

DS #:

4984

APN:

126-12-710-002

PROJECT:

Skye Canyon Parcel 2.14

SUBMITTAL:

1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		May 14, 2018 
TO: Land Development Services Department of Building & Safety		FROM: Jennifer Shinn Flood Control Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:	
	Skye Canyon Parcel 2.14	
Cross Streets:	NWC of Eagle Canyon & Skye Village	
File Number:	F:\Depot\DSMemos\DS4984A.doc	
Parcel Number:	126-12-710-002	
Zoning Action:	TMP-72766	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES X	NO
COPIES TO:		
		Slater-Hanifan Group, Inc.
		Ninety-Five Management, LLC
		Bart Anderson, P.E., DevCo

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	4/26/2018	5/10/2018	See Comments Below	\$400.00	495305: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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

	is approved subject to conformance to all City standards and the following conditions:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

- The site is 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.
- Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
- All roadway and flood control facilities as proposed and approved in Skye Canyon Phase 2 Infrastructures must be substantially constructed prior to the issuance of occupancy permits.
- It appears that flows impacting the southeastern corner of the site (at SDDI #1) will overtop the roll curb to the south before the drop inlet is able to capture all the flow as calculated. Review and revise the grading in this area to direct the flows back towards the proposed drop inlet.
- Review and revise the Finish Floor Check Table to ensure the correct high side TC elevations are used—specifically for Lots 14, 21, 35, 50, 55, 56, and 59.
- Revise the footnotes for the Specific Energy Check Table to match the correct superscript notations.
- The proposed storm drain shall be labeled as private and privately maintained.

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

jks

T/R/S: T19S/R59E/12

AREA F-12

TECHNICAL DRAINAGE STUDY

Skye Canyon II Parcel 2.14

City of Las Vegas, Nevada

Job No.: OLY1719.000

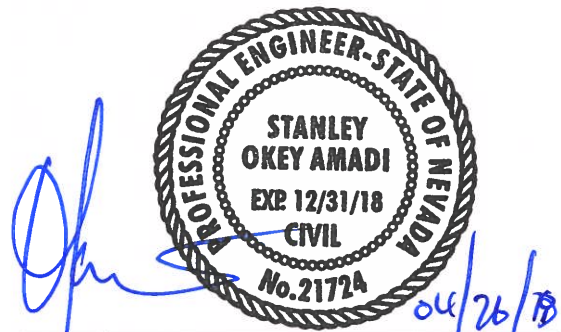
Date: April 2018

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



Stanley Okey Amadi, P.E.
NV Professional Engineer No. 21724

Assisted by: Cameron Bencini, P.E.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Skye Canyon II Parcel 2.14 Date: April 2018
Location of Development: a) Descriptive (Cross Streets): North/South: Skye Village Road
East/West: Eagle Canyon Avenue
b) Section: 12 Township: 19 South Range: 59 East
c) APN: 126-12-710-002

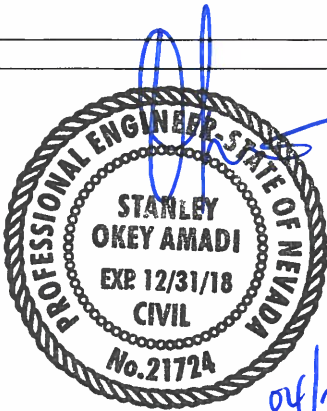
Name of Owner/Developer: KAG Development West, LLC / Ninety-Five Management, LLC
Telephone No.: 702-220-6565 Fax No.: 702-220-6566 E-mail Address: mbolduc@olympiacompanies.com
Address: 11411 Southern Highlands Parkway, Suite 300; Las Vegas, NV 89141

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

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 12.25 Acres Being Developed/Disturbed: 12.25 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.): Single-Family Residential
5. Approximate upstream land area which drains to the subject site: 0 acre +/-
6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation: Master Drainage Study for Skye Canyon (SHG, DS4420),
Technical Drainage Study for Skye Canyon Phase 2 Infrastructure (SHG, DS4739) & TDS Updates 1 thru 4
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Drains to local storm drain that discharges to the trunkline in Eagle Canyon Avenue.
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**

Local Entity File No.	Revision	Date

REFERENCE: **SHG Job No. OLY1501.001**

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Skye Canyon II Parcel 2.14		Map ID:
Firm Name: Slater Hanifan Group (SHG)		
Address: 5740 S. Arville St., Suite 216		
City: Las Vegas	State: Nevada	Zip: 89118
Phone Number: 702-284-5300	Fax Number: 702-284-5399	
Property KAG Development West, LLC / Ninety-Five Management, 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	No	
X		Design Manual Standard Form 1 with the engineer's seal and signature.
X		Design Manual Standard Form 4 .
X		2 copies of the 24" x 36" Drainage Plan.
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.
Reference:		STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS

Yes	No	
☒	☐	A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
☒	☐	A copy of the current CCRFCD Master Plan Update Figure, (F-12), for Flood Control Facilities and Environmental areas with the site delineated.
☒	☐	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.
☒	☐	Vicinity Map with local and major cross streets identified and a north arrow.
☒	☐	Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.

III. DRAINAGE PLAN

Yes	No	
☒	☐	Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
☒	☐	Minimum scale: 1" = 60'.
☒	☐	Project name.
☒	☐	Vicinity Map with local and major cross streets.
☒	☐	Revision box.
☒	☐	North arrow and bar scale.
☒	☐	Engineer's/consultant's address and phone number.
☒	☐	Elevation datum and benchmark.
☒	☐	Legend for symbols and abbreviations.
☒	☐	Cut/fill scarps, where applicable.
☒	☐	Street names, grades, widths.
☒	☐	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.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
X		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
X		Proposed typical street sections.
	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.
X		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.
X		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"x48". 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.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		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.
X		Building and/or lot numbers.
	N/A	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
	N/A	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.
	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.
X		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.
X		Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.

IV. HYDROLOGIC ANALYSIS

Yes	No	
X		Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
	N/A	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 storm water flows showing basin area, Q ₁₀ and Q ₁₀₀ for both individual basins and combined basin flows, where acceptable.
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.

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.
X		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.
X		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.
X		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, which ever 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.
X		Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X		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.
X		The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.

REFERENCE:

STANDARD FORM 2



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.)
x		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. _____ 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.
X	-	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	
X	-	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.
x	-	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.
X	-	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.
x	-	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.

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LIST OF APPENDICES

Appendix A Drainage Exhibits

- Exhibit A – Location Map
- Exhibit B – FEMA FIRM Map
- Exhibit C – CCRFCD 2013 MPU Facilities Map
- Exhibit D – Soils Map
- Exhibit E – Developed Condition Drainage Map

Appendix B Hydrologic Data

- Precipitation
- Curve Number
- Standard Form 4
- Developed Condition HEC-1 Analysis

Appendix C Hydraulic Computations

- Street Flow Computations
- Easement Analysis
- Drop Inlet Computations
- WSPG Model – P6-L2

Appendix D Finished Floor Analysis

Appendix E Reference Material

Technical Drainage Study for Skye Canyon – Phase 2 Infrastructure, by SHG

- Approval Letters
- Drainage Exhibits
- Drop Inlets
- Street Flow Computations
- WSPG Storm Drain Models
- Pertinent Improvement Plan Sheets

Appendix F Reference Material

Technical Drainage Study for Skye Canyon – Phase 1 Infrastructure, by SHG

- Approval Letters
- Drainage Exhibits
- HEC-1 Model
- Pertinent Improvement Plan Sheets

Appendix G Reference Material

Master Drainage Study for Skye Canyon – Update No.3, by SHG

- Approval Letter
- Master Land Use Plan

Appendix H CD of Electronic Files and Improvement Plans

1 INTRODUCTION

1.1 Project Overview & Study Purpose

Ninety-Five Management, LLC is proposing a single-family residential development, identified as *Skye Canyon II Parcel 2.14*, within the city limits of Las Vegas, Nevada. The proposed development is approximately ±12.5 acres in area and located at the northwest corner of the intersection of Eagle Canyon Avenue and Skye Village Road.

The proposed development is located within the master planned Skye Canyon property and specifically in the Phase 2 area supported by the *Technical Drainage Study for Skye Canyon – Phase 2 Infrastructure* (DS4739). All roadways and perimeter drainage infrastructure required for development of Parcel 2.14 has been technically addressed in the Phase 2 Infrastructure drainage study. Parcel 2.14 proposes utilization of drainage facilities provided by the Phase 2 Infrastructure. It is the objective of this study to show conformance to the drainage patterns established by the Phase 2 Infrastructure drainage study.

Additionally, the 1,662 acre Skye Canyon property has been master planned and the most recent *Update to the Master Drainage Study for Skye Canyon* (DS4420) has been approved by the City of Las Vegas on August 15, 2016. Parcel 2.14 has been proposed within the framework set forth in the Master Drainage Study.

1.2 Description of Improvements

The project is located within Township 19 South, Range 59 East and Section 12, generally within a portion of APN 126-12-710-002. Parcel 2.14 is bound by Eagle Canyon Avenue to the south, Parcel 2.15 to the west, Skye Canyon Park and Clubhouse to the north, and Skye Village Road to the east. A location map identifying the site in relation to major streets in the vicinity has been prepared as Exhibit A, included in Appendix A.

The project consists of construction of single-family residential lots averaging 6,000 ft² in area and all associated interior roadways. The typical onsite roadway is to be proposed as a 49-ft wide private street with modified roll curb. The adjacent perimeter roadways are to be installed by separate Phase 2 Infrastructure improvements and Phase 1 Infrastructure and are considered existing for development of Parcel 2.14.

Drainage improvements necessary to control storm runoff and satisfy local drainage criteria onsite have been proposed by Parcel 2.14. The proposed drainage improvements are intended to connect into the existing Phase 2 Infrastructure facilities.

1.3 FEMA Flood Zone Designation

The Parcel 2.14 site boundary has been delineated on current FEMA FIRM Panel Map 32003C1750E, dated September 27, 2002, as Exhibit B included in Appendix A. Per the FIRM Panel, the project site is located within a FEMA designated unshaded Zone 'X', defined as areas outside the 0.2% (500-year) annual chance floodplain. An unshaded Zone 'X' is located outside a FEMA designated Special Flood Hazard Area (SFHA).

1.4 CCRFCD Facility Information

The project site has been delineated on the current 2013 Clark County Regional Flood Control District (CCRFCD) Las Vegas Valley Flood Control Master Plan Update (2013 MPU, Reference 1) facility figure as Exhibit C, included in Appendix A. Per the 2013 MPU, two (2) CCRFCD regional facility alignments are considered pertinent to Parcel 2.14. The following is a summary of the pertinent regional facility alignments, per the 2013 MPU, addressed by this study:

- CNKC 0050 within Eagle Canyon Avenue. This facility is proposed as a part of the Phase 1 Infrastructure improvements as a 72-inch RCP and an 8-ft by 6-ft RCA downstream of the Parcel 2.14 project site. The Phase 2 Infrastructure improvements have established a tie in and acceptable flows to this regional facility. Stubs have been provided by the Phase 2 Infrastructure improvements for adjacent parcels and the Parcel 2.14 site utilizes an existing stub as a discharge location.

1.5 Referenced Documents

The following documents have been utilized as reference materials in the preparation of this drainage study. The referenced documents have been reviewed and determined acceptable for reference. Slater Hanifan Group concurs with all referenced and adopted hydrologic and hydraulic analyses from the studies and the results established therein.

1. *Technical Drainage Study for Skye Canyon – Phase 2 Infrastructure*, prepared by Slater Hanifan Group (hereinafter referred to as the Phase 2 Infrastructure Study, Reference 4), has technically designed the adjacent perimeter roadways and associated drainage infrastructure utilized by Parcel 2.14. The Phase 2 Infrastructure Study has been referenced to show Parcel 2.14 development conformance to the drainage patterns for the perimeter infrastructure in order to prove that development is in accordance with the master plan for the area. The following specific items have been referenced from the Phase 2 Infrastructure Study and included in Appendix E:
 - The Phase 2 Infrastructure interim condition functions as Parcel 2.14's existing drainage condition.
 - Hydraulic modeling of the lateral and Eagle Canyon Avenue storm drain for utilization in the proposed Parcel 2.14 storm drain design
 - Offsite flow impacts from the adjacent perimeter roadways.
2. *Technical Drainage Study for Skye Canyon – Phase 1 Infrastructure*, prepared by Slater Hanifan Group (hereinafter referred to as the Phase 1 Infrastructure Study, Reference 5), has technically designed the adjacent perimeter roadway Skye Village Road. Items referenced from the Phase 1 Infrastructure Study are included in Appendix F:
3. *Master Drainage Study for Skye Canyon*, prepared by Slater Hanifan Group (hereinafter referred to as the SHG Master Study, Reference 6), had conceptually master planned the drainage improvements required for the current land plan on the property. The referenced Phase 2 Infrastructure improvements were shown to be in conformance with the master drainage patterns per the SHG Master Study. Therefore, if this study shows Parcel 2.14 is in conformance with drainage patterns presented in the Phase 2 Infrastructure Study, then it is surmised that it is also in conformance with the SHG

Master Study. As a result, no reference computations from the SHG Master Study is considered necessary in preparation of this Parcel 2.14 technical study since the materials were already adopted by the Phase 2 Infrastructure Study. However, materials from the most recent Update #3 to the SHG Master Study have been provided in Appendix G for informational purposes.

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

Modeling:

The SCS Unit Hydrograph Method (SCS Method) was utilized to determine peak flow rates. The SCS Method utilizes precipitation, drainage area, curve number and lag time parameters to determine peak flow rates. The SCS Method routine within the U.S. Army Corp of Engineers HEC-1 Flood Hydrograph Package program was utilized to model the drainage basins analyzed by this study.

Precipitation:

The site is located outside of the McCarran Airport Rainfall Area. Per the CCRFCD Manual precipitation exhibits, the precipitation values utilized in this study's HEC-1 models are 3.00 and 1.67 inches for the 100-year and 10-year storm event, respectively. No drainage area exceeds 8 square miles, an SDN 3 design storm distribution referenced from Table 503 of the CCRFCD Manual is used. Relevant tables and figures from the CCRFCD Manual have been included in Appendix B.

Curve Number:

The SCS curve number loss rate methodology was utilized to approximate infiltration for the drainage basins. The soils information within the watershed was obtained from the NRCS Natural Resources Conservation Service of the Las Vegas Valley Area, Nevada, Part of Clark County (Soil Survey, Reference 3). This study's drainage basins lie within the following soil types delineated on Exhibit D, included in Appendix A:

- Soil 155 – Cave gravelly fine sandy loam, 4 to 15 percent slopes. This soil is composed of 100% HSG 'D'.

A composite curve number for land use utilized in this study's hydrologic analysis has been obtained utilizing the percentage identified above, and the computations are included in Appendix B.

Note that this project proposes lots that are an average of 6,000 ft² in area which utilizes a "6,000 sq-ft" lot curve number per the CCRFCD Manual Table 602A; therefore, the curve

numbers utilized are in conformance with the SHG Master Study as well as the Phase 2 Infrastructure Study that designed the receiving drainage facilities.

Lag Time:

The lag time is defined as the time measured from the center of mass of excess rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a basin to the outlet point of the basin. Standard Form 4, as outlined in the CCRFCD Manual, was utilized to determine the lag times for basins modeled. The lag time computations have been included in Appendix B.

2.3 Hydraulic Modeling & Criteria

Street Flow:

Street flows have been analyzed utilizing the Flowmaster Version 8i software by Haestad Methods. In accordance with the CCRFCD Manual, the following criteria apply:

- 10-year minor storm event: maximum flow depth of 1-ft from gutter flowline, and depth times velocity factor ($D \times V$) not exceeding 6.
- 100-year major storm event: maximum flow depth of 2-ft from gutter flowline, and depth times velocity factor ($D \times V$) not exceeding 8.

Curb Inlets:

Curb inlets have been assessed using an in-house computation spreadsheet which utilizes equations outlined in Section 805 of the CCRFCD Manual, which includes a 50% clogging factor in determining sizes.

Storm Drains:

The hydraulic analysis for the proposed storm drain has been performed utilizing the Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System software by the Los Angeles County Department of Public Works. As outlined in the CCRFCD Manual, storm drain facilities are designed to maintain its hydraulic gradient line (HGL) minimum 1-ft below above finished grade and limit the flow velocities in the facility to less than 25 ft/s.

Emergency Overflow:

Emergency overflow computations have been provided through utilizing the Flowmaster Version 8i software by Haestad Methods.

3 EXISTING DRAINAGE CONDITION

3.1 Definition/Discussion of Existing Condition

The existing condition considers the Phase 2 infrastructure as existing and the project site mass graded and draining in a south easterly direction per the Phase 2 Infrastructure plans. The site has been assessed by the Phase 2 Infrastructure study and Master Drainage study in the past. Due to the site being surrounded by perimeter streets provided by the Phase 2 Infrastructure study, there are no impacts to the Parcel 2.14 project site that will differ from what has been previously analyzed in the approved studies. As a result, no additional analyses have been performed by this study to demonstrate an existing drainage condition for Parcel 2.14.

