3009.5	*	1	1425	174	63.	21.7	2999.2	*	1	2245	274	0.	.0	2992.0
1	0610	75	85.	70.7	3009.4	*	1	1430	175	62.	21.2	2999.1	*	1	2250	275	0.	.0	2992.0
1	0615	76	85.	70.4	3009.4	*	1	1435	176	62.	20.8	2999.0	*	1	2255	276	0.	.0	2992.0
1	0620	77	84.	70.1	3009.3	*	1	1440	177	61.	20.4	2998.8	*	1	2300	277	0.	.0	2992.0
1	0625	78	84.	69.7	3009.3	*	1	1445	178	61.	20.0	2998.7	*	1	2305	278	0.	.0	2992.0
1	0630	79	84.	69.3	3009.2	*	1	1450	179	61.	19.5	2998.6	*	1	2310	279	0.	.0	2992.0
1	0635	80	84.	68.9	3009.1	*	1	1455	180	60.	19.1	2998.4	*	1	2315	280	0.	.0	2992.0
1	0640	81	84.	68.4	3009.0	*	1	1500	181	60.	18.7	2998.3	*	1	2320	281	0.	.0	2992.0
1	0645	82	84.	67.9	3008.9	*	1	1505	182	60.	18.3	2998.2	*	1	2325	282	0.	.0	2992.0
1	0650	83	84.	67.4	3008.8	*	1	1510	183	59.	17.9	2998.1	*	1	2330	283	0.	.0	2992.0
1	0655	84	83.	66.9	3008.8	*	1	1515	184	59.	17.5	2998.0	*	1	2335	284	0.	.0	2992.0
1	0700	85	83.	66.4	3008.7	*	1	1520	185	59.	17.1	2997.8	*	1	2340	285	0.	.0	2992.0
1	0705	86	83.	65.9	3008.6	*	1	1525	186	58.	16.7	2997.7	*	1	2345	286	0.	.0	2992.0
1	0710	87	83.	65.3	3008.5	*	1	1530	187	58.	16.3	2997.6	*	1	2350	287	0.	.0	2992.0
1	0715	88	82.	64.8	3008.4	*	1	1535	188	58.	15.9	2997.5	*	1	2355	288	0.	.0	2992.0
1	0720	89	82.	64.3	3008.3	*	1	1540	189	57.	15.5	2997.4	*	2	0000	289	0.	.0	2992.0
1	0725	90	82.	63.7	3008.2	*	1	1545	190	57.	15.1	2997.2	*	2	0005	290	0.	.0	2992.0
1	0730	91	82.	63.2	3008.1	*	1	1550	191	57.	14.7	2997.1	*	2	0010	291	0.	.0	2992.0
1	0735	92	82.	62.6	3008.0	*	1	1555	192	57.	14.3	2997.0	*	2	0015	292	0.	.0	2992.0
1	0740	93	81.	62.1	3007.9	*	1	1600	193	56.	13.9	2996.9	*	2	0020	293	0.	.0	2992.0
1	0745	94	81.	61.5	3007.8	*	1	1605	194	56.	13.5	2996.8	*	2	0025	294	0.	.0	2992.0
1	0750	95	81.	61.0	3007.7	*	1	1610	195	56.	13.1	2996.7	*	2	0030	295	0.	.0	2992.0
1	0755	96	81.	60.4	3007.6	*	1	1615	196	55.	12.7	2996.5	*	2	0035	296	0.	.0	2992.0
1	0800	97	81.	59.8	3007.5	*	1	1620	197	55.	12.4	2996.4	*	2	0040	297	0.	.0	2992.0
1	0805	98	80.	59.3	3007.4	*	1	1625	198	55.	12.0	2996.3	*	2	0045	298	0.	.0	2992.0
1	0810	99	80.	58.7	3007.3	*	1	1630	199	54.	11.6	2996.2	*	2	0050	299	0.	.0	2992.0
1	0815	100	80.	58.2	3007.2	*	1	1635	200	54.	11.2	2996.1	*	2	0055	300	0.	.0	2992.0

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
+	85.	5.83	81.	48.	46.	46.
			.741	1.755	1.755	1.755
		(INCHES)				
		(AC-FT)	40.	95.	95.	95.

PEAK STORAGE	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(AC-FT)	(HR)				
+	71.	5.83	60.	24.	23.	23.

PEAK STAGE	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(FEET)	(HR)				
+	3009.52	5.83	3007.55	2998.73	2998.48	2998.48

CUMULATIVE AREA = 1.01 SQ MI

HIGHLIGHTED DENOTES
REFERENCED BASINS

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	RATIO 2	RATIO 3
					1.00	.98	.97

HYDROGRAPH AT							
+	OFF7	.01	1	FLOW	9.	9.	9.
				TIME	3.50	3.50	3.50

HYDROGRAPH AT							
+	OFF8	.21	1	FLOW	244.	237.	234.

				TIME	3.75	3.75	3.75
2 COMBINED AT							
+	CP2	.22	1	FLOW	249.	242.	238.
				TIME	3.75	3.75	3.75

HYDROGRAPH AT							
+	OFF9	.11	1	FLOW	153.	149.	147.
				TIME	3.58	3.58	3.58

2 COMBINED AT							
+	CP2a	.33	1	FLOW	395.	384.	379.
				TIME	3.67	3.67	3.67

HYDROGRAPH AT							
+	OFF10	.65	1	FLOW	508.	494.	486.
				TIME	4.08	4.08	4.08

HYDROGRAPH AT							
+	ON2	.03	1	FLOW	66.	65.	64.
				TIME	3.50	3.50	3.50

3 COMBINED AT							
+	DB2	1.01	1	FLOW	774.	752.	741.
				TIME	3.83	3.83	3.83

ROUTED TO							
+	RDB2	1.01	1	FLOW	86.	85.	85.
				TIME	5.83	5.83	5.83

** PEAK STAGES IN FEET **

1	STAGE	3010.16	3009.74	3009.52
	TIME	5.83	5.83	5.83

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

HIGHLIGHTED DENOTES
REFERENCED BASINS

APPENDIX D

Reference Material

Technical Drainage Study for Skye Canyon Phase 3A Infrastructure

TECHNICAL DRAINAGE STUDY
Skye Canyon
(Phase 3A Infrastructure)
City of Las Vegas, Nevada

Job No.: OLY1609.000
Date: November 2017

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

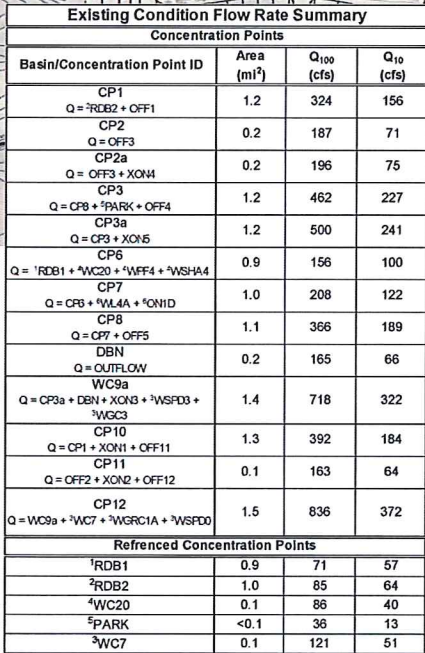


A handwritten signature in blue ink, appearing to read "Lant Leavitt", written over a horizontal line.

Lant Leavitt, P.E.
NV Professional Engineer No. 18287

Assisted by: Erick Mata, EI

Referenced Drainage Exhibits



Referenced Concentration Points			
¹ RDB1	0.9	71	57
² RDB2	1.0	85	64
⁴ WC20	0.1	86	40
⁵ PARK	<0.1	36	13
³ WC7	0.1	121	51

¹Referenced from the "DB1" Study.

²Referenced from the "DB2" Study.

³Referenced from the "Smith's" Study.

⁴Referenced from the "Master Drainage Study Update No.4".

⁵Referenced from the "Park" Study.

⁶Referenced from the "Parcel 2.16" Study.



Referenced Hydrological Computations

Data:

Reference:

Exhibit D
NRCS Soil Data

Soil Type - Soil Survey Area & Version, Soil Description				A	B	C	D
LV	155	Las Vegas Valley 2016	Cave gravelly fine sandy loam, 4 to 15 percent slopes	0%	0%	0%	100%
LV	314	Las Vegas Valley 2016	Weiser-Wehech association	80%	5%	0%	15%
LV	400	Las Vegas Valley 2016	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	0%	0%	0%	100%

Land Use	A	B	C	D
Residential (<6,000 sf)*	89	92	94	95
Commercial	89	92	94	95
Desert Shrub (poor)	63	77	85	88
Roadway	98	98	98	98
Open Space (fair)	49	69	79	84

*Commercial land use per Note 3

HISTORIC CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF1	LV	155	33.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	52.45	29.05
	LV	400	67.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	106.46	58.95
TOTAL PERCENT				100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:								158.91	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF2	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	19.89	88.00
	TOTAL PERCENT				TOTAL AREA & COMPOSITE CURVE NUMBER:								19.89	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF3	LV	155	80.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	83.60	70.40
	LV	400	20.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	20.90	17.60
TOTAL PERCENT				100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:								104.50	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF4	LV	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	141.94	88.00
	TOTAL PERCENT				TOTAL AREA & COMPOSITE CURVE NUMBER:								141.94	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON1	LV	314	8.2%	Desert Shrub (poor)	80%	5%	0%	15%	63	77	85	88	3.11	5.56
	LV	400	91.8%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	34.61	80.74
TOTAL PERCENT				100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:								37.72	86.3

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON2	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	48.79	88.00
	TOTAL PERCENT				TOTAL AREA & COMPOSITE CURVE NUMBER:								48.79	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON3	LV	155	56.9%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	31.87	50.08
	LV	400	43.1%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	24.13	37.92
TOTAL PERCENT				100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:								56.00	88.0

EXISTING CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF1	LV	155	34.9%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	49.64	30.68
	LV	400	65.1%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	92.75	57.32
TOTAL PERCENT				100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:								142.39	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF3	LV	155	78.4%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	75.85	68.99
	LV	400	21.6%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	20.90	19.01
TOTAL PERCENT				100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:								96.75	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF4	LV	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	40.14	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									40.14	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF5	LV	155	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	88.82	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									88.82	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF11	LV	314	16.6%	Desert Shrub (poor)	80%	5%	0%	15%	63	77	85	88	3.11	11.21
	LV	400	83.4%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	15.60	73.37
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									18.71	84.6

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF12	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	8.16	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									8.16	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON1	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	19.01	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									19.01	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON2	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	40.63	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									40.63	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON3	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	5.93	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									5.93	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON4	LV	155	25.1%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	1.41	22.08
	LV	400	74.9%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	4.21	65.92
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									5.62	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
XON5	LV	155	95.7%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	19.51	84.20
	LV	400	4.3%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	0.88	3.80
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									20.39	88.0

PROPOSED CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
2.02	LV	400	100.0%	Commercial	0%	0%	0%	100%	89	92	94	95	17.84	95.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									17.84	95.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
2.03	LV	400	100.0%	Commercial	0%	0%	0%	100%	89	92	94	95	17.45	95.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									17.45	95.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
2.04a	LV	400	100.0%	Open Space (fair)	0%	0%	0%	100%	49	69	79	84	1.43	84.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.43	84.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
2.04b	LV	400	100.0%	Open Space (fair)	0%	0%	0%	100%	49	69	79	84	1.26	84.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.26	84.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
2.05a	LV	400	100.0%	Residential (<6,000 sf)*	0%	0%	0%	100%	89	92	94	95	13.54	95.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									13.54	95.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
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HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL																			
TIME OF CONCENTRATION																			
Project Name & Number: Skye Canyon Infrastructure Phase 3A (OLY1609)																			
Description:																			
By: ETM																			
Date: 10/26/2017																			
SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)				TRAVEL TIME (Tt)					Tc				
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	VELOCITY FPS	V1 FPS	V2 FPS	Tt Min	Tc Calc.	Total Length Feet	Tc Check	Urbanized Basins	Flag
					[2]			[3]				[4]	[5]	[6]	[7]	[8]	[9]		[10]
HISTORIC CONDITION																			
OFF1	E	88.0	0.772	158.9	0.2483	250	13.0	3.97	6135	3.0	2.57	5.11	21.62	25.60					0.256
OFF2	E	88.0	0.772	19.9	0.0311	328	3.7	6.95	1423	4.2	3.04	6.04	5.29	12.23					0.122
OFF3	E	88.0	0.772	104.5	0.1633	350	11.4	4.91	6030	3.0	2.56	5.09	21.35	26.26					0.263
OFF4	E	88.0	0.772	141.9	0.2218	410	6.1	6.55	5793	3.5	2.77	5.50	19.05	25.60					0.256
XON1	E	86.3	0.749	37.7	0.0589	500	4.0	8.90	2245	3.1	2.61	5.19	8.79	17.68					0.177
XON2	E	88.0	0.772	48.8	0.0762	500	4.0	8.33	2873	3.4	2.73	5.42	10.35	18.68					0.187
XON3	E	88.0	0.772	56.0	0.0875	215	11.2	3.88	2720	2.8	2.49	4.95	10.83	14.71					0.147
EXISTING CONDITION																			
OFF1	E	88.0	0.772	142.4	0.2225	250	13.0	3.97	5404	3.1	2.58	5.13	19.14	23.12					0.231
OFF3	E	88.0	0.772	96.8	0.1512	350	11.4	4.91	5595	3.0	2.54	5.05	20.09	25.01					0.250
OFF4	E	88.0	0.772	40.1	0.0627	500	4.0	8.33	4071	4.1	2.98	5.92	12.86	21.18					0.212
OFF5	E	88.0	0.772	88.8	0.1388	410	6.1	6.55	4757	3.9	2.92	5.81	15.07	21.62					0.216
OFF11	E	88.0	0.772	18.7	0.0292	500	0.5	16.65	1050	2.9	2.50	4.97	5.17	21.83					0.218
OFF12	E	88.0	0.772	8.2	0.0128	150	4.6	4.35	544	3.1	2.61	5.18	3.34	7.69					0.100
XON1	E	86.3	0.749	19.0	0.0297	370	4.1	7.62	1460	3.4	2.73	5.42	6.01	13.63					0.136
XON2	E	88.0	0.772	40.6	0.0635	408	4.9	7.03	2090	3.6	2.81	5.58	7.72	14.75					0.147
XON3	E	88.0	0.772	5.9	0.0093	434	2.8	8.78	828	4.2	3.04	6.05	3.64	12.42					0.124
XON4	E	86.3	0.749	5.6	0.0088	317	6.3	6.08	1046.4	2.9	2.50	4.97	5.16	11.25					0.112
XON5	E	88.0	0.772	20.4	0.0319	215	10.0	4.02	1248	2.0	2.09	4.16	6.98	11.00					0.110