4 DEVELOPED DRAINAGE CONDITION

4.1 Definition of Developed Condition

The developed condition considers the Parcel 2.14 area constructed, inclusive of the proposed interior roadway infrastructure. The offsite storm drain improvements in Eagle Canyon Avenue are installed per the Phase 2 Infrastructure Study. Included in this project are the proposed drainage facilities that are designed to collect and convey storm runoff produced by the entire Parcel 2.14 area and conform to the master planned drainage patterns established in the Phase 2 Infrastructure Study.

The upstream offsite drainage areas are assumed to be fully developed and follow the ultimate conditions, as illustrated by the Phase 2 Infrastructure Study.

4.2 Discussion of Developed Condition

Refer to Exhibit E, included in Appendix A, for a detailed illustration of the developed condition drainage patterns.

Parcel 2.14 is defined as Basin DON. Basin DON drains to onsite roadways that convey flow south and east to a 15-ft type CM2 drop inlet. Intercepted flow is conveyed into the trunkline beneath Eagle Canyon Avenue.

4.3 Summary of Developed Condition Flows

A summary of the existing condition flow, as determined by HEC-1 analysis and reference material, has been presented on Exhibit E. Refer to Appendix B for the applicable HEC-1 analysis.

4.4 Summary of Developed Condition Street Flows

A hydraulic analysis table of the street flows, as determined by Flowmaster, has been presented on Exhibit E. Refer to Appendix C for the applicable Flowmaster analysis.

Section O-1 – This section is representative of the proposed interior private roadways. The section is described as a full street 49' ROW with roll-curb and gutters, analyzed with a minimum/maximum slope, and utilized a flowrate from Basin DON. The maximum slope

utilized the specific energy to evaluate the proposed finished floor elevations. The minimum slope utilized the normal depth to evaluate the proposed finished floor elevations. In addition, these sections were used as the most conservative sections to evaluate the flow conditions within the onsite roadways to ensure all street flow criteria is met.

Section O-1a – This section is representative of the proposed interior private roadways. The section is described as a full street 49' ROW with roll-curb and gutters, analyzed with the maximum slope on Warm Skye Street, and utilized a flowrate from Prorate Basin DON(B). This section was specifically analyzed to ensure the specific energy of the flow conveyed by Warm Skye Street does not overtop the high point at the entryway.

Section P-1 – This section is representative of the existing Skye Village Road. The section is described as a half street 100' ROW with L-curb and gutters, analyzed with the minimum slope, and utilized a flowrate of approximately 6.5 cfs being one-quarter of the flow from basin HUAL ($Q_{100}=26$ cfs) referenced from the Phase 1 Infrastructure Study. The normal depth generated by this section was used to evaluate the finished floor elevations adjacent to the roadway.

Sections ECA3b, ECA3c & ECA4 – These sections are representative of existing Eagle Canyon Avenue. The sections were referenced from the Phase 2 Infrastructure Study. All sections are provided; however, the section with the highest normal depth was utilized to evaluate finished floor elevations as well as the site entrance hump requirements.

4.5 Summary of Drainage Facilities

Storm Drain

The project site proposes an onsite drainage facility. The main onsite storm drain alignment has been identified by WSPG model "P6-L2". The alignment had been provided by the Phase 2 Study as a lateral stub (Facility L8). Facility L8 has been reset from the existing curb inlet (Facility P6) and realigned/extended to connect with the proposed 15-ft Type CM2 drop inlet located in sump (Facility P1). The proposed inlet (Facility P1) will collect the entire onsite runoff and convey it through a 24" RCP lateral which connects to the Phase 2 Infrastructure study. Note that per the Phase 2 Infrastructure Study, Facility L8 was designed to collect approximately half the onsite flow while the remaining flow was anticipated to spill onto Eagle Canyon Avenue and be collected by the dual 17.5-ft Type CM2 inlets located in sump (Facility P6). The proposed storm drain system was reanalyzed and shown to have the capacity to convey the entire onsite runoff.

The WSPGW model for the proposed storm drain and a facility summary table are provided in Appendices C and A (Exhibit E), respectively.

Emergency Overflow Path

Section E-1 – An emergency overflow path is provided for the proposed storm drain. The emergency overflow path is provided to ensure a flow path for ponded flow in the case that the proposed inlet gets completely clogged.

5 ULTIMATE DRAINAGE CONDITION

5.1 Definition/Discussion of Ultimate Condition

The ultimate condition considers that Skye Canyon is entirely developed, inclusive of the future residential areas bound by the Phase 2 Infrastructure improvements. A conceptual ultimate drainage condition had been defined by the referenced Phase 2 Infrastructure Study, and it has been utilized in the preparation of this study's ultimate condition analysis.

6 PROPOSED FINISHED FLOORS

The proposed finished floor elevations satisfy the CCRFCD as well as the local City of Las Vegas policy and are elevated a minimum of 6-inches above the adjacent top of curb elevation measured at the high side of the lot. In addition, all finished floors are adequately flood protected and elevated above twice the depth of flow in the adjacent street. The hydraulic evaluation of proposed finished floors, utilizing the applicable flow depths established by this study, has been included in Appendix F.

Additionally, an emergency overflow path is provided at the low point proposed in the site to allow for storm flows to exit into Eagle Canyon Avenue in the case that the onsite drop inlet becomes clogged or considered inefficient. After inspection of weir computations included in Appendix C, the adjacent affected lots have been determined to be above the overflow water surface elevation at the exit point; therefore, considered adequately flood protected.

7 CONCLUSIONS & RECOMMENDATIONS

1. The proposed improvements are not located within a FEMA designated SFHA.
2. The proposed drainage patterns are in conformance with the Phase 2 Infrastructure Study as well as the SHG Master Study. It is anticipated that the Phase 2 Infrastructure improvements are in place and functioning prior to start of Parcel 2.14 development.
3. Although, the Phase 2 Infrastructure Study only anticipated a portion of the onsite flows to be captured by the storm drain stub while the remainder will overflow into Eagle Canyon Avenue to be intercepted by the sump inlets. The subject study now proposes to capture and discharge the entire onsite flows to the lateral stub and into its proposed storm drain facilities. Hydraulic analysis and modeling show that the adjustment due to additional surface flows does not adversely impact the Eagle Canyon Avenue facilities as the overall quantity of flow from the site remains the same.
4. The proposed street flow and storm drain facilities satisfy local and CCRFCD criteria.
5. The proposed finished floors are adequately flood protected meeting criteria against design flows and potential overflow conditions.

6. The grading plan, storm drain profile and detail sheets for this project have been included with this study. These plans support the drainage patterns and conclusions detailed in this study.

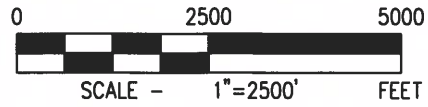
8 REFERENCES

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, 1999.
3. *Soil Survey of Las Vegas Valley Area, Nevada*. U.S. Department of Agriculture, Natural Resources Conservation Service, August 2016.
4. *Technical Drainage Study for Skye Canyon – Phase 2 Infrastructure*; by Slater Hanifan Group, October 2017.
5. *Technical Drainage Study for Skye Canyon – Phase 1 Infrastructure*; by Slater Hanifan Group, July 2015.
6. *Master Drainage Study for the Skye Canyon Master Plan – Update #3*; Slater Hanifan Group, August 2016.

APPENDIX A

Drainage Exhibits

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**OVERALL
SKYE CANYON
BOUNDARY**

**OVERALL
SKYE CANYON
BOUNDARY**

IRON MOUNTAIN ROAD

FORT APACHE ROAD

DURANGO DRIVE

PROJECT SITE

PULL DRIVE

SHAUMBER RD

EAGLE CANYON
AVENUE

EGAN CREST DRIVE

SKYE VILLAGE ROAD

GRAND TETON DRIVE

GRAND TETON DRIVE

HUALAPAI WAY

GRAND CANYON DRIVE

FARM ROAD

ELKHORN ROAD

US 95

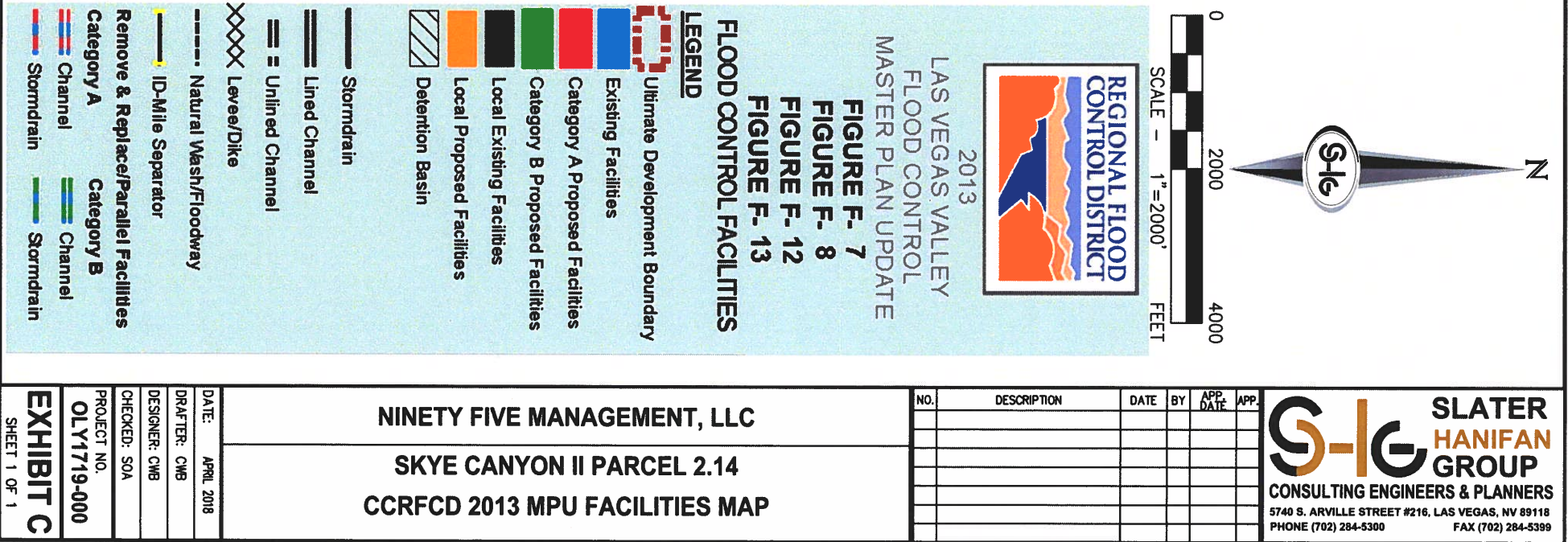
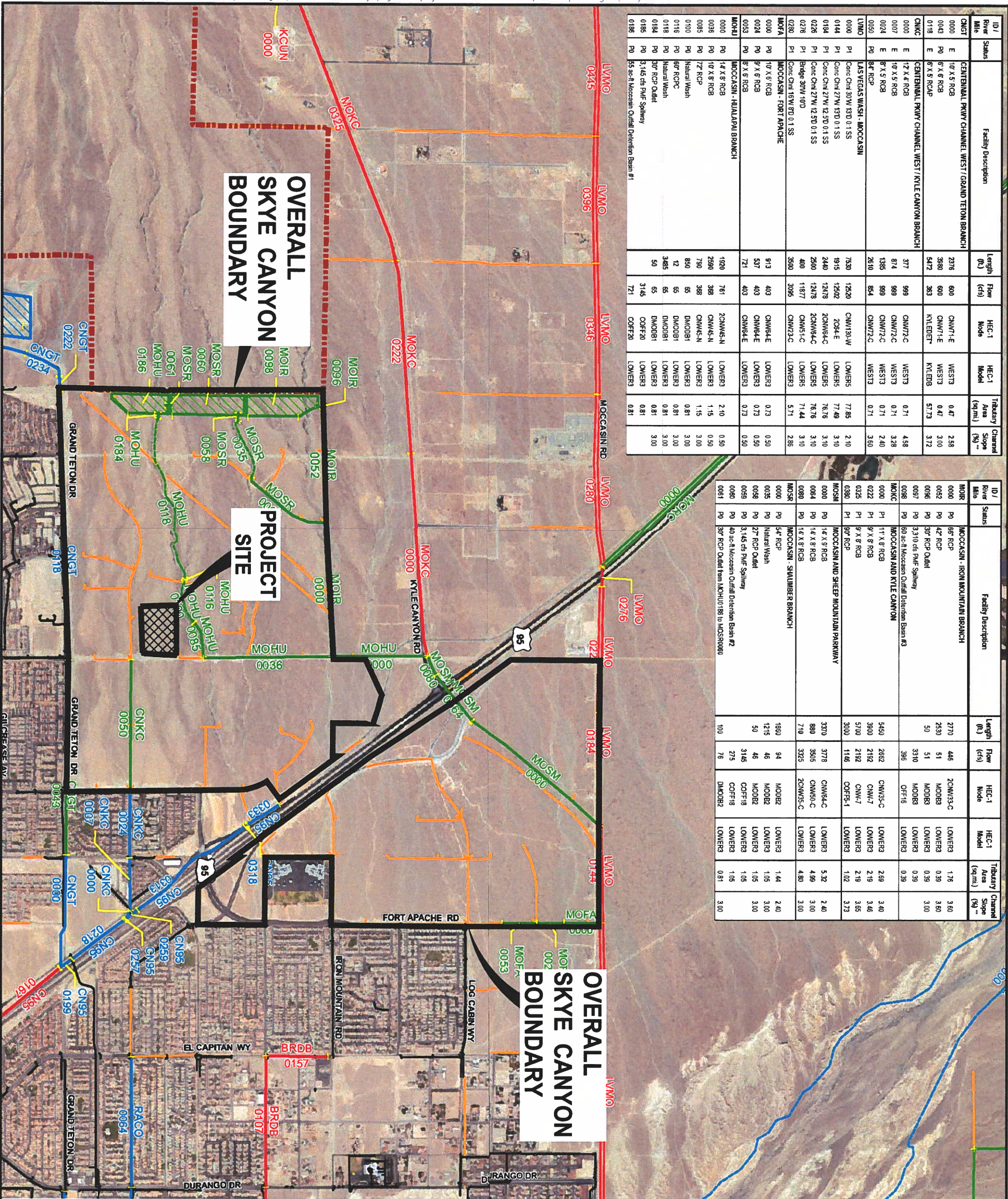
S-16
**SLATER
HANIFAN
GROUP**
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
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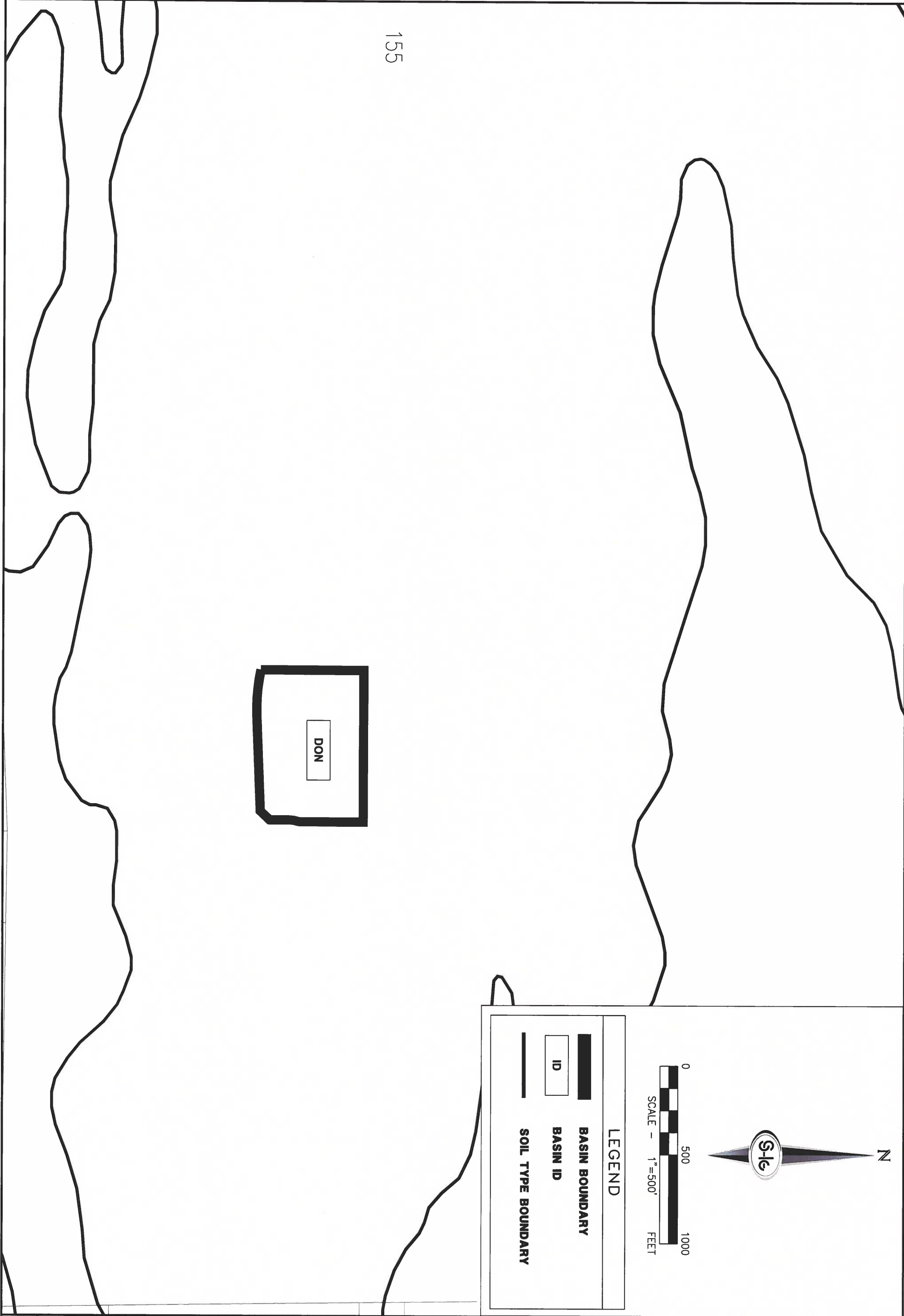
NINETY FIVE MANAGEMENT, LLC
SKYE CANYON II PARCEL 2.14
LOCATION MAP