EX

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*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*
* JUN 1998
*
* VERSION 4.1
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* RUN DATE 30OCT17 TIME 10:43:58
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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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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 -AMSK- 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

HEC-1 INPUT

PAGE 1

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1
LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*** FREE ***
*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID NINETY-FIVE MANAGEMENT, LLC.
3 ID SKYE CANYON INFRASTRUCTURE PHASE 3A
4 ID TECHNICAL DRAINAGE STUDY
5 ID
6 ID DRAINAGE CONDITION -- EXISTING CONDITION
7 ID RETURN PERIOD ----- 100 & 10-YEAR
8 ID DISTRIBUTION ----- 6-HOUR SDN3
9 ID PROJECT NO. ----- OLY1609.000
10 ID FILENAME ----- EX.H1
11 ID DATE ----- SEPTEMBER 2017
12 ID MODELED BY ----- ETH
13 ID
14 ID RETURN PERIOD RATIO
15 ID 100-YR 1.00
16 ID 10-YR 0.54
17 ID
18 ID SIX HOUR DEPTH-AREA REDUCTION FACTORS
19 ID DRAINAGE AREA (MI^2) DARF
20 ID 0.00-0.49 0.990
21 ID 0.50-0.99 0.975
22 ID 1.00-1.99 0.950
23 ID
24 ID
25 IT 5 0 0 300
26 IO 5 0 0
27 IN 5 0 0
28 JR PREC 1.00 0.99 0.975 0.95 0.54
*
29 KK *OFF7
30 KM REFERENCED FROM THE "DB2" STUDY
31 KM DISCHARGES INTO DETENTION BASIN "DB2"
32 PB 3.00
33 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
34 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
35 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
36 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
37 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
38 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
39 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
40 PC 0.998 0.999 1
41 BA .0058
42 LS 0 88.0
43 UD 0.100
*
44 KK *OFF8
45 KM REFERENCED FROM THE "DB2" STUDY
46 KM DISCHARGES INTO DETENTION BASIN "DB2"
47 KO 3
48 LS .2122
49 LS 0 88.0

```

HEC-1 INPUT

PAGE 2

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1
LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
50 UD 0.299
*
51 KK *CP2
52 KM REFERENCED FROM THE "DB2" STUDY
53 KM COMBINE OFF7, AND OFF8

```

HIGHLIGHTED DENOTES
REFERENCED FLOWRATES

54 HC 2 EX
*
55 KK *OFF9
56 KM REFERENCED FROM THE "DB2" STUDY
57 KM DISCHARGES INTO DETENTION BASIN "DB2"
58 KO 3
59 BA .1137
60 LS 0 88.0
61 UD 0.200
*
62 KK *CP2a
63 KM REFERENCED FROM THE "DB2" STUDY
64 KM COMBINE CP2, AND OFF9
65 HC 2
*
66 KK *OFF10
67 KM REFERENCED FROM THE "DB2" STUDY
68 KM DISCHARGES INTO DETENTION BASIN "DB2"
69 KO 3
70 BA .6502
71 LS 0 88.0
72 UD 0.613
*
73 KK *ON2
74 KM REFERENCED FROM THE "DB2" STUDY
75 KM DB2 BASIN
76 BA .0315
77 LS 0 94.0
78 UD 0.083
*
79 KK *DB2
80 KM REFERENCED FROM THE "DB2" STUDY
81 KM COMBINE CP2a, OFF10 AND ON2
82 KO 1
83 HC 3
*
84 KK *RDB2
85 KM REFERENCED FROM THE "DB2" STUDY
86 KM OUTLET = 25" ORIFICE @ INVERT ELEVATION = 2984.21-FT
87 KO 1
88 RS 1 ELEV 2992.0
89 SV 0.00 2.34 7.60 24.30 46.28 73.78 107.11 146.75 193.03
90 SE 2992.0 2993.0 2995.0 3000.0 3005.0 3010.0 3015.0 3020.0 3025.0
HEC-1 INPUT

PAGE 3

1
LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
91 SQ 0.00 44.44 51.05 64.70 83.84 99.36 520.9 3465.5 7888.4
92 SE 2992.0 2993.0 2995.0 3000.0 3009.0 3018.0 3019.0 3022.0 3025.0
*

93 KK OFF1
94 KM OFFSITE BASIN
95 BA .2225
96 PB 3.00 88.0
97 LS 0
98 UD 0.231
*

99 KK CP1
100 KM COMBINES *RDB2 AND OFF1
101 HC 2
*
102 KK XON1
103 KM ONSITE BASIN
104 BA .0297
105 PB 3.00
106 LS 0 86.3
107 UD 0.136
*
108 KK OFF11
109 KM OFFSITE BASIN
110 BA .0292
111 PB 3.00
112 LS 0 88.0
113 UD 0.218
*
114 KK CP10
115 KM COMBINES CP1, XON1 AND OFF11
116 HC 3
*
117 KK OFF2
118 KM OFFSITE BASIN
119 BA .0311
120 PB 3.00
121 LS 0 88.0
122 UD 0.122
*
123 KK XON2
124 KM ONSITE BASIN
125 BA .0635
126 PB 3.00
127 LS 0 88.0
128 UD 0.147
*

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PAGE 4

1
LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
129 KK OFF12
Page 2

HIGHLIGHTED DENOTES
REFERENCED FLOWRATES

208	KM	WEST BASIN, WEST OF SHAUMBER ROAD	EX						
209	BA	.0428							
210	PB	3.00							
211	LS	0	93.5						
212	UD	0.142							
	*								
213	KK	*WSHA5							
214	KM	WEST BASIN, SHAUMBER ROAD							
215	BA	.0037							
216	PB	3.00							
217	LS	0	98.0						
218	UD	0.086							
	*								
219	KK	*WC20							
220	KM	S OF EAGLE CANYON/SHAUMBER INTERSECTION							
221	KM	COMBINE WPF5, WML2, WSHA5							
222	HC	3							
	*								
223	KK	*WPF4							
224	BA	.0090							
225	PB	3.00							
226	LS	0	94.0						
227	UD	0.087							
	*								
228	KK	*WSHA4							
229	BA	.0022							
230	PB	3.00							
231	LS	0	98.0						
232	UD	0.051							
	*								
233	KK	CP6							
234	KM	COMBINES *RDB1, *WC20, *WPF4 AND *WSHA4							
235	HC	4							
	*								
236	KK	RCP6							
237	KM	ROUTE CP6 TO CP7							
238	KM	LENGTH SLOPE n-VALUE							
239	RD	2520 .039 .040 0 SHAPE TRAP WIDTH 50 S-SLOPE 2							
	*								
240	KK	*WL4A							
241	KM	BASIN WEST OF PARCEL 2.16							
242	BA	.0125							
243	PB	3.00							
244	LS	0	92.0						
245	UD	0.106							
	*								
HEC-1 INPUT									
1	LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10							
246	KK	*ON1D							
247	KM	PARCEL 2.16							
248	BA	.0222							
249	PB	3.00							
250	LS	0	92.0						
251	UD	0.099							
	*								
252	KK	CP7							
253	KM	COMBINES *RDB1, *WC20, *WPF4, *WSHA4, *WL4A AND *ON1D							
254	HC	3							
	*								
255	KK	RCP7							
256	KM	ROUTE CP7 TO CP8							
257	KM	LENGTH SLOPE n-VALUE							
258	RD	1470 .039 .040 0 SHAPE TRAP WIDTH 50 S-SLOPE 2							
	*								
259	KK	OFF5							
260	KM	OFFSITE BASIN							
261	BA	.1388							
262	PB	3.00							
263	LS	0	88.0						
264	UD	0.216							
	*								
265	KK	CP8							
266	KM	COMBINES OFF5 AND CP7							
267	HC	2							
	*								
268	KK	RCP8							
269	KM	ROUTE CP8 TO CP3							
270	KM	LENGTH SLOPE n-VALUE							
271	RD	450 .039 .040 0 SHAPE TRAP WIDTH 50 S-SLOPE 2							
	*								
272	KK	OFF4							
273	KM	OFFSITE BASIN							
274	BA	.0627							
275	PB	3.00							
276	LS	0	88.0						
277	UD	0.212							
	*								
278	KK	*OFF3							
279	KM	REFERENCED FROM THE "SMITH'S" STUDY							
280	PB	3.00							
281	BA	.0012							
282	LS	0	86.2						
283	UD	0.100							
	*								

EX

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

284 KK *D2
285 KM REFERENCED FROM THE "SMITH'S" STUDY
286 PB 3.00
287 BA .0154
288 LS 0 86.0
289 UD 0.089
*

HIGHLIGHTED DENOTES
REFERENCED FLOWRATES

290 KK *IOFF4
291 KM REFERENCED FROM THE "SMITH'S" STUDY
292 PB 3.00
293 BA .0062
294 LS 0 86.2
295 UD 0.100
*

296 KK *PARK
297 KM REFERENCED FROM THE "SMITH'S" STUDY
298 KM COMBINES IOFF4, OFF3, D2
299 HC 3
*

300 KK CP3
301 KM COMBINES CP8, OFF4 AND *PARK
302 HC 3
*

303 KK XON5
304 KM ONSITE BASIN
305 BA .0319
306 PB 3.00
307 LS 0 88.0
308 UD 0.110
*

309 KK CP3a
310 KM COMBINES CP3 AND XON5
311 HC 2
*

312 KK OFF3
313 KM OFFSITE BASIN
314 BA .1512
315 PB 3.00
316 LS 0 88.0
317 UD 0.250
*

318 KK XON4
319 KM ONSITE BASIN
320 BA .0088
321 PB 3.00
322 LS 0 86.3
323 UD 0.112
*

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PAGE 9

1

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

324 KK CP2a
325 KM COMBINES OFF3 AND XON4
326 HC 2
*

327 KK DBN
328 KM REFERENCED FROM THE "SMITH'S" STUDY
329 KM OUTLET = 54" ORIFICE @ INVERT ELEVATION = 2997.3-FT
330 KO 1
331 RS 1 ELEV 2797.3
332 SA 0.00 0.09 0.12 0.15 .37 0.79 0.86
333 SE 2797.3 2798 2799 2800 2805 2812 2813
334 SQ 0.00 54 129 193 241 268
335 SE 2797.3 2802 2804 2807 2810 2812
*

336 KK *WSPD3
337 KM REFERENCED FROM THE "SMITH'S" STUDY
338 BA .0022
339 PB 2.93
340 LS 0 92.8
341 UD 0.056
*

342 KK *WGC3
343 KM REFERENCED FROM THE "SMITH'S" STUDY
344 BA .0444
345 PB 2.93
346 LS 0 94.6
347 UD 0.095
*

348 KK XON3
349 KM ONSITE BASIN
350 BA .0093
351 PB 3.00
352 LS 0 88.0
353 UD 0.124
*

354 KK WC9a
355 HC 5
*

356 KK *ON1-D
357 KM REFERENCED FROM THE "SMITH'S" STUDY
358 KM PHASE 1, NORTHWEST QUAD ONSITE BASIN
359 BA .0278

EX

360 PB 2.93 91.2
 361 LS 0
 362 UD 0.114
 *

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PAGE 10

1

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

363 KK *ON2-D
 364 KM REFERENCED FROM THE "SMITH'S" STUDY
 365 KM PHASE 1, NORTHEAST QUAD ONSITE BASIN
 366 BA .0301
 367 PB 2.93
 368 LS 0 88.8
 369 UD 0.152
 *