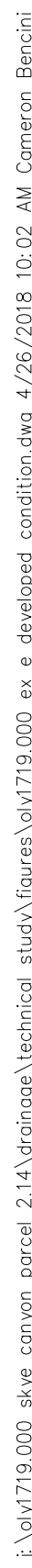
DATE: APRIL 2018	PROJECT NO. OLY1719-000
DRAFTER: CWB	EXHIBIT A SHEET 1 OF 1
DESIGNER: CWB	
CHECKED: SOA	

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Mode	HEC-1 Model	Thibault Area (sqmi)	Channel Slope (%)
CNCT								
0000	E	10 X 5 RCB	2376	600	CNW71-E	WEST3	0.47	2.58
0043	P0	6' X 6' RCB	3580	600	CNW71-E	WEST3	0.47	3.00
0118	E	6' X 5 RCB	5472	363	KYLEDET	KYLED8	57.73	3.72
CNCT								
0000	E	12 X 4 RCB	377	999	CNW72-C	WEST3	0.71	4.58
0007	E	10 X 5 RCB	874	999	CNW72-C	WEST3	0.71	3.28
0024	E	8' X 5 RCB	1385	999	CNW72-C	WEST3	0.71	2.40
0050	P0	8' RCP	2610	854	CNW72-C	WEST3	0.71	3.60
LWMO								
0000	P1	14.5 VEGAS WASH - MOCOSIN	7530	15230	CNW130-W	LOWERS	77.85	2.10
0144	P1	Conc Chm 30W 13D 0.1 SS	1915	12502	23G4-E	LOWERS	77.49	3.10
0184	P1	Conc Chm 27W 13D 0.1 SS	2440	12478	23NM6-C	LOWERS	76.76	3.10
0226	P1	Conc Chm 27W 12.5D 0.1 SS	2500	12478	23NM6-C	LOWERS	76.76	3.10
0276	P1	Bridge 30W 10D	400	11877	CNW51-C	LOWERS	71.44	3.10
0290	P1	Conc Chm 16W 10D 0.1 SS	3500	3095	CNW73-C	LOWERS	5.71	2.85
MORA								
0000	P0	10 X 8 RCB	913	403	CNW64-E	LOWERS	0.73	0.50
0024	P0	9' X 6' RCB	537	403	CNW64-E	LOWERS	0.73	0.50
0053	P0	8' X 6' RCB	721	403	CNW64-E	LOWERS	0.73	0.50
MORH								
0000	P0	14 X 8 RCB	1920	761	23NM5-N	LOWERS	2.10	0.50
0036	P0	10 X 8 RCB	2590	388	CNW65-N	LOWERS	1.45	0.50
0085	P0	72' RCP	7790	388	CNW65-N	LOWERS	1.45	3.00
0100	P0	Natural Wash	850	65	DMO0B1	LOWERS	0.81	3.00
0116	P0	60' RCP	12	65	DMO0B1	LOWERS	0.81	3.00
0168	P0	Natural Wash	3485	65	DMO0B1	LOWERS	0.81	3.00
0184	P0	30' RCP Outlet	50	65	DMO0B1	LOWERS	0.81	3.00
0186	P0	3' 14.6 cfs Puff Spillway	3145	721	COFF20	LOWERS	0.81	
55 s-ft-Mocasin Outfall Detention Basin #1								
				721	COFF20	LOWERS	0.81	

ID/ River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Mode	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%)
MOCCASIN - IRON MOUNTAIN BRANCH								
0000	P0	MOCCASIN - IRON MOUNTAIN BRANCH	2770	446	2CMW133-C	LOWM13	1.76	3.60
0000	P0	665 RCP						
0052	P0	427 RCP	2530	51	MOD13	LOWM13	0.39	3.60
0056	P0	307 RCP Outlet	50	51	MOD13	LOWM13	0.39	3.00
0057	P0	3.310 cfs PMF Siphway		3310	MOD13	LOWM13	0.39	
0068	P0	60 ac-ft Moccasin Outfall Detention Basin #3		366	OFF16	LOWM13	0.39	
MOCCASIN AND RYLE CANYON								
0000	P1	117 X 8' RCB	5450	2652	CNM135-C	LOWM13	2.59	3.40
0000	P1	117 X 8' RCB						
0222	P1	9' X 8' RCB	3600	2192	CNM-7	LOWM13	2.19	3.46
0225	P1	9' X 8' RCB	5700	2192	CNM-7	LOWM13	2.19	3.65
0380	P1	90' RCP	3000	1146	COFF15-1	LOWM13	1.02	3.73
MOSM								
0000	P0	MOCCASIN AND SHEEP MOUNTAIN PARKWAY	3370	3778	CNM164-C	LOWM13	5.32	2.40
0004	P0	14 X 8' RCB	880	3505	CNM50-C	LOWM13	4.99	3.00
0080	P0	14 X 8' RCB	710	3325	2CMW135-C	LOWM13	4.80	3.00
MOSM - SHALIMBER BRANCH								
0000	P0	54' RCP	1650	94	MOD12	LOWM13	1.44	2.40
0035	P0	Natural Wash	1215	46	MOD12	LOWM13	1.05	3.00
0056	P0	27' RCP Outlet	50	46	MOD12	LOWM13	1.05	3.00
0059	P0	3.145 cfs PMF Siphway		3145	COFF18	LOWM13	1.05	
0060	P0	40 ac-ft Moccasin Outfall Detention Basin #2		275	COFF18	LOWM13	1.05	
0061	P0	30' RCP Outlet from MOU0186 to MOSM1000	100	76	DMO102	LOWM13	0.81	3.00







S-E **H** **TE**

CONSULTING ENGINEERS & PLANNERS

H I E T E E X

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MENT, LLC
CEL 2.14
RAINAGE MAP

NINETY FIVE MANAGEMENT

SKYE CANYON II PART

DEVELOPED CONDITION D

DATE:	APRIL 2018
DRAFTER:	CWB
DESIGNER:	CWB
CHECKED:	SOA
PROJECT NO. OLY1719-000	
EXHIBIT E	
SHEET 1 OF 1	

APPENDIX B

Hydrologic Data

Precipitation

Rainfall and Precipitation Computation

Project Name: Skye Canyon Parcel 2.14

Date: 4/10/2018

File Name: OLY1719.000 TDS Precipitation Calcs.xls

By: CWB

Data:

Project is located in: Township: 19 S. Range: 59 E. Section: 12

Reference:

APN Map

Site is NOT located in the McCarran Airport Rainfall Area

Figure 513*

Rainfall Depth-Duration-Frequency 10-Year, 6-Hour: 1.35 inches

Figure 503*

Rainfall Depth-Duration-Frequency 100-Year, 6-Hour: 2.10 inches

Figure 506*

Precipitation Adjustment Ratios:

10-Year: 1.24

Table 501*

100-Year: 1.43

Table 501*

Six Hour Depth Area Reduction Factors (DARF):

Area (gross acres): 12.3 = 0.0191 square miles

Table 502*

DARF = 1.00

Calculations:

$P_{10} = 1.67$

10-Year Precipitation (in)

$P_{100} = 3.00$

100-Year Precipitation (in)

$P_{10}/P_{100} = 0.56$

HEC-1 Multiple Ratio Value

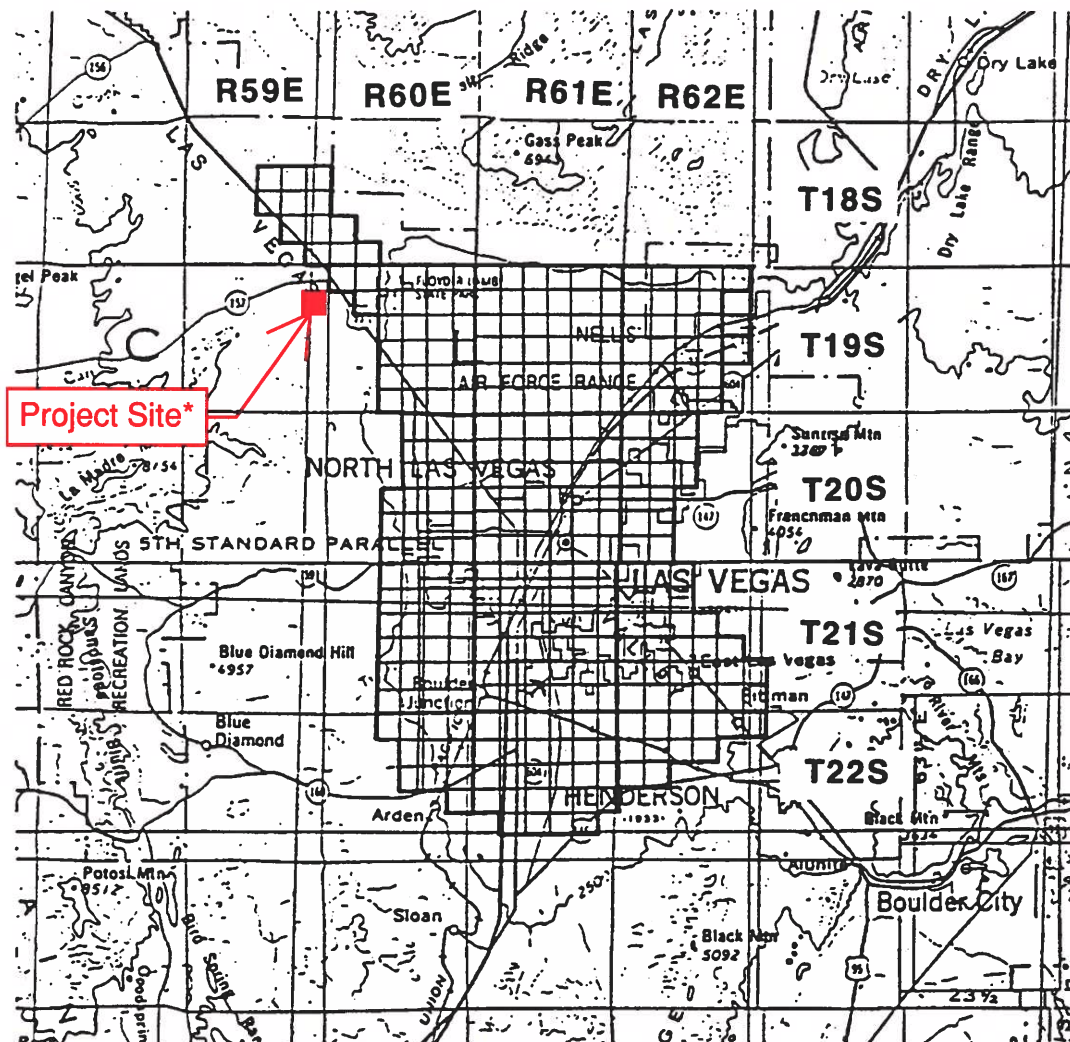
Equations:

$P = (\text{Rainfall}) * (\text{Precipitation Adjustment Ratio}) * (\text{Depth Area Reduction Factor})$

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Design

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



*Project site not located within the McCarran Rainfall area (T19S-R59E-S12)

TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

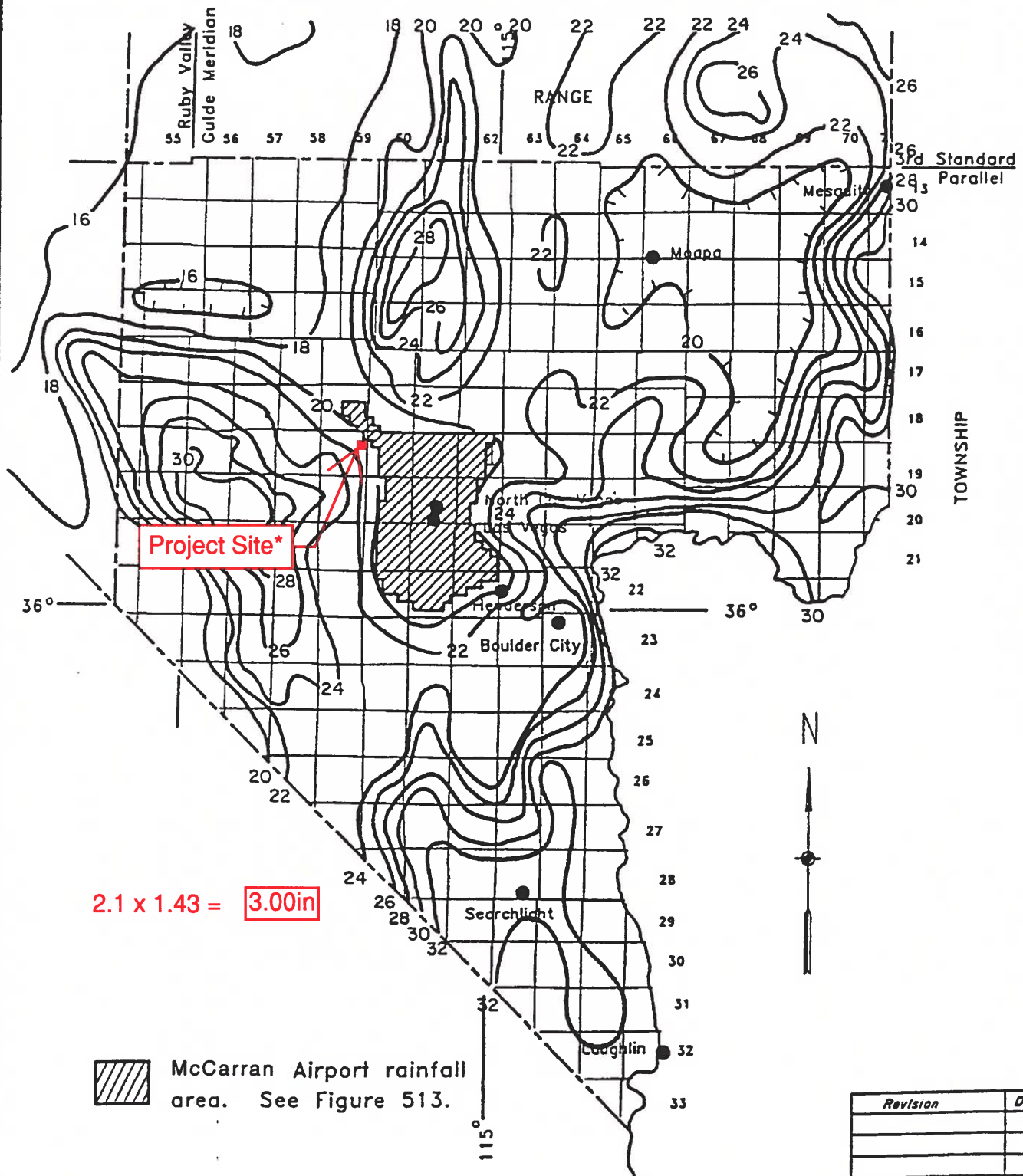
Notes:

1. Refer to Table 505 and Figure 516 Depth-Duration- Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RAINFALL DEPTH-DURATION-FREQUENCY 100-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)





PRECIPITATION ADJUSTMENT RATIOS

<u>Recurrence Interval</u>	<u>Ratio to NOAA Atlas 2</u>
2-year	1.00
5-year	1.16
10-year	1.24
25-year	1.33
50-year	1.39
100-year	1.43

- NOTE: 1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.
2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.
3. Tables 505 and 506 require no adjustments.

<i>Revision</i>	<i>Date</i>

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX HOUR DEPTH-AREA REDUCTION FACTORS

<u>Drainage Area (Square Miles)</u>	<u>Six-Hour Depth-Area Reduction Factor</u>
0.0	1.00
0.5	0.98
1.0	0.97
2.0	0.93
4.0	0.91
6.0	0.90
8.0	0.88
10.0	0.86
20.0	0.79
30.0	0.74
50.0	0.68
100.0	0.60
150.0	0.55
200.0	0.51
300.0	0.46
400.0	0.42
500.0	0.39

- NOTES: 1. A graphical representation of these factors is presented in Figure 514.
2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

<i>Revision</i>	<i>Date</i>

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

Percent of Total Storm Depth				Percent of Total Storm Depth			
Storm Time (In Minutes)	SDN3	SDN4	SDN5	Storm Time (In Minutes)	SDN3	SDN4	SDN5
0	0.0	0.0	0.0	185	32.2	37.6	43.0
5	2.0	2.0	2.0	190	35.2	41.5	47.7
10	5.7	5.8	5.9	195	40.9	46.2	51.4
15	7.0	7.5	8.0	200	49.9	53.0	56.1
20	8.7	9.9	11.0	205	59.0	61.0	63.0
25	10.8	12.6	14.4	210	71.0	71.0	71.0
30	12.4	13.7	15.0	215	74.4	73.2	72.0
35	13.0	14.5	16.0	220	78.1	75.6	73.1
40	13.0	14.9	16.8	225	81.2	78.2	75.2
45	13.0	15.1	17.1	230	81.9	79.9	77.9
50	13.0	15.5	18.0	235	83.5	81.3	79.0
55	13.0	15.6	18.2	240	85.1	82.3	79.5
60	13.0	15.9	18.7	245	85.6	83.0	80.4
65	13.3	16.2	19.0	250	86.0	83.5	81.0
70	14.0	16.9	19.7	255	86.8	84.4	82.0
75	14.2	17.2	20.2	260	87.6	85.1	82.6
80	14.8	17.9	21.0	265	88.8	86.4	84.0
85	15.8	18.9	22.0	270	91.0	88.5	85.9
90	17.2	20.1	23.0	275	92.6	90.8	88.9
95	18.1	21.1	24.1	280	93.7	92.4	91.0
100	19.0	22.0	25.0	285	95.0	94.4	93.8
105	19.7	22.8	25.9	290	97.0	96.8	96.6
110	19.9	23.2	26.5	295	97.6	97.3	97.0
115	20.0	24.0	28.0	300	98.2	97.8	97.4
120	20.1	24.6	29.0	305	98.5	98.2	97.9
125	20.4	25.2	30.0	310	98.7	98.4	98.1
130	21.4	26.0	30.5	315	98.9	98.6	98.3
135	22.9	26.9	30.9	320	99.0	98.8	98.5
140	24.1	27.6	31.0	325	99.3	99.1	98.9
145	24.9	28.3	31.7	330	99.3	99.2	99.0
150	25.1	28.6	32.1	335	99.4	99.3	99.2
155	25.6	29.2	32.7	340	99.5	99.4	99.3
160	27.0	30.2	33.3	345	99.8	99.7	99.6
165	27.8	31.2	34.6	350	99.8	99.8	99.7
170	28.1	32.1	36.1	355	99.9	99.9	99.9
175	28.3	33.2	38.1	360	100.0	100.0	100.0
180	29.5	35.2	40.8				

- Notes
1. For drainage areas less than 8 square miles in size, use SDN 3.
 2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
 3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
 4. A graphical representation of these values is presented on Figure 515.

Revision	Date

REFERENCE:

TABLE 503

Curve Number

Soil Data & Curve Number Computation

Project Name: Skye Canyon Parcel 2.14

Date: 4/10/2018

File Name: OLY1719.000 TDS SF4.xls

By: CWB

Data:

Reference:

Exhibit D
NRCS Soil Data

Soil Type - Soil Survey Area & Version, Soil Description

LV	155	Las Vegas Valley 2014	Cave gravelly fine sandy loam, 4 to 15 percent slopes	A	B	C	D
				0%	0%	0%	100%

Land Use	A	B	C	D
Residential (6,000 sf)	80	87	90	92

DEVELOPED CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP PERCENTS				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
DON	LV	155	100.0%	Residential (6,000 sf)	0%	0%	0%	100%	80	87	90	92	11.46	92.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									11.46	92.00

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HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

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

Residential districts by average lot size:

See Table 602A

Developing urban areas

Newly graded areas (pervious areas only, no vegetation) ⁵	77	86	91	94
--	----	----	----	----

1 Average runoff condition, and $I_p = 0.25$.

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

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

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

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

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

Average Lot Size or Usage ¹	Percent Impervious ²	Curve Number for Hydrologic Soil Groups			
		A	B	C	D
Apartments/Condos	72	81	88	91	93
Townhouses/6,000 sq ft lots or less ³	69	80	87	90	92
7,000 sq ft lots	63	76	84	89	91
8,000 sq ft lots	58	73	82	88	90
10,000 sq ft lots	38	61	75	83	87
14,000 sq ft lots	30	57	72	81	86
20,000 sq ft lots	25	54	70	80	85
40,000 sq ft lots	20	51	68	79	84
80,000 sq ft lots	12	46	65	77	82

1 Lot size should represent the size of the average lot and not the gross acreage divided by the number of lots.

2 Actual percent impervious value should be compared to selected land use type.

3 In cases where average residential lots are smaller than 6,000 sq ft, commercial/business/industrial land use should be used.

Revision	Date

REFERENCE:

TABLE 602A



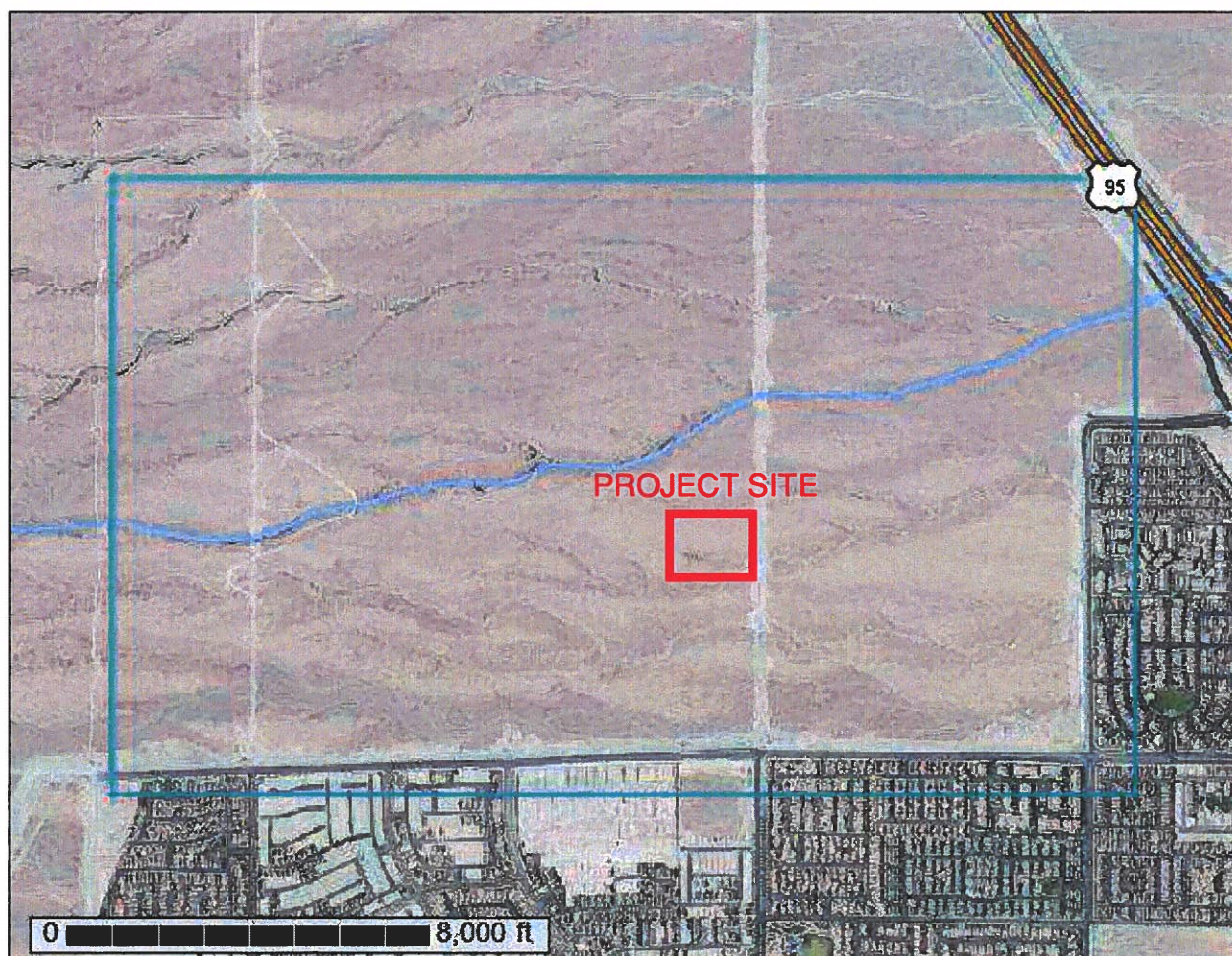
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

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

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



August 31, 2016

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

Custom Soil Resource Report

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

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

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

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

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

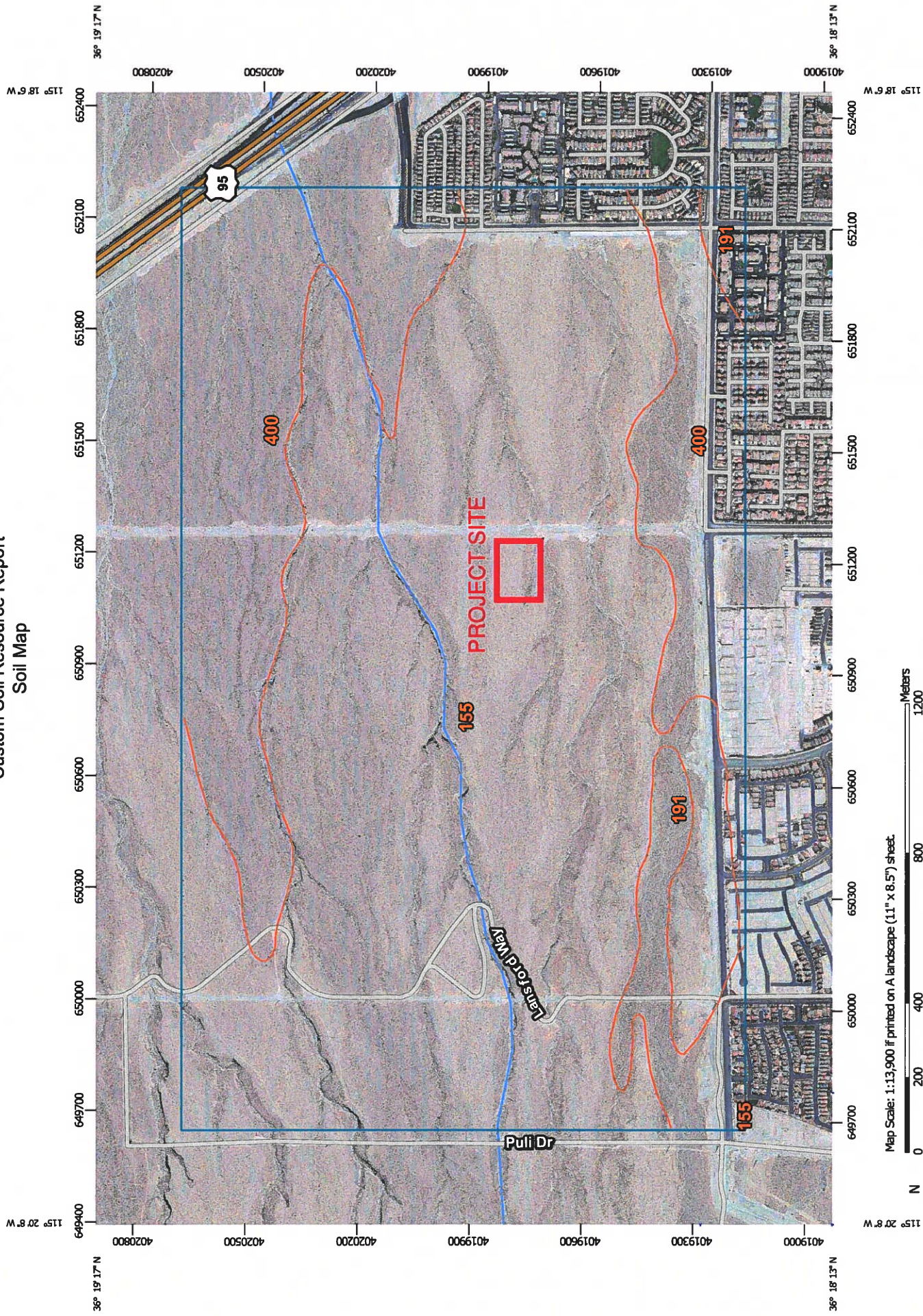
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:13,900 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

Special Line Features

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

Map Unit Legend

Las Vegas Valley Area, Nevada, Part of Clark County (NV788)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	651.4	68.6%
191	Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	47.1	5.0%
400	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	251.5	26.5%
Totals for Area of Interest		950.0	100.0%

Map Unit Descriptions

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

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

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

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

Custom Soil Resource Report

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

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

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

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

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

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

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

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

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

Las Vegas Valley Area, Nevada, Part of Clark County

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

Map Unit Setting

National map unit symbol: hr9w

Elevation: 2,000 to 4,800 feet

Mean annual precipitation: 4 to 12 inches

Mean annual air temperature: 57 to 70 degrees F

Frost-free period: 180 to 280 days

Farmland classification: Not prime farmland

Map Unit Composition

Cave and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave

Setting

Landform: Fan remnants

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 15 inches: gravelly fine sandy loam

H2 - 15 to 60 inches: indurated

Properties and qualities

Slope: 4 to 15 percent

Depth to restrictive feature: 4 to 20 inches to petrocalcic

Natural drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 40 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Hydric soil rating: No

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

Map Unit Setting

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

Map Unit Composition

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

Description of Dalian

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

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

Map Unit Setting

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

Map Unit Composition

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

Description of Tencee

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

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

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

Water Features

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

Hydrologic Soil Group and Surface Runoff

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

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

The four hydrologic soil groups are:

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

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

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

Custom Soil Resource Report

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

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

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

Report—Hydrologic Soil Group and Surface Runoff

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

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

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Custom Soil Resource Report

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Standard Form 4 Computations

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL TIME OF CONCENTRATION

Project Name: Skye Canyon Parcel 2.14

Description:

File Name: OLY1719:000 TDS SF4.xls

By: CWB

Date: 4/10/2018

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check		Tag	
DESIG:		DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Tc Calc.	Total Length Feet	Tc Check	Tag
				[1]		[2]			[3]			[4]	[5]	[6]	[7]	[8]	[9]	[10]
DEVELOPED CONDITION																		
DON	D		92.0	0.824	11.46	0.0179	105	1.00	5.08	1150	3.23	3.63	5.50	4.26	9.35	1255	16.972	0.093
[1]	K = 0.0132 (CN) - 0.39																	
[2]	A = Area/640																	
[3]	Ti = (1.8 (1.1-K) L^0.5)/S^0.33																	
[4]	For Existing Conditions: V1 = 14.8 * (S/100)^0.5																	
	For Developed Conditions: V1 = 20.2 * (S/100)^0.5																	
REFERENCE :																		
STANDARD FORM 4																		

[9] Tc = (L/180) + 10
[10] TIag = (0.6*Tc)/60
[11] Min TIag = 0.05

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

Developed Condition HEC-1 Analysis

DEV.OUT

```
1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 09APR18 TIME 09:50:14 *
* *****
```

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

```

X X XXXXXX XXXX X
X X X X X XX
X X X X X
XXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXXX XXXXX XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1G5, 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

1

HEC-1 INPUT

PAGE 1

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

```

*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID SKYE CANYON PARCEL 2.14
3 ID DEVELOPED CONDITION
4 ID
5 ID RETURN PERIOD ----- 100-YR & 10-YR
6 ID DISTRIBUTION ----- 6-HOUR SDN3
7 ID PROJECT NO. ----- OLY1719.001
8 ID FILENAME ----- DEV.H1
9 ID DATE ----- 04/09/2017
10 ID MODELED BY ----- CWB
11 ID
12 ID PRECIPITATION STORM EVENT RATIOS
13 ID STORM EVENT RATIO
14 ID 10-YR 0.56
15 ID 100-YR 1
16 ID
17 IT 5 0 0 300
18 IO 5 0 0
19 IN 5 0 0
20 JR PREC 1.00 0.56
*
21 KK DON
22 KM DEVELOPED ONSITE BASIN
23 BA 0.0179
24 PB 3.00
25 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
26 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
27 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
28 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
29 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
30 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
31 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
32 PC 0.998 0.999 1
33 LS 0 92.0
34 UD 0.093
*
35 ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