370 KK *HOR
 371 KM REFERENCED FROM THE "SMITH'S" STUDY
 372 KM PHASE 1, STREET BASIN SKYE CANYON PARK DRIVE
 373 BA .0163
 374 PB 2.93
 375 LS 0 93.3
 376 UD 0.108
 *

377 KK *WC7
 378 KM REFERENCED FROM THE "SMITH'S" STUDY
 379 HC 3
 *

380 KK *WGRC1A
 381 KM REFERENCED FROM THE "SMITH'S" STUDY
 382 BA .0022
 383 PB 2.93
 384 LS 0 93.2
 385 UD 0.095
 *

386 KK *WSPD0
 387 KM REFERENCED FROM THE "SMITH'S" STUDY
 388 BA .0010
 389 PB 2.93
 390 LS 0 93.4
 391 UD 0.050
 *

392 KK CP12
 393 HC 4
 *

394 ZZ

HIGHLIGHTED DENOTES
 REFERENCED FLOWRATES

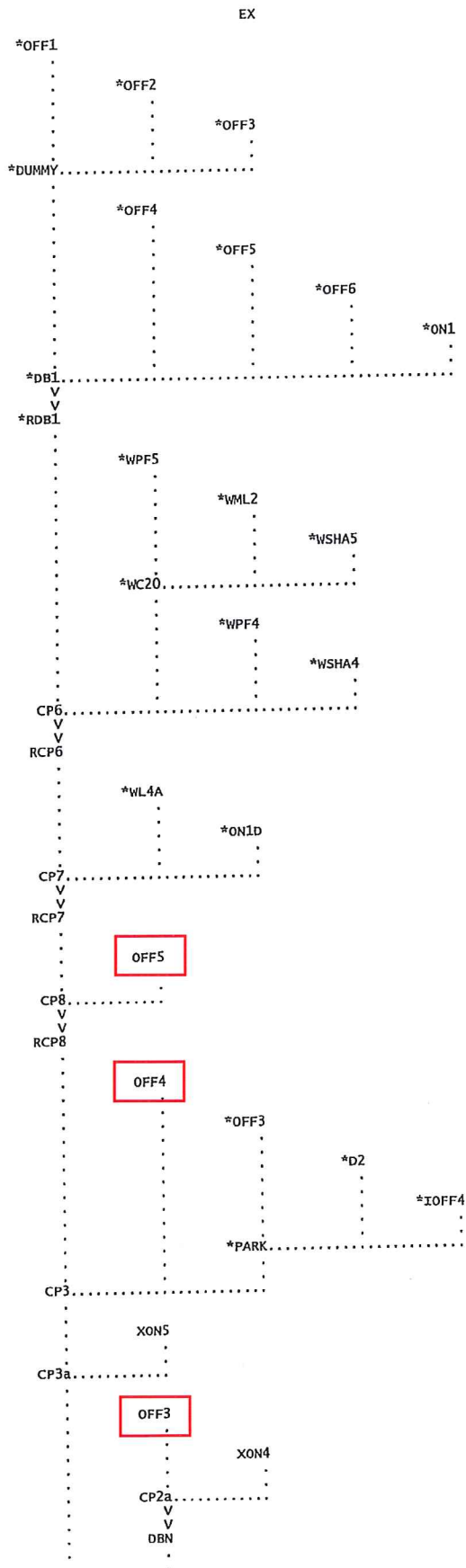
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

29 *OFF7
 .
 44 . *OFF8
 .
 51 *CP2.....
 .
 55 . *OFF9
 .
 62 *CP2a.....
 .
 66 . *OFF10
 .
 73 . *ON2
 .
 79 *DB2.....
 V
 84 *RDB2
 .
 93 . OFF1
 .
 99 CP1.....
 .
 102 . XON1
 .
 108 . OFF11
 .
 114 CP10.....
 .
 117 . OFF2
 .
 123 . XON2
 .
 129 . OFF12
 .
 135 CP11.....

138
145
152
159
162
169
176
183
189
193
201
207
213
219
223
228
233
236
240
246
252
255
259
265
268
272
278
284
290
296
300
303
309
312
318
324
327



HIGHLIGHTED DENOTES
REFERENCED FLOWRATES

EX

** PEAK STAGES IN FEET **
 1 STAGE 3010.16 3009.97 3009.63 3009.08 2999.64
 TIME 5.83 5.83 5.83 5.83 5.58

HIGHLIGHTED DENOTES
 REFERENCED FLOWRATES

HYDROGRAPH AT +	OFF1	.22	1	FLOW TIME	287. 3.67	283. 3.67	277. 3.67	267. 3.67	109. 3.67
2 COMBINED AT +	CP1	1.24	1	FLOW TIME	345. 3.67	341. 3.67	335. 3.67	324. 3.67	156. 3.67
HYDROGRAPH AT +	XON1	.03	1	FLOW TIME	43. 3.58	43. 3.58	42. 3.58	40. 3.58	16. 3.58
HYDROGRAPH AT +	OFF11	.03	1	FLOW TIME	38. 3.67	38. 3.67	37. 3.67	36. 3.67	15. 3.67
3 COMBINED AT +	CP10	1.29	1	FLOW TIME	418. 3.67	413. 3.67	405. 3.67	392. 3.67	184. 3.67
HYDROGRAPH AT +	OFF2	.03	1	FLOW TIME	49. 3.58	48. 3.58	47. 3.58	45. 3.58	19. 3.58
HYDROGRAPH AT +	XON2	.06	1	FLOW TIME	97. 3.58	96. 3.58	94. 3.58	90. 3.58	37. 3.58
HYDROGRAPH AT +	OFF12	.01	1	FLOW TIME	21. 3.50	21. 3.50	20. 3.50	19. 3.50	8. 3.50
3 COMBINED AT +	CP11	.11	1	FLOW TIME	165. 3.58	163. 3.58	160. 3.58	154. 3.58	64. 3.58
HYDROGRAPH AT +	*OFF1	.43	1	FLOW TIME	399. 3.83	393. 3.83	385. 3.83	370. 3.83	143. 3.92
HYDROGRAPH AT +	*OFF2	.04	1	FLOW TIME	49. 3.58	48. 3.58	47. 3.58	45. 3.58	14. 3.58
HYDROGRAPH AT +	*OFF3	.03	1	FLOW TIME	41. 3.50	40. 3.50	39. 3.50	38. 3.58	16. 3.58
3 COMBINED AT +	*DUMMY	.50	1	FLOW TIME	441. 3.83	435. 3.83	425. 3.83	409. 3.83	158. 3.83
HYDROGRAPH AT +	*OFF4	.06	1	FLOW TIME	90. 3.58	89. 3.58	87. 3.58	84. 3.58	35. 3.58
HYDROGRAPH AT +	*OFF5	.26	1	FLOW TIME	252. 3.83	248. 3.83	243. 3.83	234. 3.83	94. 3.83
HYDROGRAPH AT +	*OFF6	.04	1	FLOW TIME	62. 3.58	62. 3.58	60. 3.58	58. 3.58	24. 3.58
HYDROGRAPH AT +	*ON1	.03	1	FLOW TIME	49. 3.50	49. 3.50	48. 3.50	46. 3.50	23. 3.58
5 COMBINED AT +	*DB1	.88	1	FLOW TIME	785. 3.75	774. 3.75	757. 3.75	729. 3.75	288. 3.83
ROUTED TO +	*RDB1	.88	1	FLOW TIME	71. 5.58	71. 5.58	71. 5.58	70. 5.58	57. 5.42
					** PEAK STAGES IN FEET ** 1 STAGE 3035.28 3035.13 3034.91 3034.53 3028.62 TIME 5.67 5.58 5.58 5.58 5.42				
HYDROGRAPH AT +	*WPF5	.00	1	FLOW TIME	1. 3.50	1. 3.50	1. 3.50	1. 3.50	0. 3.50
HYDROGRAPH AT +	*WML2	.04	1	FLOW TIME	78. 3.58	77. 3.58	76. 3.58	74. 3.58	36. 3.58
HYDROGRAPH AT +	*WSHA5	.00	1	FLOW TIME	8. 3.50	8. 3.50	8. 3.50	8. 3.50	4. 3.50
3 COMBINED AT +	*WC20	.05	1	FLOW TIME	86. 3.58	85. 3.58	83. 3.58	81. 3.58	40. 3.58
HYDROGRAPH AT +	*WPF4	.01	1	FLOW TIME	19. 3.50	18. 3.50	18. 3.50	18. 3.50	9. 3.50
HYDROGRAPH AT +	*WSHA4	.00	1	FLOW TIME	6. 3.50	5. 3.50	5. 3.50	5. 3.50	3. 3.50
4 COMBINED AT +	CP6	.94	1	FLOW TIME	159. 3.58	158. 3.58	156. 3.58	153. 3.58	100. 3.58

EX

HIGHLIGHTED DENOTES
REFERENCED FLOWRATES

ROUTED TO +	RCP6	.94	1	FLOW TIME	157. 3.67	155. 3.67	153. 3.67	150. 3.67	99. 3.67
HYDROGRAPH AT +	*WL4A	.01	1	FLOW TIME	23. 3.50	23. 3.50	22. 3.50	21. 3.50	10. 3.50
HYDROGRAPH AT +	*ON1D	.02	1	FLOW TIME	42. 3.50	41. 3.50	40. 3.50	39. 3.50	18. 3.50
3 COMBINED AT +	CP7	.97	1	FLOW TIME	213. 3.58	211. 3.58	208. 3.58	202. 3.58	122. 3.58
ROUTED TO +	RCP7	.97	1	FLOW TIME	207. 3.67	204. 3.67	201. 3.67	197. 3.67	119. 3.67
HYDROGRAPH AT +	OFF5	.14	1	FLOW TIME	182. 3.67	179. 3.67	175. 3.67	169. 3.67	69. 3.67
2 COMBINED AT +	CP8	1.11	1	FLOW TIME	389. 3.67	383. 3.67	376. 3.67	366. 3.67	189. 3.67
ROUTED TO +	RCP8	1.11	1	FLOW TIME	387. 3.67	382. 3.67	375. 3.67	365. 3.67	187. 3.67
HYDROGRAPH AT +	OFF4	.06	1	FLOW TIME	82. 3.67	81. 3.67	80. 3.67	77. 3.67	32. 3.67
HYDROGRAPH AT +	*OFF3	.00	1	FLOW TIME	2. 3.50	2. 3.50	2. 3.50	2. 3.50	1. 3.50
HYDROGRAPH AT +	*D2	.02	1	FLOW TIME	24. 3.50	24. 3.50	23. 3.50	23. 3.50	9. 3.50
HYDROGRAPH AT +	*IOFF4	.01	1	FLOW TIME	9. 3.50	9. 3.50	9. 3.50	9. 3.50	3. 3.50
3 COMBINED AT +	*PARK	.02	1	FLOW TIME	36. 3.50	35. 3.50	34. 3.50	33. 3.50	13. 3.50
3 COMBINED AT +	CP3	1.20	1	FLOW TIME	491. 3.67	485. 3.67	475. 3.67	462. 3.67	227. 3.67
HYDROGRAPH AT +	XON5	.03	1	FLOW TIME	50. 3.50	49. 3.50	48. 3.50	46. 3.58	20. 3.58
2 COMBINED AT +	CP3a	1.23	1	FLOW TIME	535. 3.58	527. 3.58	517. 3.58	500. 3.58	241. 3.67
HYDROGRAPH AT +	OFF3	.15	1	FLOW TIME	189. 3.67	187. 3.67	183. 3.67	176. 3.67	71. 3.67
HYDROGRAPH AT +	XON4	.01	1	FLOW TIME	13. 3.58	13. 3.58	12. 3.58	12. 3.58	5. 3.58
2 COMBINED AT +	CP2a	.16	1	FLOW TIME	199. 3.67	196. 3.67	192. 3.67	185. 3.67	75. 3.67
ROUTED TO +	DBN	.16	1	FLOW TIME	167. 3.83	165. 3.83	162. 3.83	158. 3.83	66. 3.83
					** PEAK STAGES IN FEET **				
1					2805.80 3.83	2805.70 3.83	2805.56 3.83	2805.34 3.83	2802.31 3.83
HYDROGRAPH AT +	*WSPD3	.00	1	FLOW TIME	5. 3.50	5. 3.50	5. 3.50	5. 3.50	2. 3.50
HYDROGRAPH AT +	*WGC3	.04	1	FLOW TIME	89. 3.50	88. 3.50	86. 3.50	84. 3.50	42. 3.50
HYDROGRAPH AT +	XON3	.01	1	FLOW TIME	15. 3.58	14. 3.58	14. 3.58	14. 3.58	6. 3.58
5 COMBINED AT +	WC9a	1.44	1	FLOW TIME	765. 3.58	755. 3.58	741. 3.58	718. 3.58	322. 3.67
HYDROGRAPH AT +	*ON1-D	.03	1	FLOW TIME	47. 3.58	46. 3.58	45. 3.58	44. 3.58	20. 3.58
HYDROGRAPH AT +	*ON2-D	.03	1	FLOW TIME	45. 3.58	45. 3.58	44. 3.58	42. 3.58	18. 3.58
HYDROGRAPH AT +	*HOR	.02	1	FLOW TIME	30. 3.50	30. 3.50	29. 3.50	28. 3.50	14. 3.50

APPENDIX E

Clark County Dust Mitigation Plan



Department of Air Quality
4701 W. Russell Rd. Suite 200 2nd Floor
Las Vegas, NV 89118
Main Number: (702)455-5942
Fax Number: (702)383-9994

Dust Control Operating Permit (DCOP) For Construction Activities

This permit does not exempt the permittee from compliance with the Endangered Species Act

Permit #: 48592 - Revision #0
Permittee: Las Vegas Paving Corp
Project: Skye Canyon Detention Basin #2
Project Address: W Grand Teton Dr.
Cross Streets: W. Grand Teton Dr./N. Hualapai Way NW
Effective Date: 1/11/2018
Expiration Date: 1/11/2019
Revision Date:
Project Acreage: 48.6
Area: WNW - West/Northwest

Notes/Additional Permit Conditions

Onsite Project Manager:

Name: Michael McComb
Company: Las Vegas Paving Corp
Phone Number: 702.448.0298

Responsible Official:

Name: Troy Hildreth
Company: Las Vegas Paving Corp
Phone Number: 702.251.5800
Cell Number: 702.510.1278

Dust control measures must occur 24 hours a day, 7 days a week.