21 DON
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****
*
* *****
```

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

```

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   JUN 1998                      *
*   VERSION 4.1                    *
* RUN DATE 09APR18 TIME 09:50:14 *
* *****

```

DEV.OUT

```

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

```

SLATER HANIFAN GROUP
 SKYE CANYON PARCEL 2.14
 DEVELOPED CONDITION

RETURN PERIOD ----- 100-YR & 10-YR
 DISTRIBUTION ----- 6-HOUR SDN3
 PROJECT NO. ----- OLY1719.001
 FILENAME ----- DEV.H1
 DATE ----- 04/09/2017
 MODELED BY ----- CWB

PRECIPITATION STORM EVENT RATIOS	
STORM EVENT	RATIO
10-YR	0.56
100-YR	1

```

18 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      .56

```

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
				1.00	.56
HYDROGRAPH AT					
+	DON	.02	1	FLOW	34.
				TIME	16.
					3.50
					3.50

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

APPENDIX C

Hydraulic Computations

Street Flow Computations

Worksheet for Section O-1 (Min Slope)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.60 %
Discharge 34.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+24.50	0.46
0+41.50	0.12
0+41.50	0.08
0+42.50	0.00
0+43.62	0.38
0+44.00	0.38
0+49.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.50, 0.08)	0.013
(0+07.50, 0.08)	(0+41.50, 0.08)	0.016
(0+41.50, 0.08)	(0+49.00, 0.48)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section O-1 (Min Slope)

Results

Normal Depth	0.54	ft
Elevation Range	0.00 to 0.48 ft	
Flow Area	11.68	ft ²
Wetted Perimeter	49.35	ft
Hydraulic Radius	0.24	ft
Top Width	49.00	ft
Normal Depth	0.54	ft
Critical Depth	0.55	ft
Critical Slope	0.00538	ft/ft
Velocity	2.91	ft/s
Velocity Head	0.13	ft
Specific Energy	0.68	ft
Froude Number	1.05	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.55	ft
Channel Slope	0.60	%
Critical Slope	0.00538	ft/ft

Cross Section for Section 0-1 (Min Slope)

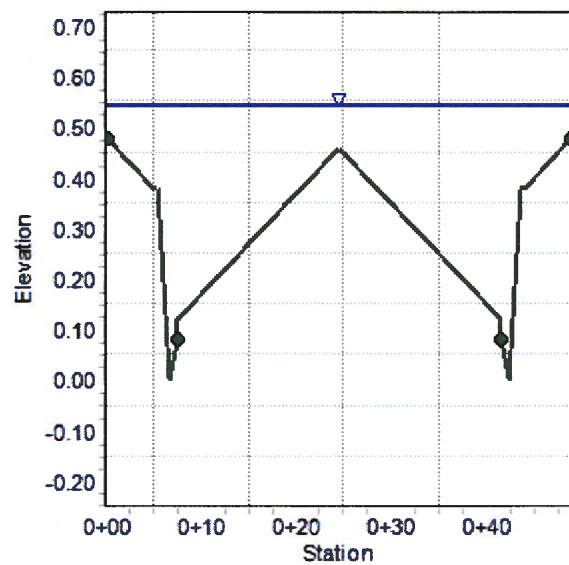
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.60	%
Normal Depth	0.54	ft
Discharge	34.00	ft ³ /s

Cross Section Image



Worksheet for Section 0-1 (Max Slope)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 5.75 %
Discharge 34.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+24.50	0.46
0+41.50	0.12
0+41.50	0.08
0+42.50	0.00
0+43.62	0.38
0+44.00	0.38
0+49.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.50, 0.08)	0.013
(0+07.50, 0.08)	(0+41.50, 0.08)	0.016
(0+41.50, 0.08)	(0+49.00, 0.48)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section 0-1 (Max Slope)

Results

Normal Depth	0.40	ft
Elevation Range	0.00 to 0.48 ft	
Flow Area	5.29	ft ²
Wetted Perimeter	36.04	ft
Hydraulic Radius	0.15	ft
Top Width	35.83	ft
Normal Depth	0.40	ft
Critical Depth	0.55	ft
Critical Slope	0.00558	ft/ft
Velocity	6.42	ft/s
Velocity Head	0.64	ft
Specific Energy	1.05	ft
Froude Number	2.95	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.40	ft
Critical Depth	0.55	ft
Channel Slope	5.75	%
Critical Slope	0.00558	ft/ft

Cross Section for Section O-1 (Max Slope)

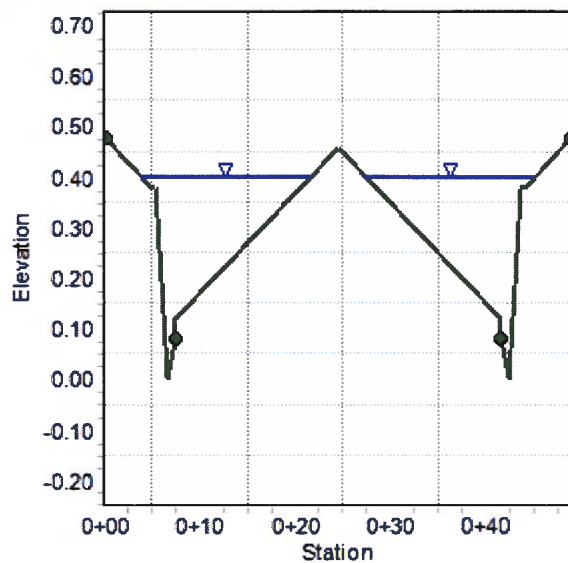
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	5.75	%
Normal Depth	0.40	ft
Discharge	34.00	ft ³ /s

Cross Section Image



Worksheet for Section O-1a

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.90 %
Discharge 5.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.48
0+05.00	0.38
0+05.38	0.38
0+06.50	0.00
0+07.50	0.08
0+07.50	0.12
0+24.50	0.46
0+41.50	0.12
0+41.50	0.08
0+42.50	0.00
0+43.62	0.38
0+44.00	0.38
0+49.00	0.48

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.48)	(0+07.50, 0.08)	0.013
(0+07.50, 0.08)	(0+41.50, 0.08)	0.016
(0+41.50, 0.08)	(0+49.00, 0.48)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section O-1a

Results

Normal Depth		0.24	ft
Elevation Range	0.00 to 0.48 ft		
Flow Area		1.36	ft ²
Wetted Perimeter		16.08	ft
Hydraulic Radius		0.08	ft
Top Width		15.91	ft
Normal Depth		0.24	ft
Critical Depth		0.31	ft
Critical Slope		0.00719	ft/ft
Velocity		3.67	ft/s
Velocity Head		0.21	ft
Specific Energy		0.45	ft
Froude Number		2.21	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

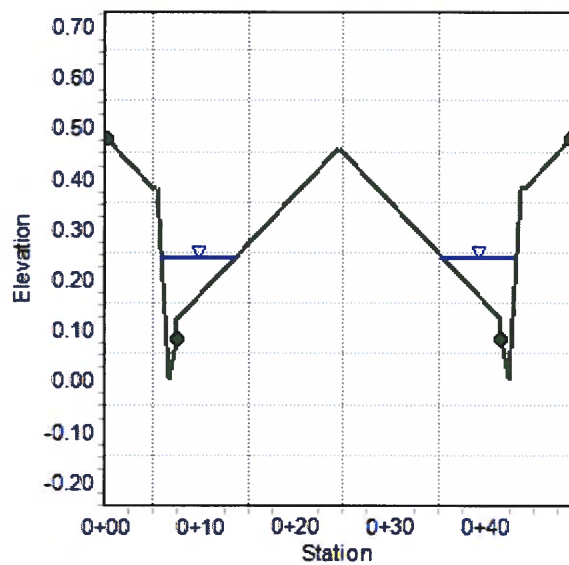
GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.31	ft
Channel Slope	3.90	%
Critical Slope	0.00719	ft/ft

Project Description

Input Data

Cross Section Image



Worksheet for Section P-1 (Min Slope)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.50 %
Discharge 6.50 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+39.00	0.91
0+39.01	0.99
0+39.26	1.30
0+39.68	1.32
0+45.50	1.32
0+50.00	1.32

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.17)	0.013
(0+02.00, 0.17)	(0+39.00, 0.91)	0.016
(0+39.00, 0.91)	(0+50.00, 1.32)	0.013

Options

Current roughness weighted Pavlovskii's Method
Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Section P-1 (Min Slope)

Results

Normal Depth		0.48	ft
Elevation Range	0.00 to 1.32 ft		
Flow Area		3.11	ft²
Wetted Perimeter		17.90	ft
Hydraulic Radius		0.17	ft
Top Width		17.37	ft
Normal Depth		0.48	ft
Critical Depth		0.46	ft
Critical Slope		0.00672	ft/ft
Velocity		2.09	ft/s
Velocity Head		0.07	ft
Specific Energy		0.55	ft
Froude Number		0.87	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.48	ft
Critical Depth	0.46	ft
Channel Slope	0.50	%
Critical Slope	0.00672	ft/ft

Cross Section for Section P-1 (Min Slope)

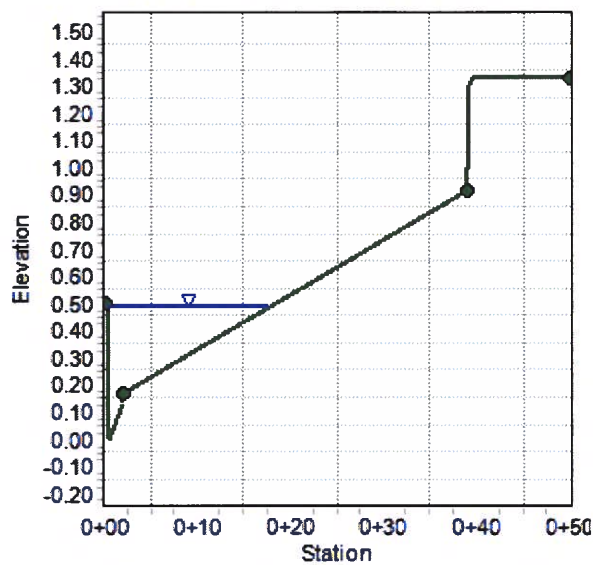
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50	%
Normal Depth	0.48	ft
Discharge	6.50	ft ³ /s

Cross Section Image



Drop Inlet Computations

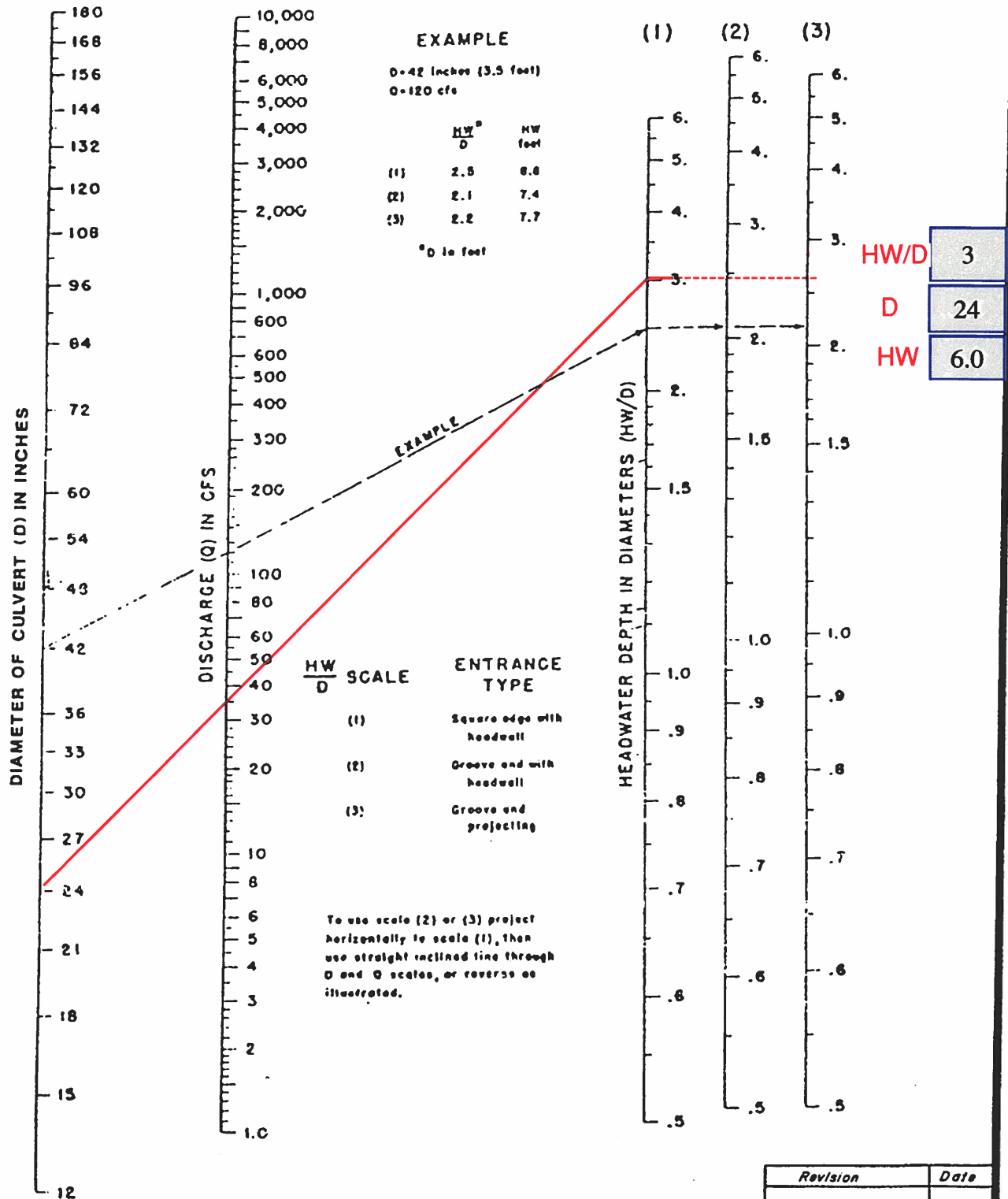
Project Name:	Skye Canyon II Parcel 2.14	 SLATER HANIFAN GROUP CONSULTING ENGINEERS & PLANNERS
By:	CWB	
Date:	4/25/2018	
Notes:		
Facility ID:	P1	
Drainage Condition	Proposed	
Source of Flow	Q100 = Basin DON	
Design Flow (cfs)	34.0	
Inlet Type:	Type CM2 (Sump)	
Inlet Length:	15.-ft	
Number of Grates:	5	
Input:	Variable:	Input:
Depth at Inlet (ft)	D	0.79
Grate Width (ft)	W	1.50
Length of Grate (ft)	L_g	12.50
Length of Curb Opening (ft)	L_c	15.00
Height of Curb Opening (ft)	H	0.50
Weir Coef. - Curb Opening	W_c	2.3
Weir Coef. - Grate	W_g	3.0
Orifice Coef.	O_c	0.67
Grate Coef.	G_c	0.60
Clogging Factor - Grate (%)	CF_g	50
Clogging Factor - Curb (%)	CF_c	50
Output (Grate):	Equation:	Output (Grate):
Effective Weir Length (ft)	$2*W+L_g$	15.50
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	7.75
Grate Open Area (sf)	$W*L_g$	18.75
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	5.63
Controlling Flow Type (weir/orifice)	If $D < 1.792*(Adj. \text{ Grate Open Area}/Adj. \text{ Eff. Length})$ use weir, else orifice	weir
Intercepted Flow (cfs)	weir: $W_g*(Adj. \text{ Eff. Weir Length})*D^{1.5}$ orifice: $O_c*(Adj. \text{ Grate Open Area})*(64.4*D)^{0.5}$	16.3
Output (Curb):	Equation:	Output (Curb):
Effective Weir Length (ft)	$L+1.8*W$	17.70
Adjusted Effective Weir Length (ft)	$L+1.8(1-CF_c/100)*W$	16.41
Curb Open Area (sf)	$L*H$	7.50
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	3.75
Controlling Flow Type (weir/orifice)	If $D < H$, weir, else orifice	orifice
Intercepted Flow (cfs)	weir: $W_c*(Adj. \text{ Eff. Weir Length})*D^{1.5}$ orifice: $O_c*(Adj. \text{ Curb Open Area})*(64.4*(D-H/2))^{0.5}$	17.88
Output (Total):	Equation:	Output (Total):
Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	34

WSPGW Model – P6-L2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

FACILITY P1: Q= 34 CFS



Revision	Date

P6-L2.WSW

T1 OLY1719.000 SKYE CANYON PARCEL 2.14
T2 BY NINETY-FIVE MANAGEMENT, LLC
T3 EAGLE CANYON LATERAL P6-L2
SO 1000.0002839.130 42 .013 2843.34
R 1027.7302839.490 42 .013 45.0 1
JX 1027.7302840.990 24 24 .013 12.5 2840.990 90.0
R 1099.3402842.780 24 .013 0.0 1
SH 1099.3402842.780 24 .013 0.000
CD 24 4 1 0.000 2.000 0.000 0.000 0.000 0.000
CD 42 4 1 0.000 3.500 0.000 0.000 0.000 0.000
Q 34.000 .0

		W S P G W	PAGE NO	1
HEADING LINE NO 1 IS -	WATER SURFACE PROFILE - TITLE CARD LISTING			
HEADING LINE NO 2 IS -	OLY1719.000 SKYE CANYON PARCEL 2.14			
HEADING LINE NO 3 IS -	BY NINETY-FIVE MANAGEMENT, LLC			
	EAGLE CANYON LATERAL P6-L2			

[illegible]

WATER SURFACE PROFILE LISTING
 OLY1719.000 SKYE CANYON PARCEL 2.14
 BY NINETY-FIVE MANAGEMENT, LLC
 EAGLE CANYON LATERAL P6-L2

Date: 4-25-2018 Time:10:12:25

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.EI.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2839.130	4.210	2843.340	46.50	4.83	.36	2843.70	.00	2.13	.00	3.500	.000	.00	1 .0
27.730	.0130					.0021	.06	4.21	.00	1.55	.013	.00	.00	PIPE
1027.730	2839.490	3.981	2843.471	46.50	4.83	.36	2843.83	.00	2.13	.00	3.500	.000	.00	1 .0
JUNCT STR	.0000							3.98	.00		.013	.00	.00	PIPE
1027.730	2840.990	1.619	2842.609	34.00	12.48	2.42	2845.03	.00	1.91	1.57	2.000	.000	.00	1 .0
34.885	.0250					.0224	.78	1.62	1.67	1.56	.013	.00	.00	PIPE
1062.615	2841.862	1.675	2843.537	34.00	12.10	2.27	2845.81	.00	1.91	1.48	2.000	.000	.00	1 .0
26.391	.0250					.0209	.55	1.68	1.54	1.56	.013	.00	.00	PIPE
1089.006	2842.522	1.775	2844.297	34.00	11.54	2.07	2846.36	.00	1.91	1.26	2.000	.000	.00	1 .0
10.334	.0250					.0199	.21	1.78	1.33	1.56	.013	.00	.00	PIPE
1099.340	2842.780	1.911	2844.691	34.00	11.00	1.88	2846.57	.00	1.91	.82	2.000	.000	.00	1 .0

OLY1719.000 SKYE CANYON PARCEL 2.14

BY NINETY-FIVE MANAGEMENT, LLC

EAGLE CANYON LATERAL P6-L2

1000.00	.I		C		H		W		E					R
1002.03	.													.
1004.05	.													.
1006.08	.													.
1008.11	.													.
1010.14	.													.
1012.16	.													.
1014.19	.													.
1016.22	.													.
1018.25	.													.
1020.27	.													.
1022.30	.													.
1024.33	.													.

[illegible]

[illegible]

1. GLOSSARY

- I = INVERT ELEVATION
C = CRITICAL DEPTH
W = WATER SURFACE ELEVATION
S = SUPER-ELEVATION
H = HEIGHT OF CHANNEL
E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

Emergency Overflow Analysis

Worksheet for Section E-1 - Emergency Overflow Section (Weir)

Project Description

Solve For Headwater Elevation

Input Data

Discharge		34.00	ft ³ /s
Crest Elevation		53.03	ft
Tailwater Elevation		53.17	ft
Crest Surface Type	Paved		
Crest Breadth		2.00	ft
Crest Length		49.00	ft

Results

Headwater Elevation	53.40	ft
Headwater Height Above Crest	0.37	ft
Tailwater Height Above Crest	0.14	ft
Weir Coefficient	3.06	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	3.06	US
Flow Area	18.21	ft ²
Velocity	1.87	ft/s
Wetted Perimeter	49.74	ft
Top Width	49.00	ft

Worksheet for Section E-1 - Emergency Overflow Section (Weir)

Project Description

Solve For Headwater Elevation

Input Data

Discharge		34.00	ft ³ /s
Crest Elevation		53.03	ft
Tailwater Elevation		53.17	ft
Crest Surface Type	Paved		
Crest Breadth		2.00	ft
Crest Length		49.00	ft

Results

Headwater Elevation	53.40	ft
Headwater Height Above Crest	0.37	ft
Tailwater Height Above Crest	0.14	ft
Weir Coefficient	3.06	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	3.06	US
Flow Area	18.21	ft ²
Velocity	1.87	ft/s
Wetted Perimeter	49.74	ft
Top Width	49.00	ft

Cross Section for Section E-1 - Emergency Overflow Section (Weir)

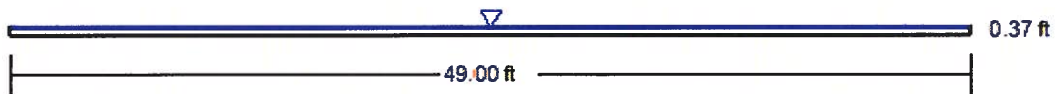
Project Description

Solve For Headwater Elevation

Input Data

Discharge		34.00	ft ³ /s
Headwater Elevation		53.40	ft
Crest Elevation		53.03	ft
Tailwater Elevation		53.17	ft
Crest Surface Type	Paved		
Crest Breadth		2.00	ft
Crest Length		49.00	ft

Cross Section Image



V: 1
H: 1

Worksheet for Section E-1 - Emergency Overflow Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.025	
Channel Slope	10.00	%
Bottom Width	49.00	ft
Discharge	34.00	ft ³ /s

Results

Normal Depth	0.14	ft
Flow Area	6.78	ft ²
Wetted Perimeter	49.28	ft
Hydraulic Radius	0.14	ft
Top Width	49.00	ft
Critical Depth	0.25	ft
Critical Slope	0.01472	ft/ft
Velocity	5.01	ft/s
Velocity Head	0.39	ft
Specific Energy	0.53	ft
Froude Number	2.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.14	ft
Critical Depth	0.25	ft
Channel Slope	10.00	%
Critical Slope	0.01472	ft/ft

Cross Section for Section E-1 - Emergency Overflow Section

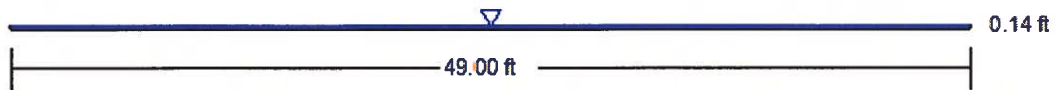
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.025
Channel Slope	10.00 %
Normal Depth	0.14 ft
Bottom Width	49.00 ft
Discharge	34.00 ft ³ /s

Cross Section Image



V: 1
H: 1

APPENDIX D

Finished Floor Analysis

SKYE CANYON II PARCEL 2.14												
FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION												
INPUT INFORMATION				FINISHED FLOORS						NOTES		
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. ³ (ft)	T/C + 6" F.F. ⁴ (ft)	F.F.-design (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet		
1	O-1	2876.75	2876.37	0.54	2877.45	2877.25	2878.7	OK	OK			
2	O-1	2874.39	2874.01	0.54	2875.09	2874.89	2876.3	OK	OK			
3	O-1	2871.93	2871.55	0.54	2872.63	2872.43	2873.8	OK	OK			
4	O-1	2869.39	2869.01	0.54	2870.09	2869.89	2871.3	OK	OK			
5	O-1	2866.74	2866.36	0.54	2867.44	2867.24	2868.6	OK	OK			
6	O-1	2864.09	2863.71	0.54	2864.79	2864.59	2866.0	OK	OK			
7	O-1	2861.55	2861.17	0.54	2862.25	2862.05	2863.5	OK	OK			
8	O-1	2859.48	2859.10	0.54	2860.18	2859.98	2861.4	OK	OK			
9	O-1	2857.91	2857.53	0.54	2858.61	2858.41	2859.8	OK	OK			
10	O-1	2856.84	2856.46	0.54	2857.54	2857.34	2858.8	OK	OK			
11	O-1	2855.88	2855.50	0.54	2856.58	2856.38	2857.9	OK	OK			
12	O-1	2854.48	2854.10	0.54	2855.18	2854.98	2856.4	OK	OK			
13	O-1	2856.07	2855.69	0.54	2856.77	2856.57	2858.0	OK	OK			
14	O-1	2857.39	2857.01	0.54	2858.09	2857.89	2859.2	OK	OK			
15	O-1	2857.82	2857.44	0.54	2858.52	2858.32	2859.7	OK	OK			
16	O-1	2858.12	2857.74	0.54	2858.82	2858.62	2860.2	OK	OK			
17	O-1	2858.42	2858.04	0.54	2859.12	2858.92	2860.5	OK	OK			
18	O-1	2858.72	2858.34	0.54	2859.42	2859.22	2860.7	OK	OK			
19	O-1	2859.02	2858.64	0.54	2859.72	2859.52	2861.0	OK	OK			
20	O-1	2859.38	2859.00	0.54	2860.08	2859.88	2861.4	OK	OK			
21	O-1	2859.65	2859.27	0.54	2860.35	2860.15	2861.8	OK	OK			
22	O-1	2860.59	2860.21	0.54	2861.29	2861.09	2862.5	OK	OK			
23	O-1	2862.36	2861.98	0.54	2863.06	2862.86	2864.3	OK	OK			
24	O-1	2864.58	2864.20	0.54	2865.28	2865.08	2866.5	OK	OK			
25	O-1	2867.34	2866.96	0.54	2868.04	2867.84	2869.2	OK	OK			
26	O-1	2870.22	2869.84	0.54	2870.92	2870.72	2872.1	OK	OK			
27	O-1	2873.09	2872.71	0.54	2873.79	2873.59	2875.0	OK	OK			
28	O-1	2875.97	2875.59	0.54	2876.67	2876.47	2877.9	OK	OK			
29	O-1	2878.84	2878.46	0.54	2879.54	2879.34	2880.7	OK	OK			
30	O-1	2881.52	2881.14	0.54	2882.22	2882.02	2883.4	OK	OK			
31	O-1	2883.47	2883.09	0.54	2884.17	2883.97	2885.4	OK	OK			
32	O-1	2885.22	2884.84	0.54	2885.92	2885.72	2887.1	OK	OK			
33	O-1	2886.97	2886.59	0.54	2887.67	2887.47	2888.9	OK	OK			

SKYE CANYON II PARCEL 2.14 FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION										
INPUT INFORMATION				FINISHED FLOORS					NOTES	
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{-design} (ft)	Flowline Check	T/C + 6" Check	See References on Last Sheet
34	O-1	2888.71	2888.33	0.54	2889.41	2889.21	2890.6	OK	OK	
35	O-1	2888.71	2888.33	0.54	2889.41	2889.21	2892.0	OK	OK	
36	O-1	2885.92	2885.54	0.54	2886.62	2886.42	2888.3	OK	OK	
37	O-1	2884.62	2884.24	0.54	2885.32	2885.12	2886.5	OK	OK	
38	O-1	2883.63	2883.25	0.54	2884.33	2884.13	2885.5	OK	OK	
39	O-1	2882.07	2881.69	0.54	2882.77	2882.57	2884.0	OK	OK	
40	O-1	2874.97	2874.59	0.54	2875.67	2875.47	2876.9	OK	OK	
41	O-1	2871.41	2871.03	0.54	2872.11	2871.91	2873.3	OK	OK	
42	O-1	2868.49	2868.11	0.54	2869.19	2868.99	2870.4	OK	OK	
43	O-1	2865.80	2865.42	0.54	2866.50	2866.30	2867.7	OK	OK	
44	O-1	2863.14	2862.76	0.54	2863.84	2863.64	2865.0	OK	OK	
45	O-1	2860.75	2860.37	0.54	2861.45	2861.25	2862.7	OK	OK	
46	O-1	2858.86	2858.48	0.54	2859.56	2859.36	2860.8	OK	OK	
47	O-1	2857.47	2857.09	0.54	2858.17	2857.97	2859.4	OK	OK	
48	O-1	2856.57	2856.19	0.54	2857.27	2857.07	2858.6	OK	OK	
49	O-1	2856.32	2855.94	0.54	2857.02	2856.82	2858.6	OK	OK	
50	O-1	2858.18	2857.80	0.54	2858.88	2858.68	2860.2	OK	OK	
51	O-1	2858.48	2858.10	0.54	2859.18	2858.98	2860.5	OK	OK	
52	O-1	2858.72	2858.34	0.54	2859.42	2859.22	2861.0	OK	OK	
53	O-1	2872.93	2872.55	0.54	2873.63	2873.43	2874.8	OK	OK	
54	O-1	2873.70	2873.32	0.54	2874.40	2874.20	2875.6	OK	OK	
55	O-1	2873.70	2873.32	0.54	2874.40	2874.20	2876.0	OK	OK	
56	O-1	2873.70	2873.32	0.54	2874.40	2874.20	2876.0	OK	OK	
57	O-1	2873.70	2873.32	0.54	2874.40	2874.20	2875.6	OK	OK	
58	O-1	2872.93	2872.55	0.54	2873.63	2873.43	2875.5	OK	OK	
59	O-1	2884.39	2884.01	0.54	2885.09	2884.89	2886.7	OK	OK	
60	O-1	2884.39	2884.01	0.54	2885.09	2884.89	2886.3	OK	OK	
61	O-1	2883.45	2883.07	0.54	2884.15	2883.95	2885.3	OK	OK	
Where:										
1: Top of Curb at High Side of Lot										
2: TC-0.38 (For Roll Curb), TC-0.5 (For L Curb)										
3: Minimum Allowable Finished Floor Elevation above flowline elevation @ high side of lot = (2 x D ₁₀₀) + F/L										

SKYE CANYON II PARCEL 2.14									
FINISH FLOOR - CITY OF LAS VEGAS JURISDICTION									
INPUT INFORMATION				FINISHED FLOORS				NOTES	
Lot Number	Hydraulic Section Utilized	T/C ¹ (ft)	F/L ² (ft)	D ₁₀₀ (ft)	Flowline F.F. _{min} ³ (ft)	T/C + 6" F.F. _{min} ⁴ (ft)	F.F. _{design} (ft)	Flowline Check	T/C + 6" Check
4: City of Las Vegas minimum allowable finished floor elevation = T.C. @ high side of lot + 6-inches									
5: These lots have an adjacent solid grouted wall that protects the FF.									
City of Las Vegas Finished Floor Criteria:									
-The finished floor shall be set a vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the WSEL in the street.									
-The finished floor shall be set a vertical distance of at least 6-inches above the highest adjacent top of curb.									

See References on Last Sheet

Adjacent/Perimeter Street Check									
Lot	Street	High TC ¹	High FL ²	Section	Flow	Min FF ⁴	Design FF	Check	Solid Grout
11	Skye Struck Dr	2854.09	2853.71	O-1	0.54	2854.79	2857.9	OK	No
22	Skye Struck Dr	2859.68	2859.30	O-1	0.54	2860.38	2862.5	OK	No
36	Fire Skye Ave	2890.11	2889.73	O-1	0.54	2890.81	2888.3	CHECK	Yes
40	Warm Skye St	2881.79	2881.41	O-1	0.54	2882.49	2876.9	CHECK	Yes
49	Skye Struck Dr	2857.88	2857.50	O-1	0.54	2858.58	2858.6	OK	No
52	Fire Skye Ave	2864.58	2864.20	O-1	0.54	2865.28	2861.0	CHECK	Yes
53	Fire Skye Ave	2869.24	2868.86	O-1	0.54	2869.94	2874.8	OK	No
58	Fire Skye Ave	2879.71	2879.33	O-1	0.54	2880.41	2875.5	CHECK	Yes
59	Fire Skye Ave	2884.24	2883.86	O-1	0.54	2884.94	2886.7	OK	No
1	Eagle Canyon Ave	2871.57	2871.07	ECA4	0.58	2872.23	2878.7	OK	No
2	Eagle Canyon Ave	2869.80	2869.30	ECA4	0.58	2870.46	2876.3	OK	No
3	Eagle Canyon Ave	2867.33	2866.83	ECA4	0.58	2867.99	2873.8	OK	No
4	Eagle Canyon Ave	2863.25	2862.75	ECA4	0.58	2863.91	2871.3	OK	No
5	Eagle Canyon Ave	2862.40	2861.90	ECA4	0.58	2863.06	2868.6	OK	No
6	Eagle Canyon Ave	2858.42	2857.92	ECA4	0.58	2859.08	2866.0	OK	No
7	Eagle Canyon Ave	2857.42	2856.92	ECA4	0.58	2858.08	2863.5	OK	No
8	Eagle Canyon Ave	2854.99	2854.49	ECA4	0.58	2855.65	2861.4	OK	No
9	Eagle Canyon Ave	2852.74	2852.24	ECA4	0.58	2853.40	2859.8	OK	No
10	Eagle Canyon Ave	2850.87	2850.37	ECA4	0.58	2851.53	2858.8	OK	No
11	Eagle Canyon Ave	2849.37	2848.87	ECA4	0.58	2850.03	2857.9	OK	No
12	Skye Village Road	2848.66	2848.16	P-1	0.48	2849.12	2856.4	OK	No
13	Skye Village Road	2848.91	2848.41	P-1	0.48	2849.37	2858.0	OK	No
14	Skye Village Road	2849.04	2848.54	P-1	0.48	2849.50	2859.2	OK	No
15	Skye Village Road	2849.35	2848.85	P-1	0.48	2849.81	2859.7	OK	No
16	Skye Village Road	2849.55	2849.05	P-1	0.48	2850.01	2860.2	OK	No
17	Skye Village Road	2849.74	2849.24	P-1	0.48	2850.20	2860.5	OK	No
18	Skye Village Road	2849.94	2849.44	P-1	0.48	2850.40	2860.7	OK	No
19	Skye Village Road	2850.14	2849.64	P-1	0.48	2850.60	2861.0	OK	No
20	Skye Village Road	2850.33	2849.83	P-1	0.48	2850.79	2861.4	OK	No
21	Skye Village Road	2850.53	2850.03	P-1	0.48	2850.99	2861.8	OK	No

1: High TC is the elevation at the high side of the adjacent perimeter street

2: 0.38-ft is subtracted from the High TC to obtain the High FL elevation

3: Flow depth is the normal depth in adjacent perimeter street

4: Min FF is the High FL plus twice the depth of flow.

Storm Drain FFE Check						
Lot Number	High FL ¹	Facility Number	Ponding Depth ²	Min FF ³	Design FF	Check
12	2852.78	P1	0.83	2855.11	2856.40	OK
						No

1: TC - Curb height at the drainage facility

2: Ponding depth is peak ponding depth above the drainage facility

3: Min FF is the High TC/FL plus the Flow Depth plus 18 inches.

Specific Energy Check							
Lot Number	High TC ¹	High FL ²	Section	Specific Energy ³	Min FF ⁴	Design FF	Check
12	2854.48	2854.10	O-1(Max)	1.05	2855.15	2856.40	OK
13	2856.07	2855.69	O-1(Max)	1.05	2856.74	2858.00	OK
18	2859.02	2858.64	O-1(Max)	1.05	2859.69	2860.70	OK
19	2858.72	2858.34	O-1(Max)	1.05	2859.39	2861.00	OK
26	2870.22	2869.84	O-1(Max)	1.05	2872.10	2872.10	OK
27	2873.09	2872.71	O-1(Max)	1.05	2875.00	2875.00	OK

1: High TC is the elevation at the high side of the adjacent perimeter street

2: 0.38-ft is subtracted from the High TC to obtain the High FL elevation

2: Specific energy depth is taken from FlowMaster calculation for street directing flow toward lot.

3: Min FF is the High FL plus the specific energy depth.

Emergency Overflow - FFE Check							
Lot Number	High FL ¹	Section	Normal/Headwater Depth	Min FF ³	Design FF	Check	Solid Grout
11	2853.03	E-1	0.14	2853.17	2857.90	OK	No
11	2853.03	E-1(Weir)	0.38	2853.86	2857.90	OK	No
12	2853.03	E-1	0.14	2853.86	2856.40	OK	No
12	2853.03	E-1(Weir)	0.38	2853.86	2856.40	OK	No

1: TC - Curb height at the Easement

APPENDIX E

Reference Material

Technical Drainage Study for Skye Canyon – Phase 2 Infrastructure, by SHG

Approval Letters

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		October 19, 2017
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	COPIES TO:	
Drainage Study for:	Slater Hanifan Group, Inc.	
Skye Canyon – Phase 2 Infrastructure Update #5		