This permit is not valid until all fees are paid in full and a complete copy of the permit with conditions and the dust mitigation plan is posted on the project site.

It is a condition of the issuance of any operating permit required by the commission or pursuant to any local ordinance for the control of air pollution that the holder of the operating permit agrees to permit inspection of the premises to which the permit relates by any authorized officer of the department at any time during the holder's hours of operation without prior notice. This condition must be stated on each application form and operating permit. NRS 445B.580.

The issuance of this PERMIT does not relieve the PERMITTEE from compliance with all other applicable federal, state, county and local ordinances and regulations. Issuance of this PERMIT shall not be a defense to violations of any applicable ordinances or regulations.

48592 Sm

Dust Control Operating Permit (DCOP) Application Clark County Department of Air Quality				For DAQ Use Only	
NOTE: Demolition by implosion is not covered by this application -- use Implosion Operating Permit Application.				Invoice Number: <u>✓ 029084 MK</u>	
Application Type (Select One):		Applicant Type (Select One):		RECEIVED CC DAQ 2018 JAN 5 PM 12:18 <u>MK</u>	
☒ New ☐ Renewal ☐ Modification		☐ Property Owner ☐ Developer ☐ Easement Holder ☒ Contractor ☐ Government			
1. Responsible Official (Applicant) Information:					
Responsible Official Name:		Responsible Official Title:			
TROY HILDRETH		ENVIRONMENTAL MANAGER		LAS VEGAS PAVING CORP.	
Mailing and Email Address Information					
Number:	Direction:	Street:		Street Type:	Suite:
4420	S	DECATUR		BLVD	
City:	LAS VEGAS			State:	Zip:
				NV	89103
Email:	TROY.HILDRETH@LVPaving.COM			Primary Communication Method: ☒ Email ☐ US Postal	
Phone Numbers					
Office:	702-251-5800	Extension:		Cell:	702-510-1278
				Fax:	702-247-9436
2. Construction Site Superintendent or other designated On-site Representative:					
Name:		Title:		Company:	
MICHAEL MCCOMB		PROJECT MANAGER		LAS VEGAS PAVING CORP.	
Email:	MICHAEL.MCCOMB@LASVEGASPAVING.COM			Dust Card #:	DC52960
				Card Expires:	11/27/2020
Office:	702-251-5800	Extension:		Cell:	702-448-0298
				Fax:	702-247-9436
3. Project Information:					
Permit # (For new permit, enter NEW; otherwise, enter existing DCOP #):				NEW	
Project Name (same as signage):				SKYE CANYON DETENTION BASIN #2	
Project Description:				Project Attributes (check all that apply): ☐ Residential ☐ Commercial ☐ Government Facility ☐ Infrastructure Utilities ☒ Flood Control ☐ Airport ☐ Soil Remediation ☐ Structure Demolition ☐ Roadway ☐ Blasting	
CONSTRUCTION OF DETENTION BASIN #2 THERE IS APPROXIMATELY 450,000 CY OF CUT/FILL, A CONCRETE CHANNEL AND SPILLWAY, AND STORM DRAIN IN THE BASIN.					
Modification Acreage Added:		0			
Modification Acreage Removed:		0			
Project Modification Description:				Projects less than two weeks in duration may qualify for a sign waiver. Does the project qualify for a sign waiver request? ☐ Yes ☒ No Is a sign waiver requested for this project? ☐ Yes ☒ No	

Project Physical Location									
Number:		Direction:		Street:			Street Type:		Suite:
		W		GRAND TETON			DR		
City:	LAS VEGAS			State:	NV		Zip:	89166	
List major cross streets and the proximity to the intersection:									
2nd Cross Street:				1st Cross Street:				Proximity:	
W. GRAND TETON DR.				N. HUALAPAI WAY				NW	
4. Project Disturbed Surface Area:									
a. Project Disturbed Surface Area Information:									
Nonlinear Area Disturbed (Acreage in Tenths)									
(e.g., project site, stockpiles, staging areas, etc.)									
New/Current Total Project Acreage:			48.6		Proposed Total Project Acreage (new/renewal/Modifications):			48.6	
Linear Area Disturbed (Not Within Nonlinear Area)									
(e.g., new unpaved access roads, off-site that may include trenching for utilities, street development, road work, etc.)									
Enter number of linear segments:								0	
New/Current DCOP Maximum Linear Dimensions: (enter dimensions for new/renewal/modification DCOP)					Proposed DCOP Maximum Linear Dimensions: (enter dimensions for DCOP modification/renewal DCOP)				
Linear Length:		Length Unit of Measure:		Linear Width (feet):		Linear Length:		Length Unit of Measure:	
0		Feet		0		0		Feet	
New/Current Total Linear Project Acreage:			0		Proposed Total Linear Project Acreage:			0	
(1) Nonlinear Area Acreage Subtotal:		48.6		(2) Linear Area Acreage Subtotal:		0		Total Project Area Disturbed (1) + (2):	
						48.6		Modification Acreage Increase:	
								0	
b. Project Parcel. List a parcel number for the project. Particulate Emission Potential (PEP) will automatically be determined by the parcel number. If your project spans multiple parcel numbers, DAQ reserves the right to request the parcel number be changed to account for a higher soil PEP.						Parcel Number		Project PEP	
						12612101002		MODERATE HIGH	
If the project acreage is ten acres or more or if project trenching activities are one mile in length or more, a detailed supplement to the Dust Mitigation Plan must be submitted with this application in accordance with Section 94.5.5 of the Clark County Air Quality Regulations (AQRs) and Appendix B of the Construction Activities Dust Control Handbook.									
Project Map Must Be Attached to DCP Application									
5. Responsible Official (Applicant) Certification Statement. By signing this permit application, the signatory certifies the following:									
a. As the Responsible Official (applicant), I am authorized on behalf of the Owner Builder/Company/Organization (permittee) listed in Section 1 to apply for this Dust Control Operating Permit (DCOP) and to commit to all of the terms and conditions therein.									
b. Before disturbing soils on a parcel, enacting a grade change, constructing a structure and/or appurtenances, or installing, constructing, or modifying equipment that emits an air pollutant, you must contact and obtain all required permits from Clark County's Department of Comprehensive Planning, Building Department, Department of Air Quality (Title 30 Notice) and the municipality with jurisdiction.									
c. The permit issued in response to this application is not a substitute for obtaining the property owner's permission to use land associated with the project. Issuance of the DCOP is intended only for controlling the emission of air pollutants and assuring compliance with the AQRs. Clark County cannot be held liable for any unauthorized use of the land.									
d. If applying on behalf of the permittee listed in Section 1, the permittee shall be responsible for complying with requirements of this DCOP and the AQRs. Otherwise, the applicant listed in Section 1 shall be the responsible party.									
e. The permittee accepts responsibility for assuring that all contractors, subcontractors, and other persons on the construction site defined by this permit comply with the terms and conditions of the DCOP, the associated Dust Mitigation Plan and the AQRs.									
f. In accordance with the DCOP and the AQRs, the applicant and the permittee shall consent to inspection of the site during normal hours of operation by DAQ staff without prior notice to determine compliance with the terms and conditions of the DCOP and the AQRs.									

- g. If the project has 50 or more acres of actively disturbed soil, the permittee shall notify DAQ and identify the on-site Dust Control Monitor for the project(s). In addition, this notification requirement applies to the following circumstances:
- When the permittee has common control of multiple adjacent projects that individually have less than 50 acres of actively disturbed soil, but the combined project has 50 or more acres of actively disturbed soil; or
 - When the permittee has common control of multiple projects that are not adjacent, but are within a common master-planned community and have 50 or more acres of actively disturbed soil.
- The permittee shall notify DAQ using the current notification form, which is available on the DAQ website and at the front counter of the main office, before disturbing the soil. The Dust Control Monitor must be on-site at all times when construction activities occur and shall manage dust prevention and control on-site.

Applicant Certification

 Applicant's Signature	01/05/2018 Signature Date
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Advisories

- a. DCOP acreage fee is based on total project acreage of disturbed surface area (Item 4.a. of this application), which is rounded up to the next whole acre. If the project is less than 1 acre, a minimum of 1 acre shall apply to the project for fee purposes. All fees must be paid in full at the time of application; otherwise, the application cannot be accepted.
- b. Any payment made to the department in conjunction with this application may only be refunded to the permittee with the approval of the Board of County Commissioners. Approved refunds may not be issued to a preparer. Only the applicant or permittee may request a refund, which must contain written justification, a completed federal W-9 Form, a copy of the invoice/receipt, a completed Clark County Supplier Addition/Maintenance/Update form, and a copy of the cancelled check (front & back) . The Control Officer shall have sole discretion to approve/disapprove the request for refund approval.
- c. Stormwater Advisory: Be advised that all land disturbances that exceed 1 acre or are adjacent to a waterway must submit a "Notice of Intent" to the Nevada Division of Environmental Protection that certifies a Storm Water Pollution Prevention Plan has been developed and is maintained for the site. Contact NDEP at (775) 687-9429 for an application, information, and instructions.
- d. Payment : Invoice payments must be made by check, money order, or credit card. Checks and money orders must be made payable to **Clark County Air Quality or DAQ**. Credit card payment must be made in person at the DAQ main office.

Handwritten:
WNW/212
1.10.18



DUST MITIGATION PLAN

Permit # :			NEW
Project Name:	SKYE CANYON DETENTION BASIN #2		
Company (Permittee):	LAS VEGAS PAVING CORP.		
Total Project Area Disturbed:	48.6	Particulate Emission Potential (PEP):	MODERATE HIGH

If the project acreage is ten acres or more or if project trenching activities are one mile in length or more, a detailed supplement to the Dust Mitigation Plan must be submitted with this application in accordance with Section 94.5.5 of the Clark County Air Quality Regulations (AQRs) and Appendix B of the Construction Activities Dust Control Handbook.

Water Source (check all that apply)	Water Application Method (check all that apply)
☒ Hydrant with Jones Valve ☒ Stand Tanks ☐ Ponds ☐ Well ☐ Other (Describe Below): 	☐ Fire Hose ☒ Water Trucks/Pulls ☐ Other (Describe Below):

Project Activities:

The Dust Mitigation Plan applies to the following project activities: **Backfilling** (Filling area previously excavated or trenched); **Blasting - Abrasive** (Sandblasting and/or abrasive blasting); **Blasting Soil & Rock** (Explosive blasting of soil and rock); **Clearing & Grubbing** (Clearing and grubbing for site preparation and vacant land cleanup); **Clearing Forms, Foundations and Slabs** (Clearing and cleaning of forms, foundations and slabs prior to pouring concrete); **Crushing** (Crushing of construction and demolition debris, rock and soil); **Cut and/or Fill** (Cut and/or fill soils for site grade preparation); **Demolition - Mechanical/Manual** (Mechanical and manual demolition of walls, stucco, concrete, freestanding structures, buildings, load-bearing walls and/or removal of transit pipe); **Disturbed Soil** (Disturbed soil throughout project including between structures); **Disturbed Land - Long Term Stabilization** (Large tracts of disturbed land that will not have continuing activity for more than 30 days); **Dust Suppressants** (Selection and use of chemical and organic dust suppressing agents and other dust palliatives); **Importing/Exporting Materials** (Importing or exporting of soil, aggregate, decorative rock, debris, Type II and other bulk material); **Landscaping** (Installation of sod, decorative rock, desert or other landscape material); **Paving/Subgrade Preparation** (Subgrade preparation for paving streets, parking lots, etc.); **Sawing/Cutting Material** (Sawing or cutting materials such as concrete, asphalt, block or pipe); **Screening** (Screening of rock, soil or construction debris); **Staging Areas** (Staging areas, equipment storage, vehicle parking lots, and material storage areas); **Stockpiles** (Stockpiling of materials, such as Type II, other soils, rock or debris, for future use or export); **Trackout Prevention and Cleanup** (Prevention and cleanup of mud, silt and soil tracked out onto paved roads); **Traffic - Unpaved Routes and Parking** (Construction related traffic on unpaved interior and/or access roads and unpaved employee/worker parking areas); **Trenching** (Trenching with track or wheel mounted excavator, shovel, backhoe or trencher); and **Truck Loading** (Loading trucks with materials including construction and demolition debris, rock and soil).

This DCP Application and Dust Mitigation Plan does not include project activities related to **Demolition - Implosion** (Implosive demolition of a structure, using explosives).

Best Management Practices (BMPs) - Control Measures:

The permittee shall comply with all requirements of Section 94 of the AQRs, all requirements of the current *Clark County Dust Control Handbook*, and all provisions of the DCOP issued from this application.

For each project activity listed in this Dust Mitigation Plan, the permittee shall comply with the requirements for the associated BMPs in the *Dust Control Handbook*. Where options are listed for a BMP requirement, the permittee shall apply one or more of the control measures to comply with the requirement. The permittee will apply corresponding control measures for the PEP for the project soil type(s).

48592 MOD-O = 48.6

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M.18
10.18



Skye Canyon Detention Basin #2
Dust Map
48.6 Acres



A HM
1.10.18

Attention Heather Mackinnon

DUST MITIGATION PLAN FOR Skye Canyon Detention Basin #2

Prepared for:

Clark County Department
of Air Quality
4701 W. Russell Rd.
Las Vegas, NV 89118

Prepared By:

Las Vegas Paving Corp.
4420 S. Decatur Boulevard
Las Vegas, Nevada 89103

January 10, 2018

Tim Heath

A. Project Description

This project consist of the CONSTRUCTION OF DETENTION BASIN #2
THERE IS APPROXIMATELY 450,000 CY OF CUT/FILL, A CONCRETE
CHANNEL AND SPILLWAY, AND STORM DRAIN IN THE BASIN.

B. Development Plan

- Las Vegas Paving anticipates this project to continue for 12 months.

C. Estimated Proposed Expenditure

The costs for the miscellaneous products anticipated to be used on this project
are as follows:

Water Truck with Driver	\$110.00 per Hour
Water	\$3.00 per 1,000 gallons
Surfactant	\$5.50 per 1,000 gallons of water

For this project, Las Vegas Paving anticipates that the water truck,
operator, and water consumption will cost approximately \$249,228.00

D. Control Measures

All control measures are listed in the previous section.

E. Water Source Identification

Stand Tanks will be used to fill water trucks.



F. Soil Stabilization Measures

Las Vegas Paving plans on using water as our primary source of Dust Control. If
water is not effective alone, then a surfactant will be added to the water at a rate
of no less than 2 gallon per 4,000 gallons of water. Las Vegas Paving will keep
records of any surfactant used for this project.

G. Employee Dust Control Training and Compliance

Mr. Tony Haney the Project Super will supervise the activities for this project.
Mr. Haney will work closely with Mr. Troy Hildreth, Las Vegas Paving's
Environmental Department, if situations occur that conflicts with this mitigation
plan.

Best Management Practices (BMPs) & Control Measures

BMP 01

BACKFILLING

Definition: Filling area previously excavated or trenched.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize backfill material when not actively handling.

- 01-01 Water backfill material to maintain moisture or to form crust when not actively handling.
- 01-02 Apply and maintain a dust palliative to backfill material to form crust when not actively handling.
- 01-03 Cover or enclose backfill material when not actively handling.

Requirement: Stabilize backfill material during handling.

- 01-04 Empty loader bucket slowly and minimize drop height from loader bucket.
- 01-05 Dedicate water truck or large hose to backfilling equipment and apply water as needed.

Requirement: Stabilize backfill material during handling based on project soil type.

- 01-07 L & ML: Apply and mix water into the backfill material until optimum moisture is reached.
- 01-08 MH: Apply and mix water and tackifier solution into the backfill material until optimum moisture is reached.
- 01-09 H: Apply and mix water and surfactant solution into the backfill material until optimum moisture is reached.

Requirement: Stabilize soil at completion of backfilling activity.

- 01-10 Apply water and maintain disturbed soils in a stable condition until permanent stabilization is complete.
- 01-11 Apply and maintain a dust palliative on disturbed soils to form a crust following backfilling activity.

Requirement: Stabilize material while using pipe padder equipment.

- 01-12 Mix moist soil with dry soil until the optimum moisture is reached.
- 01-13 Dedicate water truck or large hose to equipment and apply water as needed.

Best Management Practices (BMPs) & Control Measures

BMP 02

BLASTING - ABRASIVE

Definition: Sandblasting and/or abrasive blasting.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize surface soils where support equipment and vehicles will operate.

- 02-01 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- 02-02 Apply and maintain a dust palliative on surface soils where support equipment and vehicles will operate.

Requirement: Limit visible emissions to no more than an average of 40% opacity for any period aggregating 3 minutes in any 60-minute period pursuant to Air Quality Regulations.

- 02-03 Hydro-blasting, using water as the propellant, must be conducted in a manner to maintain visible emissions within opacity standards.
- 02-04 Dry, unconfined blasting with abrasive material must use only those abrasives that are approved and certified by the California Air Resources Board (CARB) for such use (see Attachment 3: CARB-Approved Abrasives Information).

Requirement: Stabilize particulate matter in surrounding area following blasting.

- 02-05 Clean particulate material from surrounding area and water disturbed soils following blasting.
- 02-06 Apply and maintain a dust palliative to surrounding area following blasting.

Best Management Practices (BMPs) & Control Measures

BMP 03

BLASTING - SOIL & ROCK

Definition: Explosive blasting of soil and rock.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: A Blasting Supplemental form must be filled out, submitted and approved by the DAQEM prior to any blasting (see Appendix A: Dust Control Permit Supplemental Forms)

Requirement: No blasting within 1,500 feet of a residential area, occupied building or major roadway, when wind direction is toward these structures.

Requirement: Blasting shall be between the hours of 8:00 a.m. and 4:30 p.m., excluding Saturdays, Sundays and holidays unless prior permission is obtained from the Control Officer.

Requirement: No blasting allowed when the National Weather Service forecasts wind gusts above 25 miles per hour (mph).

- 03-01 Prior to setting explosive charges in holes, document current and predicted weather conditions as provided by the National Weather Service. If the current forecast is for wind gusts of 25 mph or greater or they are forecasted to be 25 mph or greater within the next 24 hours, do not charge any blast holes. When setting explosive charges, monitor weather reports for wind gusts of 25 mph or greater on the National Weather Service Radio and/or Internet sites. If wind gusts above 25 mph are stated, d

Requirement: Stabilize surface soils where drills, support equipment and vehicles will operate.

- 03-02 Pre-water and maintain surface soils in a stabilized condition where drills, support equipment and vehicles will operate.
- 03-03 Apply and maintain a dust palliative on surface soils where drills, support equipment and vehicles will operate.

Requirement: Stabilize soil during blast preparation activities.

- 03-04 Limit the blast footprint area to no larger than what can be practically stabilized immediately following the blast.
- 03-05 Maintain surface rock and vegetation where possible to reduce exposure of disturbed soil to wind.

Requirement: Stabilize soil during blast preparation activities based on project soil type.

- 03-06 L & ML: Presoak surface soils to depth of the caliche or bedrock with water using water trucks, water pulls, sprinklers or wobblers.
- 03-07 MH: Presoak surface soils to depth of the caliche or bedrock with water and tackifier mixture using water trucks, water pulls, sprinklers or wobblers.
- 03-08 H: Presoak surface soils to depth of the caliche or bedrock with water and surfactant mixture using water trucks, water pulls, sprinklers or wobblers.

Requirement: Stabilize soil after blasting.

- 03-09 Water disturbed soils to form crust immediately following blast and safety clearance.
- 03-10 Apply and maintain a dust palliative to form crust immediately following blast and safety clearance.

Best Management Practices (BMPs) & Control Measures

BMP 04

CLEARING & GRUBBING

Definition: Clearing and grubbing for site preparation and vacant land cleanup.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize surface soils where support equipment and vehicles will operate.

- 04-01 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- 04-02 Apply and maintain a dust palliative on surface soils where support equipment and vehicles will operate.

Requirement: Stabilize soil during clearing and grubbing activities.

- 04-03 L & ML: Apply water during clearing and grubbing activities.
- 04-04 MH: Apply water and tackifier mixture during clearing and grubbing activities.
- 04-05 H: Apply water and surfactant mixture during clearing and grubbing activities.

Requirement: Stabilize disturbed soil immediately after clearing and grubbing activities.

- 04-06 Water disturbed soils to form crust immediately following clearing and grubbing activities.
- 04-07 Apply and maintain a dust palliative on disturbed soils to form crust immediately following clearing and grubbing activities.

Best Management Practices (BMPs) & Control Measures

BMP 05

CLEARING FORMS, FOUNDATIONS AND SLABS

Definition: Clearing and cleaning of forms, foundations and slabs prior to pouring concrete.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Limit visible emissions to no more than an average of 20% opacity for any period aggregating 3 minutes in any 60-minute period pursuant to Air Quality Regulations.

05-01 Use single stage pours, unless prohibited by engineering design or building code, to minimize clearing.

Requirement: Limit visible emissions to no more than an average of 20% opacity for any period aggregating 3 minutes in any 60-minute period by complying with at least one of the additional control measures.

05-02 Use water spray to clear forms, foundations and slabs.

05-03 Use sweeping and water spray to clear forms, foundations and slabs.

05-04 Use industrial vacuum to clear forms, foundations and slabs prior to the use of high pressure air to blow soil and debris.

05-05 Use industrial vacuum to clear forms, foundations and slabs.

Best Management Practices (BMPs) & Control Measures

BMP 06

CRUSHING

Definition: Crushing of construction and demolition debris, rock and soil.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Obtain the appropriate Operating Permit for powered crushers prior to engaging in crushing activity. Comply with permit conditions.

Requirement: Stabilize surface soils where support equipment and vehicles will operate.

- 06-01 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- 06-02 Apply and maintain a dust palliative to surface soils where support equipment and vehicles will operate.

Requirement: Stabilize material before crushing.

- 06-03 Pre-water material prior to loading into crusher.
- 06-04 Test material to determine moisture content and silt loading, crush only material that is at optimum moisture content.

Requirement: Stabilize material during crushing.

- 06-05 Apply water to stabilize material so as to remain in compliance with opacity standards and permit conditions, during crushing.
- 06-06 Monitor emissions opacity. Make adjustments to remain in compliance with opacity standards and permit conditions.

Requirement: Stabilize material after crushing.

- 06-07 Water crushed material to form crust immediately following crushing.
- 06-08 Apply and maintain a dust palliative to crushed material.

Best Management Practices (BMPs) & Control Measures

BMP 07

CUT AND/OR FILL

Definition: Cut and/or fill soils for site grade preparation.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize surface soils where support equipment and vehicles will operate.

- 07-01 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- 07-02 Apply and maintain a dust palliative to surface soils where support equipment and vehicles will operate.

Requirement: Pre-water soils based on project soil type.

- 07-03 Dig a test hole to depth of cut or equipment penetration to determine if soils are moist at depth. Continue to pre-water if not moist to depth of cut.
- 07-04 L & ML: Pre-water with sprinklers or wobblers to allow time for penetration.
- 07-05 L & ML: Pre-water with water trucks or water pulls to allow time for penetration.
- 07-06 MH: Pre-water with a water and tackifier mixture using sprinklers or wobblers to allow time for penetration.
- 07-07 MH: Pre-water with a water and tackifier mixture using water trucks or water pulls to allow time for penetration.
- 07-08 H: Pre-water with a water and surfactant mixture using sprinklers or wobblers to allow time for penetration.
- 07-09 H: Pre-water with a water and surfactant mixture using water trucks or water pulls to allow time for penetration.

Requirement: Stabilize soil during cut activities.

- 07-10 Apply water, using water truck or water pull, to depth of cut prior to subsequent cuts.
- 07-11 No cut activities fill only.

Requirement: Stabilize soil after cut and fill activities.

- 07-12 Water disturbed soils to form crust following fill and compaction.
- 07-13 Apply and maintain a dust palliative on disturbed soils to form crust following fill and compaction.

Best Management Practices (BMPs) & Control Measures

BMP 08

DEMOLITION - IMPLOSION

Definition: Implosive demolition of a structure, using explosives.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: A Demolition Supplemental form (see Appendix A) and a Supplement To The Dust Mitigation Plan (see Appendix B) must be filled out, submitted and approved by the Control Officer prior to implosion.

Requirement: An asbestos survey must be conducted on any facility before demolition can commence.

Requirement: A complete Clark County NESHAP Notification form must be submitted to the DAQEM at least ten working days prior to demolition. The asbestos survey must be attached to this notification.

Requirement: All friable and non-friable asbestos containing material must be removed from the facility prior to implosion.

Requirement: Confine blasting to times when wind direction is away from closest residential areas, occupied buildings and major roadways.

Requirement: Implosion time must be pre-approved by the Control Officer.

Requirement: Monitor and document current weather conditions and weather predictions from National Weather Service.

- 08-01 Prior to setting explosive charges, obtain and document current and predicted weather conditions as provided by the National Weather Service. If wind advisory (over 20 miles per hour gusts or average wind speed of 10 miles per hour) is current or forecasted for blast period, do not set charges and do not blast. Maintain a calibrated anemometer and log ambient air velocity and direction within 1,000 feet of the implosion site, beginning at least 1 (one) hour prior to and 15 minutes after the impl

Requirement: Stabilize surface area where support equipment and vehicles will be operated.