Cross Streets:	NWC of Grand Teton Blvd. & Hualapai Way	Section 12, LLC / Ninety Five Mgmt.
File Number:	F:\Depot\DSMemos\DS4739J.doc	Bart Anderson, P.E., DevCo
Parcel Number:	Portion of 126-12-000-001	CCRFCFCD
Zoning Action:	TMP-58560	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES X	NO

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal & Supplemental	6/18/2015, 8/4/2015	8/26/2015	Not Approved	\$400.00	402578: \$400
2 nd Submittal	10/19/2015	11/02/2015	Not Approved	\$400.00	419048: \$400
3 rd Submittal	11/19/2015 & Supplemental	1/7/2016	Conditional Approval	\$400.00	423549: \$400
4 th Submittal	4/4/2016	4/13/2016	Conditional Approval	\$100.00	438958: \$100
5 th Submittal & CCRFCFCD	5/12/2016 & 5/16/2016	6/8/2016 & 6/21/2016	Conditional Approval	\$100.00	443735: \$100
6 th Submittal	12/15/2016 & 1/17/2017	1/19/2017	Conditional Approval	\$100.00	469104: \$100
7 th Submittal	6/19/2017	7/10/2017	Not Approved	\$100.00	488195: \$100
8 th Submittal	8/2/2017	8/17/2017	Approved	\$400.00	489157: \$400
9 th Submittal	9/28/2017	10/19/2017	See Comments Below	\$100.00	490355: \$100
TOTAL FEES (LDDRS):				\$2,100.00	----

REMARKS:

9th Submittal: Update #5 for minor revision of storm drain connection at the intersection of Grand Teton Boulevard and Egan Crest Drive.

7th & 8th Submittals: Update #4 & Addendum for minor relocations of drop inlets and the discharge stub of Parcel 2.27

6th Submittal: Update #3 Revise storm drain system capture and collection points based upon Parcel development.

5th Submittal: Update #2 and CCRFCFCD concurrence received. Revised Memo on 6/21/2016, Approved "At Risk".

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

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is approved "At Risk" subject to the final approval of the Revised Master Drainage Study.

The following conditions are repeated until they are complete:

A Flood Control Master Plan Amendment (MPA) shall be updated to reflect the latest Master Plan for the Skye Canyon Development and approved by the City 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.

Detention Basin #1 and the Phase 2 Infrastructure are required to be substantially complete prior to the final inspection of the first Unit in Phase 2. No Certificate of Occupancy on the houses will be issued until after the detention basin has been accepted for Substantial Completion by the City.

1. Note that the ***Skye Canyon Master Drainage Study*** has not been approved in the current stage. The subject *Skye Canyon Infrastructure Phase 2* drainage study is approved **"At Risk"** until the final approval of the Master Drainage Study. Any changes required by the Master Drainage Study to the Phase 2 area shall require a drainage study update to the ***Phase 2 Infrastructure Study*** and any required facility changes to the Phase 2 Infrastructure shall be provided at the developers' cost.
2. The ***Skye Canyon Phase 2 Development*** is based on the sole protection of a planned ***Skye Canyon Detention Basin #1*** from major storm flood events. The Detention Basin #1 drainage study has been approved.
3. Building Permits for onsite developments within Phase 2 will be issued subject to the construction and substantial completion of the ***Skye Canyon Detention Basin #1***. The notice of Substantial Completion from the City of Las Vegas, Department of Public Works is required for the release of Occupancy Permits for any development within Phase 2.
4. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility. CCRFCD concurrence has been provided for the Phase 2 Infrastructure.
5. The impacts to existing downstream neighborhoods of the long term discharge from the detention basin(s) and the Phase 2 developments without the associated regional outfall facilities is a major concern of both the City and the Clark County Regional Flood Control District. Flood Control understands that these interim impacts are addressed with Skye Canyon Detention Basin #1. The proposed interim impact solution was included as a part of the Skye Canyon Detention Basin #1 improvements until the overall Skye Canyon MPU facilities are completed.
6. The drainage study for Phase 2 Infrastructure assumes that the project will be constructed in one phase. It was noted within this Addendum response that the developer desires to phase the construction of the improvements. If improvement plans are submitted to break the Phase 2 Infrastructure into separate phases, a drainage study update will be required for each phase addressing the interim condition.
7. The development of Parcel 2.23B, identified as Parcel WML9 on Exhibit E2, drains through the future park and onto Eagle Canyon (WC10A) near Station 41+00 on Sheet C-03. The roadway plans shall incorporate the proposed drainage facilities as the 60 cfs will impact the 17-foot sidewalk & amenity zone. Provide concrete low flow channel connection through the 17-foot sidewalk & amenity zone.

8. The provided Phase 2 Infrastructure plans only show the proposed drainage facilities. The complete improvement plans will require additional review for impacts with other needed infrastructure; i.e. sanitary sewer, water, gas, etc. Any changes to the proposed storm drain system shall require a drainage study update.
9. The Storm Drain Plans have been revised to accommodate the proposed cross fall street sections and include added nuisance inlets at low points within the intersections.
10. The plans show preliminary mass grading with collection facilities within the parcels to intercept the flows prior to entering the infrastructure roadway improvements. It was noted that the inlet collection system needs to incorporate stormwater quality (SWQ) features and Best Management Practices (BMP's) at these interim collection points. This information will be provided and shown on the SWPPP, a copy of which shall be provided to Flood Control prior to permits. Additionally, the mass grading plan (Sheet GR-03) shows sheet flow from Basin ON2-1B discharging directly onto Hualapai Way without any interim collection. Revise to incorporate interim collection.
11. All drainage facilities proposed in this **Phase 2 Infrastructure Study** are considered interim facilities and must be maintained by the Master Developer until the facilities are dedicated to and formally accepted by the *City of Las Vegas*.
12. Since the streets network and the associated storm drain facilities will eventually be accepted by the City, the engineer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final approval of the subject drainage study.
13. The provided WSPG Model shows that the storm drain in *Eagle Canyon Avenue* exceeds the maximum allowed velocity (25 fps) per the *CCRFCD Hydrologic & Hydraulic Design Manual*. A *Special Construction Note* has been added to the plan & profile sheets that call out the special construction requirement and the required special inspection for the additional sacrificial concrete.
14. Structural plans for the storm drain improvements must be submitted for review. Provide a soil report, structural calculations and specifications, wet stamped structural sets and a grading plan to the *City of Las Vegas Building Department* for processing (call *Building Department* to confirm their submittal requirements). The engineer must provide a copy of *Building Department* approval of the structures to *City Flood Control Section* prior to the final acceptance of the technical drainage study.
15. The project proposes to build temporary drainage berms/swales over the *Phase 2* site. 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 \$50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for construction the facility and an exhibit that adequately shows the location and limits of the drainage facility to *City Flood Control* for approval. Once the drainage study is conditionally approved, the engineer/developer should contact the *City's Land Development Section* (702-229-6371) to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update/letter will be required to justify that the berms/swales are no longer necessary and can be removed.
16. Technical drainage studies are required for each of the future PODs. Final approval for the infrastructure study must be obtained prior to final approval of the impacted POD drainage studies.
17. A note on the Grading Plans has been provided that "*Property Owner is responsible to maintain the best management practices such as but not limited to the removal of accumulated sediment and debris and care of the vegetation.*"
18. A numbering system for the manholes and inlets has been provided. It was noted in the response that the project may be divided into additional phases.
19. Show the size of all the proposed riprap areas. The rip-rap pads are shown on the GR-Sheets and some of the SD-Sheets include the pad size. Add the pad size to the grading plans and revise all pertinent plans and callouts accordingly.

20. Revise the pipe penetration detail to include a concrete collar with dowelled rebar connections. The detail has not been provided at this time and was noted that it will be a part of the Structural Details.
21. Provide details for the transition structure modifications to accommodate the 66"-RCP connection and the removal of the existing facilities to allow construction of the proposed improvements. The detail has not been provided at this time and was noted that it will be a part of the Structural Details.

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

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

END OF REMARKS
AYS/PBJ

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

Drainage Exhibits

100-Year Street Flow Summary				
Ultimate Condition				
Cross Section	Slope (%)	Q _{max} (cfs)	Depth (ft)	Velocity (ft/s)
EC1	4.50	33	0.46	6.1
EC2	4.80	99	0.62	8.5
EC3	2.00	47	0.58	4.7
EC4	4.94	17	0.38	5.3
EC5	4.94	13	0.36	4.9
EC6	4.94	32	0.46	6.1
EC7	4.94	25	0.58	2.5
EC8	2.40	4	0.29	2.9
EC9	0.50	2.5	0.38	1.6
EC10	0.50	4	0.35	3.3
EC11	2.75	4	0.28	2.5
EC12	2.75	3	0.26	2.9
EC13	0.57	59	0.62	3.8
EC14	0.57	41	0.62	3.5

Referenced Ultimate Condition Flow Rate Summary				
Concentration Points				
Basin/Concentration Point ID	Area (sq. ft)	Q _{max} (cfs)	Q _{avg} (cfs)	Q ₁₀₀ (cfs)
WC10A	0.03	60	30	30
Q = WMA3 + WMA5				
WC10B	0.05	99	48	48
Q = WC10A + WMA4 + WMA1				
WC11	0.07	127	61	61
Q = WMA10 + WMA6				
WC12	0.11	226	109	109
Q = WMA10 + WMA1				
WC13	0.17	352	170	170
Q = WC12 + WMA8 + WMA7 + WMA13 + WMA2				
WC14	0.24	485	236	236
Q = WMA14 + WMA3 + WMA3 + WMA4				
WC20	0.05	96	42	42
Q = WMA5 + WMA5				
WC22A	0.05	67	43	43
Q = WMA4 + WMA4 + WMA3				

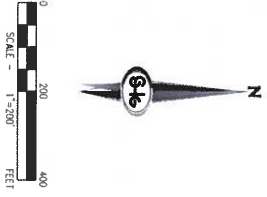
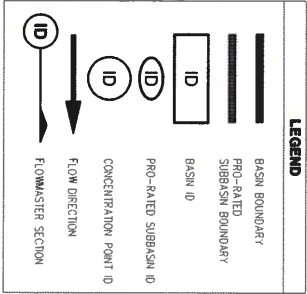
Ultimate Condition Pooled Flow Summary				
Basin	Q _{max} (cfs)	Area (sq. ft)	Unit Flow (cfs/ac)	Q _{avg} (cfs)