- 08-02 Restrict support equipment and vehicles to existing paved and/or stable areas.
- 08-03 If paved and/or stable areas do not already exist, pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- 08-04 If paved and/or stable areas do not already exist, apply and maintain a dust palliative on surface soils where support equipment and vehicles will be operated.

Requirement: Stabilize demolition debris immediately following blast and safety clearance.

- 08-05 Apply water to debris immediately following blast and safety clearance.
- 08-06 Apply and maintain a dust palliative to debris immediately following blast and safety clearance.

Requirement: Stabilize and clean surrounding area immediately following blast and safety clearance.

- 08-07 Water all disturbed soil surfaces to establish crust and prevent wind erosion of soil.
- 08-08 Thoroughly clean blast debris from paved and other surfaces following blast and safety clearance.

Best Management Practices (BMPs) & Control Measures

BMP 09

DEMOLITION - MECHANICAL/MANUAL

Definition: Mechanical and manual demolition of walls, stucco, concrete, freestanding structures, buildings, load-bearing walls and/or removal of transit pipe

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: For renovation or demolition of a structure, a Demolition Supplemental form (see Appendix A) must be filled out, submitted and approved by the Control Officer prior to commencing demolition.

Requirement: An asbestos survey must be conducted on any facility or structure that is subject to NESHAP requirements before demolition can commence.

Requirement: A complete Clark County NESHAPS Notification form must be submitted to the DAQEM at least ten working days prior to demolition. The asbestos survey must be attached to this notification.

Requirement: Stabilize surface soils where support equipment and vehicles will operate.

09-01 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.

09-02 Apply and maintain a dust palliative to surface soils where support equipment and vehicles will operate.

09-03 Area where support equipment and vehicles will operate is completely covered with paving or concrete.

Requirement: Stabilize demolition debris during handling.

09-04 Apply water to demolition debris during handling.

Requirement: Stabilize debris following demolition.

09-05 Apply water to stabilize demolition debris.

09-06 Apply a dust palliative to stabilize demolition debris.

Requirement: Stabilize surrounding area following demolition.

09-07 Apply water to stabilize surrounding area following demolition.

09-08 Apply and maintain a dust palliative to stabilize surrounding area following demolition.

Best Management Practices (BMPs) & Control Measures

BMP 10

DISTURBED SOIL

Definition: Disturbed soil throughout project including between structures.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: For each non-linear project to be permitted for 5 acres or less; install perimeter wind barrier 3 feet or more in height made of material with a porosity of 50% or less.

Requirement: Limit vehicle traffic and disturbance of soils where possible.

- 10-01 Limit vehicle traffic and disturbance of soils with the use of fencing, barriers, barricades, and/or wind barriers.

Requirement: Stabilize and maintain stability of all disturbed soil throughout construction site.

- 10-02 Apply water to stabilize disturbed soils. Soils must be kept in a sufficiently damp, crusted or covered condition.
- 10-03 Apply and maintain a dust palliative based on soil type and future plans.

Requirement: Soil conditions, including preventive and corrective measures, must be recorded every day the construction project is active.

- 10-04 Record soil conditions and dust control actions in daily project records.

Best Management Practices (BMPs) & Control Measures

BMP 11

DISTURBED LAND - LONG TERM STABILIZATION

Definition: Large tracts of disturbed land that will not have continuing activity for more than 30 days.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize soil to meet standards required by Air Quality Regulation Section 90.

- 11-01 Apply and maintain a dust palliative on disturbed soils for long-term stabilization.
- 11-02 Stabilize disturbed soil with vegetation for long-term stabilization.
- 11-03 Pave or apply surface rock for long-term stabilization.
- 11-04 Use wind breaks in accordance with a site-specific plan approved by the Control Officer and Region IX Administrator of the EPA.
- 11-05 Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization.

Requirement: Prevent access to limit soil disturbance.

- 11-06 Prevent access by fencing, ditches, vegetation, berms or other suitable barrier or means approved by the Control Officer.

Best Management Practices (BMPs) & Control Measures

BMP 12

DUST SUPPRESSANTS - SELECTION AND USE

Definition: Selection and use of chemical and organic dust suppressing agents and other dust palliatives.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Follow CCHD "Interim Policy on Dust Palliatives Use In Clark County, Nevada".

Requirement: Record use of suppressants and dust palliatives and retain records.

Requirement: Follow applicable federal and state regulations.

Requirement: Select method of long-term stabilization taking into consideration future land use.

- 12-01 For traffic area applications use Table 1: Traffic Area Application Requirements, Appropriate Use of Liquid Dust Palliatives and Application Rates, from the Interim Policy on Dust Palliatives Use in Clark County, Nevada.
- 12-02 For non-traffic area applications use Table 2: Non-Traffic Area Application Requirements, Appropriate Use of Liquid Dust Palliatives and Application Rates, from the Interim Policy on Dust Palliatives Use in Clark County, Nevada.

Best Management Practices (BMPs) & Control Measures

BMP 13

IMPORTING/EXPORTING MATERIALS

Definition: Importing or exporting of soil, aggregate, decorative rock, debris, Type II and other bulk material.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Limit visible dust opacity from vehicular operations.

13-01 Apply water and limit vehicle speeds to 15 mph on the work site.

13-02 Apply and maintain dust suppressant on haul routes.

Requirement: Check belly-dump truck seals regularly and remove any trapped rocks to prevent spillage.

Requirement: Maintain 3-6 inches of freeboard to minimize spillage.

Requirement: Stabilize materials during transport on site.

13-03 Use tarps or other suitable enclosures on haul trucks.

13-04 Stabilize materials with water.

Requirement: Clean wheels and undercarriage of haul trucks prior to leaving construction site.

Best Management Practices (BMPs) & Control Measures

BMP 14

LANDSCAPING

Definition: Installation of sod, decorative rock, desert or other landscape material.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize soils, materials and slopes during handling.

- 14-01 L & ML: Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process.
- 14-02 MH: Apply a water and tackifier mixture prior to leveling or any other earth moving activity to keep the soil moist throughout the process.
- 14-03 H: Apply a water and surfactant mixture prior to leveling or any other earth moving activity to keep the soil moist throughout the process.

Requirement: Stabilize soils, materials and slopes at completion of activity.

- 14-04 Stabilize sloping surfaces using soil binders until vegetation or ground cover can effectively stabilize the slope.
- 14-05 Apply water and maintain sloping surfaces in a crusted condition.
- 14-06 Maintain effective cover over materials.

Best Management Practices (BMPs) & Control Measures

BMP 15

PAVING/SUBGRADE PREPARATION

Definition: Subgrade preparation for paving streets, parking lots, etc.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize soils prior to activities.

- 15-01 Pre-water subgrade surface until optimum moisture content is reached and maintained.

Requirement: Stabilize soils during activities.

- 15-02 Maintain at least 70% of optimum moisture content for Type II material while aggregate is being applied.

Requirement: Stabilize soils following activities.

- 15-03 Place tack coat on Type II aggregate base immediately after it is applied.
- 15-04 Apply water to Type II aggregate base immediately after it is applied.

Requirement: Stabilize adjacent disturbed soils following paving activities.

- 15-05 Stabilize adjacent disturbed soils following paving activities by crusting with water.
- 15-06 Stabilize adjacent disturbed soils following paving activities by applying a dust palliative.
- 15-07 Stabilize adjacent disturbed soils following paving activities with immediate landscaping activity or installation of vegetative or rock cover.
- 15-08 There are no soils adjacent to paving activities.

Best Management Practices (BMPs) & Control Measures

BMP 16

SAWING/CUTTING MATERIAL

Definition: Sawing or cutting materials such as concrete, asphalt, block or pipe.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Limit visible emissions to no more than an average of 20% opacity, pursuant to Air Quality Regulations.

16-01 Use water to control dust when cutting materials.

16-02 Use a vacuum to collect dust when cutting materials.

Best Management Practices (BMPs) & Control Measures

BMP 17

SCREENING

Definition: Screening of rock, soil or construction debris.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: If using a powered screen, obtain the appropriate Operating Permit for powered screens prior to engaging in screening activity. Comply with permit conditions.

Requirement: Drop material through the screen slowly and minimize drop height.

Requirement: Stabilize surface soils where support equipment and vehicles will operate.

- 17-01 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- 17-02 Apply and maintain a dust palliative on surface soils where support equipment and vehicles will operate.

Requirement: Pre-treat material prior to screening.

- 17-03 Apply sufficient water to obtain at least 70% optimum moisture in material prior to screening.
- 17-04 Apply a dust suppressant to material prior to screening.

Requirement: Stabilize material during screening.

- 17-05 Dedicate water truck or large hose to screening operation and apply water as needed to prevent dust.
- 17-06 Apply water to material as it is being dropped through the screen.
- 17-07 Install wind barrier upwind of screen as high as the screen drop point and made of material with a porosity of 50% or less.

Requirement: Stabilize material and surrounding area immediately after screening.

- 17-08 Apply water to stabilize screened material and surrounding area after screening.
- 17-09 Apply and maintain a dust palliative to stabilize screened material and surrounding area after screening.

Best Management Practices (BMPs) & Control Measures

BMP 18

STAGGING AREAS

Definition: Staging areas, equipment storage, vehicle parking lots, and material storage areas.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Limit visible dust opacity from vehicular operations.

- 18-01 Limit vehicle speeds to 15 mph in the staging area and on all unpaved access routes.
- 18-02 Apply and maintain dust suppressant on all vehicle traffic areas in the staging areas and unpaved access routes.

Requirement: Stabilize staging area soils during use.

- 18-03 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- 18-04 Apply and maintain a dust palliative to surface soils where support equipment and vehicles will be operated.

Requirement: Stabilize staging area soils at project completion.

- 18-05 Apply a dust palliative.
- 18-06 Apply screened or washed Type II aggregate.
- 18-07 Use wind breaks in accordance with a site-specific plan approved by the Control Officer and Region IX Administrator of the EPA.
- 18-08 Pave with thin paving.
- 18-09 Completed project will cover staging area with buildings, paving, and/or landscaping.
- 18-10 Apply water to form adequate crust and prevent access.

Best Management Practices (BMPs) & Control Measures

BMP 19

STOCKPILES

Definition: Stockpiling of materials, such as Type II, other soils, rock or debris, for future use or export.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: To the extent possible, maintain stockpile to avoid steep sides or faces.

Requirement: Stockpile location and height must be maintained pursuant to Air Quality Regulations. Stockpiles located within 100 yards of occupied buildings must not be constructed over 8 feet in height.

19-01 Stockpiles will not be constructed over 8 feet in height.

19-02 Stockpiles will be constructed over 8 feet high and must have a road bladed to the top to allow water truck access or must have a sprinkler irrigation system installed, used and maintained.

Requirement: Stabilize surface soils where support equipment and vehicles will operate.

19-03 Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.

19-04 Apply and maintain a dust palliative on surface soils where support equipment and vehicles will operate.

Requirement: Stabilize stockpile materials during handling.

19-05 Maintain stockpile materials with at least 70% optimum moisture content.

19-06 Remove material from the downwind side of the stockpile, when safe to do so.

Requirement: Stabilize stockpile materials during handling based on the project soil type.

19-07 L & ML: Apply water during stacking, loading and unloading operations.

19-08 MH: Apply a water and tackifier mixture during stacking, loading and unloading operations.

19-09 H: Apply a water and surfactant mixture during stacking, loading and unloading operations.

Requirement: Stabilize stockpiles at completion of activity.

19-10 Water stockpiles to form a crust immediately at the completion of activity.

19-11 Apply and maintain a dust palliative to all outer surfaces of the stockpiles.

19-12 Provide and maintain wind barriers on 3 sides of the pile, whose length is no less than equal to the length of the pile, whose distance from the pile is no more than twice the height of the pile, whose height is equal to the pile height, and made of material with a porosity of 50% or less.

19-13 Apply a cover or screen to stockpiles.

Best Management Practices (BMPs) & Control Measures

BMP 20

TRACKOUT PREVENTION AND CLEANUP

Definition: Prevention and cleanup of mud, silt and soil tracked out onto paved roads.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: In soils that have a PEP classification of “High”, pave construction activities roadways as early as possible.

Requirement: Use of soil to create a ramp for vehicle access over a curb is prohibited.

Requirement: Trackout conditions, including preventive and corrective measures, must be recorded daily for every day that the construction project access is used by vehicles.

20-01 Record soil conditions and dust control actions in daily project records.

Requirement: Prevent dust from trackout.

20-02 Immediately clean trackout from paved surfaces to maintain dust control. Trackout must not extend 50 feet or more.

20-03 Maintain dust control during working hours and clean trackout from paved surfaces at the end of the work shift/day. Trackout must not extend 50 feet or more and must be cleaned daily, at minimum.

Requirement: Install and maintain trackout control devices in effective condition at all access points where paved and unpaved access or travel routes intersect.

20-04 Install gravel pad(s) consisting of 1” to 3” rough diameter, clean, wellgraded gravel or crushed rock. Minimum dimensions must be 30 feet wide by 3 inches deep, and, at minimum, 50’ or the length of the longest haul truck, whichever is greater. Re-screen, wash or apply additional rock in gravel pad to maintain effectiveness.

20-05 Install wheel shakers. Clean wheel shakers on a regular basis to maintain effectiveness.

20-06 Install wheel washers. Maintain wheel washers on a regular basis to maintain effectiveness.

20-07 Install wheel shakers in the event that trackout cannot be controlled with gravel pads.

20-08 Install wheel washer in the event that trackout cannot be controlled with gravel pads and wheel shakers.

20-09 Motorized vehicles will only operate on paved surfaces.

Requirement: All exiting traffic must be routed over selected trackout control device(s).

20-10 Clearly establish and enforce traffic patterns to route traffic over selected trackout control device(s).

20-11 Limit site accessibility to routes with trackout control devices in place by installing effective barriers on unprotected routes.

Best Management Practices (BMPs) & Control Measures

BMP 21

TRAFFIC - UNPAVED ROUTES AND PARKING

Definition: Construction related traffic on unpaved interior and/or access roads and unpaved employee/worker parking areas.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Limit visible dust opacity from vehicular operations.

21-01 Limit vehicle speeds to 15 mph on all unpaved routes and parking areas.

21-02 Apply and maintain dust palliative on all vehicle travel areas.

Requirement: Stabilize all haul routes.

21-03 Apply water to haul routes and maintain in a stabilized condition.

21-04 Apply a dust palliative to haul routes and maintain in a stabilized condition.

21-05 Apply gravel to haul routes and maintain in a stabilized condition.

21-06 Supplement dust palliative or aggregate applications with watering, if necessary.

Requirement: Stabilize all off-road and parking areas.

21-07 Apply water to off-road traffic and parking areas and maintain in a stabilized condition.

21-08 Apply gravel to off-road traffic and parking areas and maintain in a stabilized condition.

21-09 Apply recycled asphalt (or other suitable material) to off-road traffic and parking areas and maintain in a stabilized condition.

21-10 Apply and maintain a dust palliative (designed for vehicle traffic) to off-road traffic and parking areas and maintain in a stabilized condition.

Best Management Practices (BMPs) & Control Measures

BMP 22

TRENCHING

Definition: Trenching with track or wheel mounted excavator, shovel, backhoe or trencher.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Stabilize surface soils where trenching equipment, support equipment and vehicles will operate.

- 22-01 Pre-water and maintain surface soils in a stabilized condition where trenching equipment, support equipment and vehicles will operate.
- 22-02 Apply and maintain a dust palliative to surface soils where trenching equipment, support equipment and vehicles will operate.

Requirement: Presoak soils prior to trenching activities based on the project soil type.

- 22-03 Pre-water surface, pre-trench to 18" depth, soak soils via pre-trench prior to deep trenching.
- 22-04 L & ML: Presoak soil with water using sprinklers or wobblers.
- 22-05 L & ML: Presoak with water, using water truck and/or water pull.
- 22-06 MH: Presoak soil with a water and tackifier mixture using water pulls and/or water trucks.
- 22-07 MH: Presoak soil with a water and tackifier mixture using sprinklers or wobblers.
- 22-08 H: Presoak soil with a water and surfactant mixture using water pulls and/or water trucks.
- 22-09 H: Presoak soil with a water and surfactant mixture using sprinklers or wobblers.

Requirement: Stabilize soil during trenching activities based on the project soil type.

- 22-10 L & ML: Complete trenching with a dedicated water truck or large hose maintaining water as needed to prevent dust.
- 22-11 L & ML: Use spray nozzles mounted on trenching machine.
- 22-12 MH: Complete trenching with a dedicated water truck or large hose maintaining a water and tackifier mixture as needed to prevent dust.
- 22-13 H: Complete trenching with a dedicated water truck or large hose maintaining a water and surfactant mixture as needed to prevent dust.

Requirement: Stabilize soils at the completion of trenching activities.

- 22-14 Use water to form crust on excavated soil windrow as it is formed.
- 22-15 Use dust palliative to form crust on excavated soil windrow as it is formed.

Best Management Practices (BMPs) & Control Measures

BMP 23

TRUCK LOADING

Definition: Loading trucks with materials including construction and demolition debris, rock and soil.

PEP/Soil Type: L (Low), ML (Moderate Low), MH (Moderate High) & H (High).

The permittee shall comply with all applicable requirements for activities performed pursuant to this Dust Control Operating Permit (DCOP). If a requirement has control measures listed, permittee shall comply with one or more of the control measures. If control measures for the requirement are contingent on the project PEP/Soil Type, permittee shall comply with one or more of the control measure for the designated PEP/Soil Type.

Requirement: Ensure all loads are covered prior to leaving the construction site and traveling on public roadways.

Requirement: Stabilize surface soils where loaders, support equipment and vehicles will operate.

- 23-01 Pre-water and maintain surface soils in a stabilized condition where loaders, support equipment and vehicles will operate.
- 23-02 Apply and maintain a dust palliative on surface soils where loaders, support equipment and vehicles will operate.

Requirement: Stabilize material during loading.

- 23-03 Empty loader bucket slowly and keep loader bucket close to the truck to minimize the drop height while dumping.

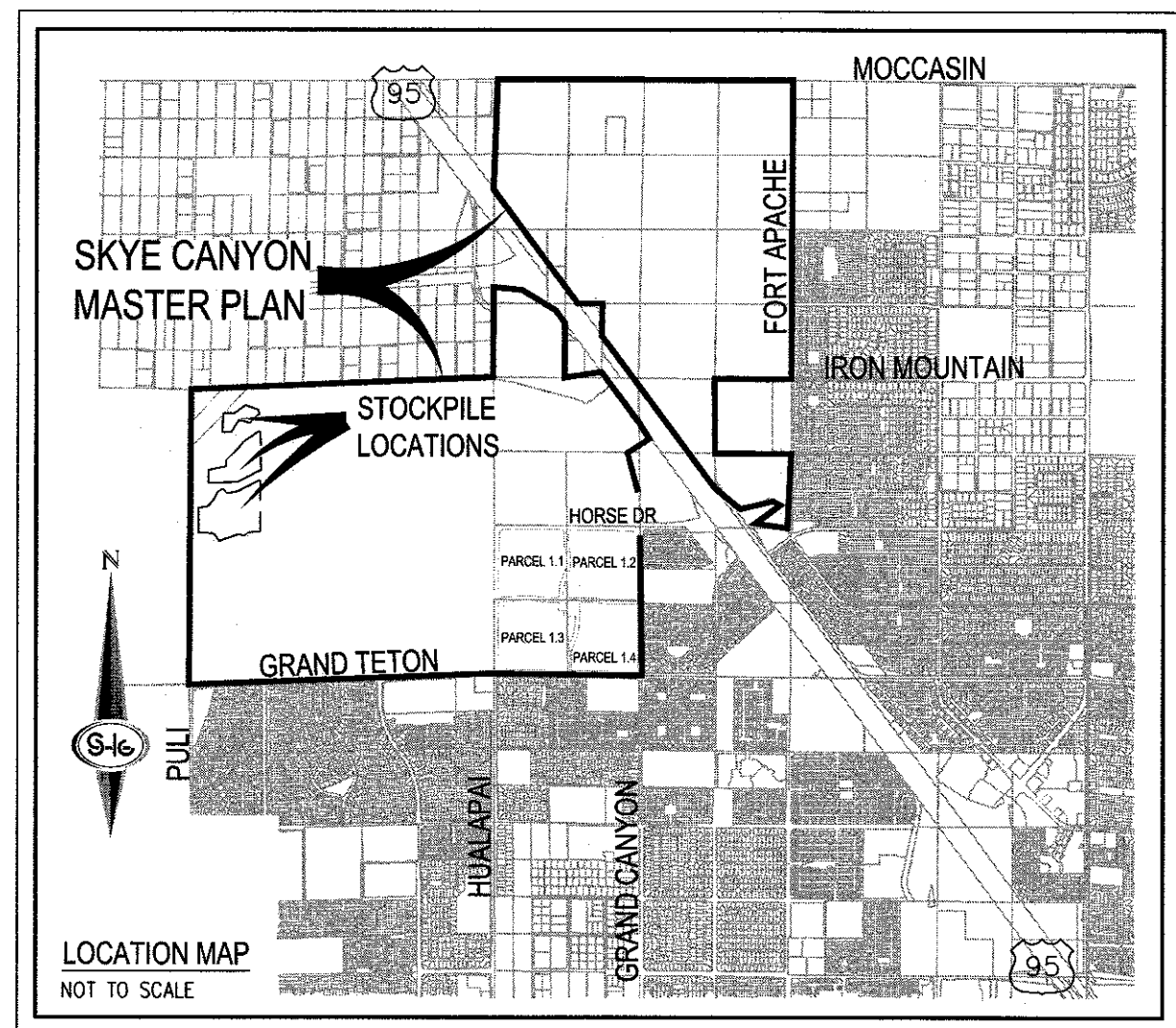
Requirement: Stabilize material during loading based on the project soil type.

- 23-04 L & ML: Mix material with water prior to loading.
- 23-05 L & ML: Spray material with water while loading.
- 23-06 MH: Mix material with a water and tackifier mixture prior to loading.
- 23-07 MH: Spray material with a water and tackifier mixture while loading.
- 23-08 H: Mix material with a water and surfactant mixture prior to loading.
- 23-09 H: Spray material with a water and surfactant mixture while loading.

APPENDIX F

Stockpile Plan

SKYE CANYON STOCKPILE PERMIT PLAN
FOR
NINETY-FIVE MANAGEMENT LLC



SHEET INDEX		
NO.	SHEET	TITLE
1	C-1	COVER SHEET
2	S-1	STOCKPILE PLAN
3	S-2	SECTIONS

OWNER	DEVELOPER
SECTION 12 LLC C/O OLYMPIA COMPANIES 11411 SOUTHERN HIGHLANDS PARKWAY, SUITE 300 LAS VEGAS, NV 89141 PHONE: (702) 220-6565 FAX: (702) 284-5399	NINETY-FIVE MANAGEMENT LLC C/O OLYMPIA COMPANIES, LLC 11411 SOUTHERN HIGHLANDS PARKWAY, SUITE 300 LAS VEGAS, NV 89141 PHONE: (702) 220-6565 FAX: (702) 220-6566
ENGINEER	
SLATER HANFAN GROUP 5740 S. ARVILLE STREET #216 LAS VEGAS, NV 89118-3071 PHONE: (702) 284-5300 FAX: (702) 284-5399	

APN'S:
126-12-101-002
LEGAL DESCRIPTION
BEING A PORTION OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 12, TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

EARTHWORK QUANTITIES
STOCKPILE #1 (19.40 AC) = 125,000 CY STOCKPILE #2 (10.82 AC) = 161,500 CY STOCKPILE #3 (3.84 AC) = 27,500 CY TOTAL FILL = 314,000 CY

FLOOD ZONE
THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1750E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD.

DUST MITIGATION NOTE
STOCKPILE TO COMPLY WITH THE APPROVED DUST MITIGATION PLAN#

NOTES:
1. STOCK PILE MATERIALS SHALL CONSIST OF CLEAN EARTH FILL UNLESS OTHERWISE APPROVED BY THE CITY OF LAS VEGAS. 2. STOCKPILES WITH HEIGHT OVER 4 FT MUST BE PROVIDED WITH A TEMPORARY FENCING.

APPROVALS
CITY ENGINEER-DAVID BOWERS PE, P10E #16736 DATE APPROVAL OF THESE PLANS IS LIMITED TO STOCKPILING ONLY
CHRIS KNIGHT, DIRECTOR BUILDING AND SAFETY DATE THESE PLANS MEET THE APPLICABLE STANDARDS OF THE PLANNING AND DEVELOPMENT DEPARTMENT.

DRAINAGE COMPLIANCE
I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY (SSAB13) ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT. JERRY J. SLATER, P.E. 14167 DATE



SLATER
HANFAN
GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

CITY OF LAS VEGAS

NINETY-FIVE MANAGEMENT

SKYE CANYON STOCKPILE PERMIT PLAN

COVER

DATE: 12/12/17

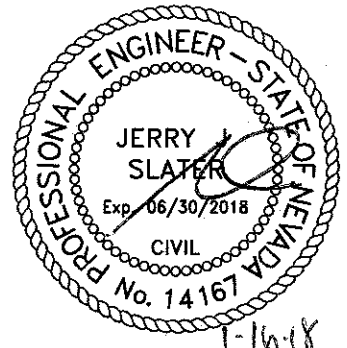
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DESIGNER: BCC

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PROJECT NO.

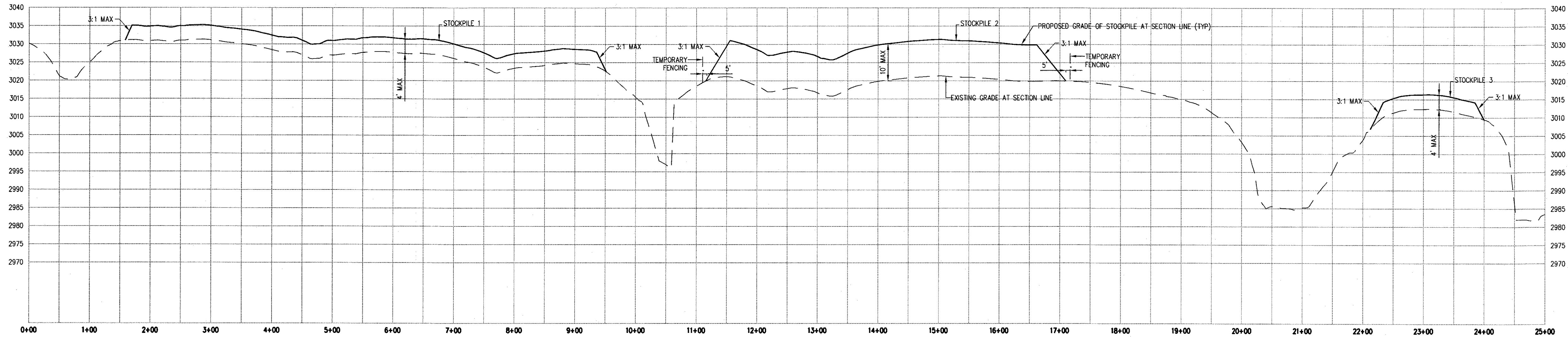
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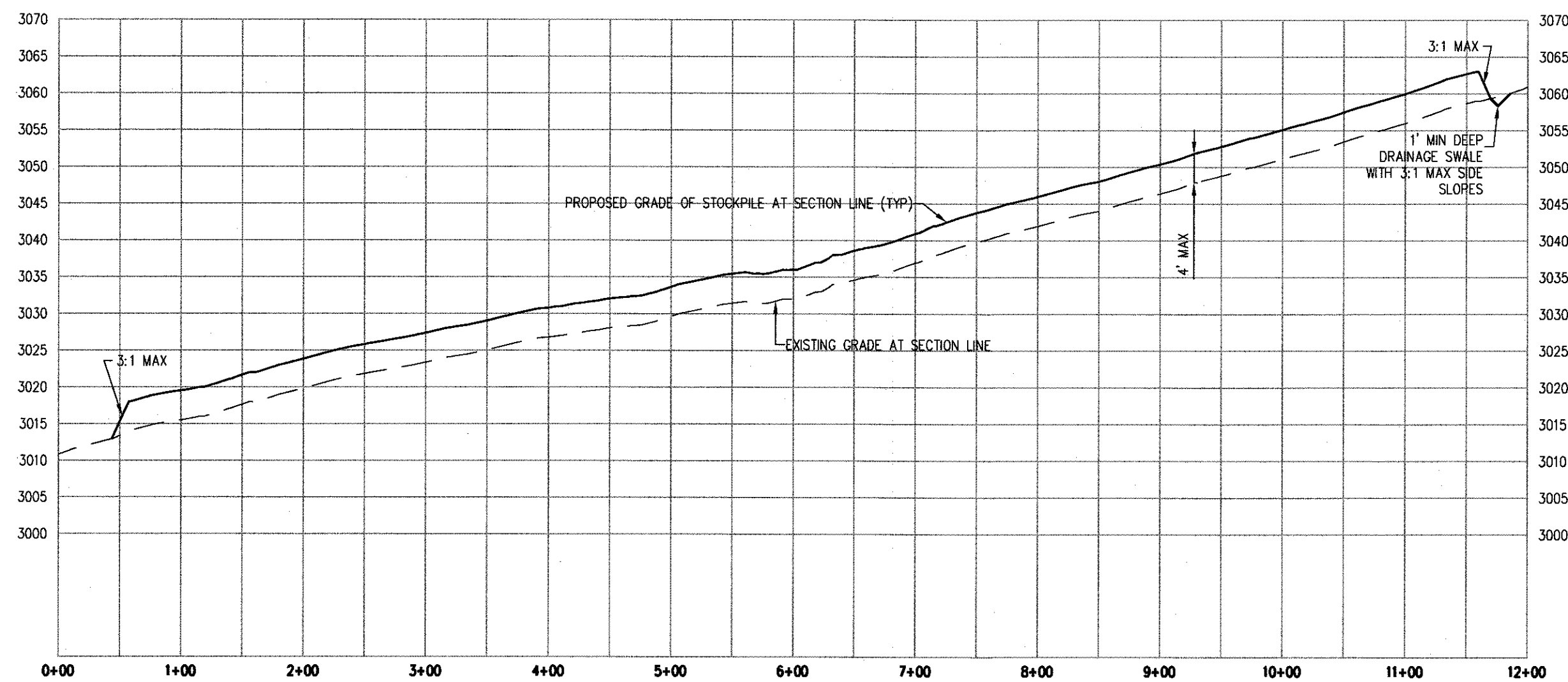
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SHEET 1 OF 3

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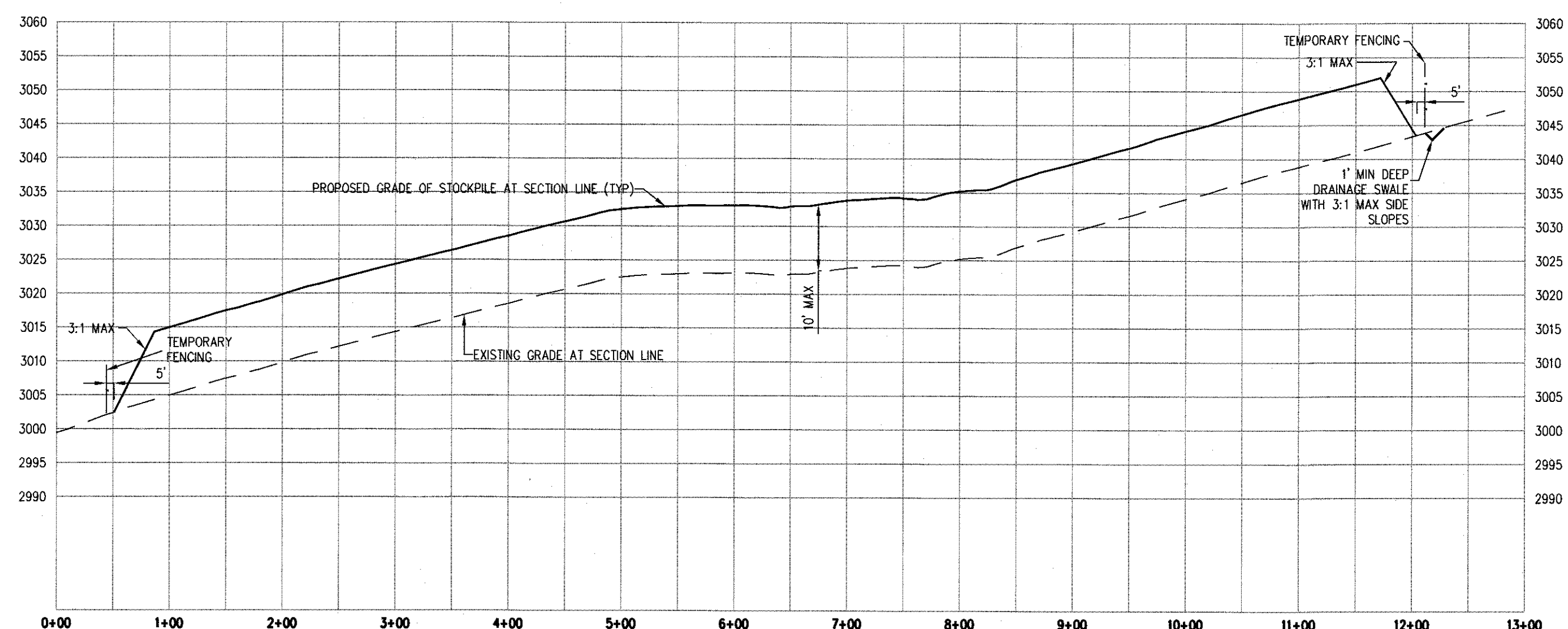
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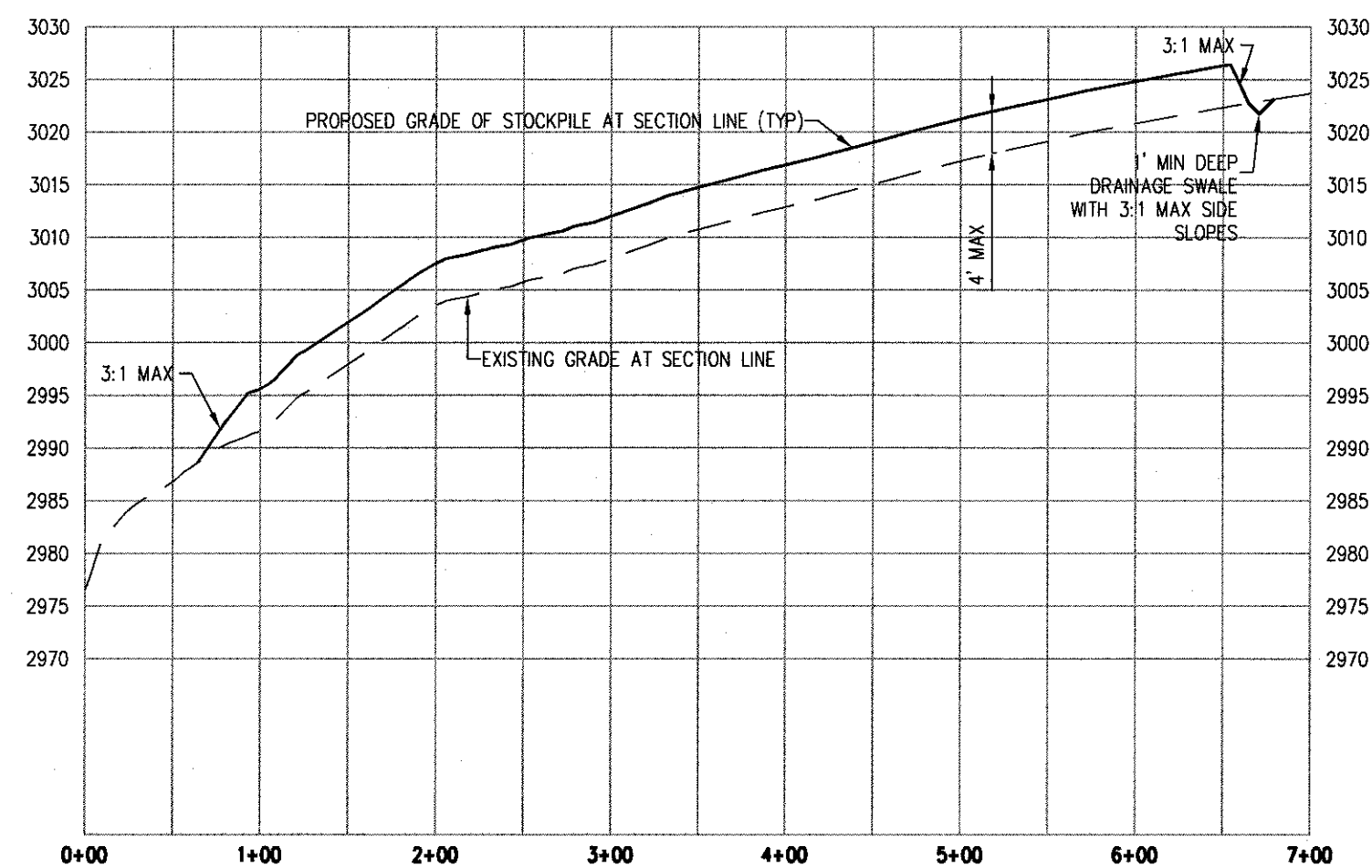
SECTION A
HORZ: 1" = 100'
VERT: 1" = 5'



SECTION B
STOCKPILE 1
HORZ: 1" = 100'
VERT: 1" = 5'



SECTION C
STOCKPILE 2
HORZ: 1" = 100'
VERT: 1" = 5'



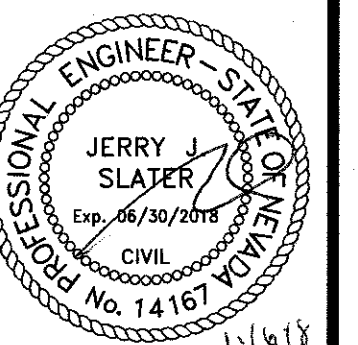
SECTION D
STOCKPILE 3
HORZ: 1" = 100'
VERT: 1" = 5'

CITY ENGINEER-DAVID BOWERS PE, PTOE #16736 DATE
APPROVAL OF THESE PLANS IS LIMITED TO STOCKPILING ONLY
DIRECTOR OF BUILDING & SAFETY-CHRIS KNIGHT DATE
THESE PLANS MEET THE APPLICABLE STANDARDS OF THE PLANNING AND DEVELOPMENT DEPARTMENT.

NO.	DESCRIPTION	DATE	BY	APP.

CITY OF LAS VEGAS
NINETY-FIVE MANAGEMENT
SKYE CANYON STOCKPILE PERMIT PLAN
SECTIONS

DATE: 12/12/17
DRAFTER: BCC
DESIGNER: BCC
CHECKED: LL
PROJECT NO.
OLY1505-000



APPENDIX G

Electronic Files