WSHA4	6	1.4	4.2	4.2
WSHA5	8	2.4	3.4	3.4
WEGN2	6	2.1	3.0	3.0
WEGN3	10	3.3	3.0	3.0
Subbasin				
WSHA4A	4	3.3	1.2	1.2
WSHA4B	1	0.3	4.2	4.2
TOTAL	6	7.4	3.4	3.4
WSHA5A	4	1.3	3.4	3.4
WSHA5B	4	1.1	3.4	3.4
TOTAL	8	2.4	3.0	3.0
WEGN2A	2	0.6	3.0	3.0
WEGN2B	4	1.5	3.0	3.0
TOTAL	6	2.1	3.0	3.0
WEGN3A	8	2.5	3.0	3.0
WEGN3B	2	0.8	3.0	3.0
TOTAL	10	3.3		

Referenced Ultimate Condition Flow Rate Summary				
Basin/Concentration Point ID	Area (sq. ft)	Q _{max} (cfs)	Q _{avg} (cfs)	Q ₁₀₀ (cfs)
WL4A	8.0	22	10	10
WL4B	8.9	22	12	12
WL5A	10.9	32	15	15
WL5B	3.8	32	14	14
WL6B	10.6	30	14	14
WL7	11.5	34	16	16
WL8	17.4	48	22	22
WL10	11.6	38	19	19
WL11	16.0	48	23	23
WL13	16.4	49	25	25
WL14	19.2	59	29	29
WL15	19.2	59	29	29
WL16	16.4	55	28	28
WL17	27.4	79	39	39
WL18	6.7	19	9	9
WPRK5	6.7	19	9	9
WPRK6	2.0	5	2	2

HEC-RAS Summary Table				
River Sta	Q Total (cfs)	Min Ch B (ft)	W.S. Elev (ft)	Overbank Left/Right Velocity (ft/sec)
-3800	99	2874.12	2874.74	8.43
-3900	99	2869.22	2869.84	8.43
-4000	99	2864.32	2864.94	8.43
-4100	99	2859.42	2859.04	8.43
-4200	99	2854.52	2855.14	8.43
-4300	99	2849.62	2845.24	8.43
-4400	99	2844.72	2840.34	8.43
-4500	99	2839.82	2835.44	8.43
-4600	99	2834.92	2830.54	8.43
-4700	99	2830.02	2830.64	8.43
-4800	99	2825.12	2825.74	8.43

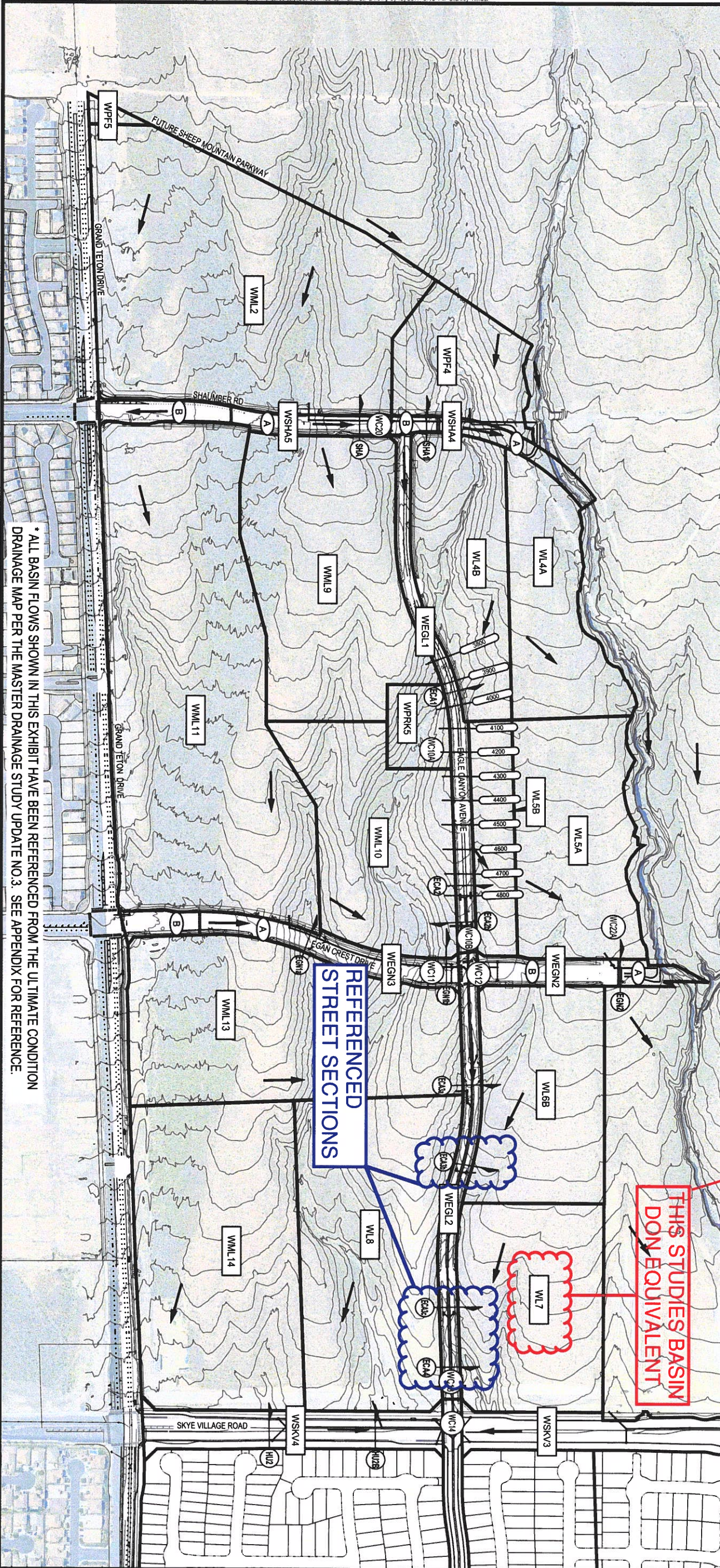
10-Year Street Flow Summary				
Ultimate Condition				
Cross Section	Slope (%)	Q _{max} (cfs)	Depth (ft)	Dry Lane (ft)
EC1	2.40	2	0.24	0.8
EC2	0.50	1	0.30	1.3
EC3	0.50	2	0.30	1.3
EC4	2.75	29	0.73	3.2
EC5	0.57	22	0.67	2.0

1. For Rating Drop Pools, Capture Flow as to nearest Dry Lane



THIS STUDIES BASIN
DOES EQUIVALENT

REFERENCED
STREET SECTIONS



* ALL BASIN FLOWS SHOWN IN THIS EXHIBIT HAVE BEEN REFERENCED FROM THE ULTIMATE CONDITION DRAINAGE MAP PER THE MASTER DRAINAGE STUDY UPDATE NO.3. SEE APPENDIX FOR REFERENCE.

Drop Inlets

Project:	Skye Canyon Infrastructure - Phase 2 Update No.4	
Title:	Type CM2 Drop Inlet (SUMP)	
Subtitle:	17.5-ft Drop Inlet at Section ECA4	
By:	ETM	
Date:	6/14/2017	

Input:	Variable:	Input:
Depth at Inlet (ft)	D	0.44
Grate Width (ft)	W	1.50
Length of Grate (ft)	L _g	15.00
Length of Curb Opening (ft)	L _c	17.50
Height of Curb Opening (ft)	H	0.500
Weir Coef. - Curb Opening	W _c	2.3
Weir Coef. - Grate	W _g	3.0
Orifice Coef.	O _c	0.67
Grate Coef.	G _c	0.60
Clogging Factor - Grate (%)	CF _g	50
Clogging Factor - Curb (%)	CF _c	50

Output (Grate):	Equation:	Output (Grate):
Effective Weir Length (ft)	2*W+L _g	18.00
Adjusted Effective Weir Length (ft)	2*(1-CF _g /100)*W+(1-CF _g /100)*L _g	9.00
Grate Open Area (sf)	W*L _g	22.50
Adjusted Grate Open Area (sf)	Grate Open Area * G _c *(1-CF _g /100)	6.75
Controlling Flow Type (weir/orifice)	If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length) use weir, else orifice	weir
Intercepted Flow (cfs)	weir: W _g *(Adj. Eff. Weir Length)*D ^{1.5}	7.9
	orifice: O _c *(Adj. Grate Open Area)*(64.4*D) ^{0.5}	

Output (Curb):	Equation:	Output (Curb):
Effective Weir Length (ft)	L+1.8*W	20.20
Adjusted Effective Weir Length (ft)	L+1.8(1-CF _c /100)*W	18.91
Curb Open Area (sf)	L*H	8.75
Adjusted Curb Open Area (sf)	Curb Open Area * (1-CF _c /100)	4.38
Controlling Flow Type (weir/orifice)	If D<H, weir, else orifice	weir
Intercepted Flow (cfs)	weir: W _c *(Adj. Eff. Weir Length)*D ^{1.5}	12.65
	orifice: O _c *(Adj. Curb Open Area)*(64.4*(D-H/2)) ^{0.5}	

Output (Combination):		Output (Combination):
Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	20.5

FLOW REDUCED BY
17-CFS BY ALL ONSITE
FLOW BEING COLLECTED
BY PROPOSED INLET
42-CFS - 17-CFS = 25-CFS
25/2 = 12.5-CFS PER INLET

Total Capacity for Two Inlets = 68 cfs Actual Flow Collected = 42 cfs

Street Flow Computations

Section - ECA3b (Ultimate Condition)

Worksheet for Irregular Channel

Project Description	
Worksheet	Section - ECA3b (Ultimate Condition)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	4.94 %
Discharge	14.00 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	0.016
Water Surface Elevation	0.36 ft
Elevation Range	0.00 to 0.56
Flow Area	2.8 ft ²
Wetted Perimeter	23.27 ft
Top Width	22.45 ft
Actual Depth	0.36 ft
Critical Elevation	0.48 ft
Critical Slope	0.69 %
Velocity	5.02 ft/s
Velocity Head	0.39 ft
Specific Energy	0.76 ft
Froude Number	2.51
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+43.00	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+21.50	0.56
0+41.00	0.17
0+41.00	0.13
0+42.50	0.00
0+42.50	0.48
0+43.00	0.50

STREET SECTION ADJACENT TO THE PROJECT SITE. NOT USED FOR ANY COMPUTATION, PROVIDED FOR REFERENCE ONLY

Section - ECA3b (Ultimate Condition)

Worksheet for Irregular Channel

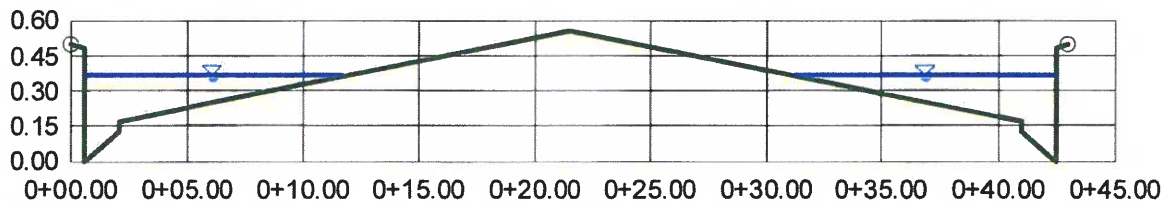
Notes: $Q = \text{WML13 (0 CFS)} + \text{EC3a BYPASS (11 CFS)} + \text{WEGL2/4 (3 CFS)} = 14 \text{ CFS}$

Section - ECA3b (Ultimate Condition)

Cross Section for Irregular Channel

Project Description	
Worksheet	Section - ECA3b (Ultimate Condition)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	4.94 %
Water Surface Elevation	0.36 ft
Elevation Range	0.00 to 0.56
Discharge	14.00 cfs



V:10.0
H:1
NTS

Section - ECA3c (Ultimate Condition)

Worksheet for Irregular Channel

Project Description	
Worksheet	Section - ECA3c (Ultimate Condition)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	4.94 %
Discharge	31.00 cfs

STREET SECTION ADJACENT TO
THE PROJECT SITE. NOT USED FOR
ANY COMPUTATION, PROVIDED
FOR REFERENCE ONLY

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	0.016
Water Surface Elevation	0.45 ft
Elevation Range	0.00 to 0.56
Flow Area	5.1 ft²
Wetted Perimeter	32.12 ft
Top Width	31.12 ft
Actual Depth	0.45 ft
Critical Elevation	0.60 ft
Critical Slope	0.61 %
Velocity	6.06 ft/s
Velocity Head	0.57 ft
Specific Energy	1.02 ft
Froude Number	2.64
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+43.00	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+21.50	0.56
0+41.00	0.17
0+41.00	0.13
0+42.50	0.00
0+42.50	0.48
0+43.00	0.50

Section - ECA3c (Ultimate Condition)

Worksheet for Irregular Channel

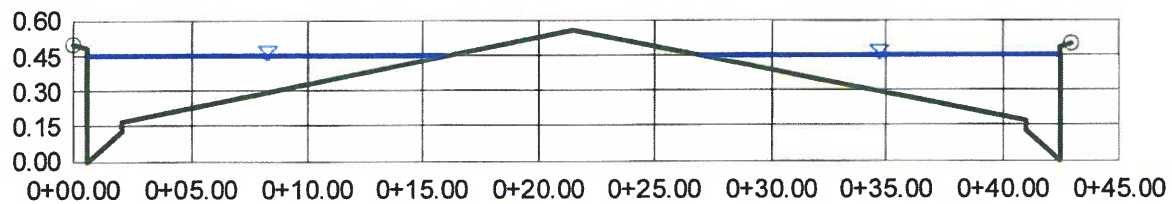
Notes: $Q = \text{Parcel 2.15 Basin ON2}\{\text{WL6B OVERFLOW (22 CFS)}\} + \text{EC3b BYPASS (6 CFS)} + \text{WEGL2/4 (3 CFS)} = 31 \text{ CFS}$

Section - ECA3c (Ultimate Condition)

Cross Section for Irregular Channel

Project Description	
Worksheet	Section - ECA3c (Ultimate Condition)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	4.94 %
Water Surface Elevation	0.45 ft
Elevation Range	0.00 to 0.56
Discharge	31.00 cfs



V:10.0
H:1
NTS

Section - ECA4 (Ultimate Condition)

Worksheet for Irregular Channel

**REFERENCED STREET SECTION
TO ANALYZE FINISHED FLOOR
ELEVATIONS OF LOTS ADJACENT
TO EAGLE CANYON AVENUE**

Project Description	
Worksheet	Section - ECA4 (Ultimate Condition)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.50 %
Discharge	24.00 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	0.016
Water Surface Elevation	0.58 ft
Elevation Range	0.00 to 0.56
Flow Area	9.9 ft²
Wetted Perimeter	44.21 ft
Top Width	43.00 ft
Actual Depth	0.58 ft
Critical Elevation	0.56 ft
Critical Slope	0.65 %
Velocity	2.42 ft/s
Velocity Head	0.09 ft
Specific Energy	0.67 ft
Froude Number	0.89
Flow Type	Subcritical

Calculation Messages:
Water elevation exceeds lowest end station by 0.77367849e-1 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+43.00	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+21.50	0.56
0+41.00	0.17
0+41.00	0.13
0+42.50	0.00
0+42.50	0.48
0+43.00	0.50

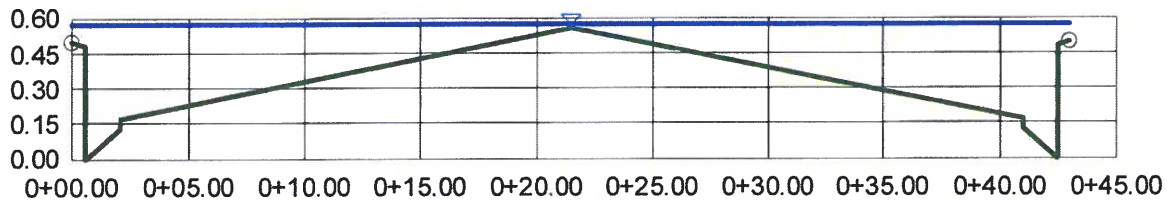
Section - ECA4 (Ultimate Condition) Worksheet for Irregular Channel

Notes: $Q = \text{WEGL2/4 (3 CFS)} + \text{ECA3c BYPASS (21 CFS)} = 24\text{CFS}$

Section - ECA4 (Ultimate Condition) Cross Section for Irregular Channel

Project Description	
Worksheet	Section - ECA4 (Ultimate Condition)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	0.50 %
Water Surface Elevation	0.58 ft
Elevation Range	0.00 to 0.56
Discharge	24.00 cfs



V:10.0
H:1
NTS

WSPG Storm Drain Models

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36.0

DATE: 6/15/2017
TIME: 16: 5

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4			1.50														
CD	24	4			2.00														
CD	30	4			2.50														
CD	36	4			3.00														
CD	42	4			3.50														
CD	48	4			4.00														
CD	54	4			4.50														
CD	60	4			5.00														
CD	66	4			5.50														
CD	72	4			6.00														
CD	78	4			6.50														

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)

HEADING LINE NO 2 IS -

BY OLYMPIA COMPANIES

HEADING LINE NO 3 IS -

EAGLE CANYON - TRUNK STORM DRAIN

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
1	IS A SYSTEM OUTLET		613.00	2823.35	72	2829.26				
2	IS A REACH		900.00	2830.52	72		0.00	0.00	0.00	1
3	IS A JUNCTION		900.00	2830.52	72					
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING										
4	IS A REACH		950.00	2831.58	72		0.00	0.00	0.00	1
5	IS A WALL ENTRANCE		950.00	2831.58	72					
6	IS A TRANSITION		1000.00	2835.61	66					
7	IS A WALL EXIT		1000.00	2835.61	66					
8	IS A REACH		1093.00	2837.13	66		0.00	0.00	0.00	1
9	IS A JUNCTION		1093.00	2838.13	54					
10	IS A REACH		1389.50	2839.63	54		0.00	0.00	0.00	1
11	IS A JUNCTION		1394.50	2840.13	48					
F 0 5 1 5 P										

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H	
12	IS A REACH		1632.00	2854.48	48	0.00	0.00	5.00	1	
13	IS A REACH		1762.00	2862.62	48	0.00	0.00	5.00	1	
14	IS A REACH		1883.00	2868.57	48	0.00	0.00	5.00	1	
15	IS A REACH		1992.00	2873.94	48	0.00	0.00	5.00	1	
16	IS A JUNCTION		1992.00	2873.94	48					
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING										
17	IS A REACH		2072.00	2877.87	48	0.00	0.00	5.00	1	
18	IS A REACH		2167.00	2882.51	48	0.00	0.00	5.00	1	

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ELEMENT NO 19 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 2262.00 2885.16 48 0.013 0.00 0.00 5.00 1

ELEMENT NO 20 IS A JUNCTION
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
 2262.00 2885.16 48 36 0 0.013 56.0 0.0 2886.16 0.00 38.00 0.00

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

ELEMENT NO 21 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 2422.00 2888.80 48 0.013 0.00 0.00 0.00 1

ELEMENT NO 22 IS A JUNCTION
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
 2422.00 2888.80 48 18 0 0.013 3.0 0.0 2891.30 0.00 45.00 0.00

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

PAGE NO 4

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 23 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 2820.00 2903.13 48 0.013 0.00 0.00 0.00 1

ELEMENT NO 24 IS A JUNCTION
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
 2820.00 2903.13 48 42 0 0.013 86.0 0.0 2903.63 0.00 45.00 0.00

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

ELEMENT NO 25 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 3004.00 2908.81 48 0.013 0.00 0.00 60.00 1

ELEMENT NO 26 IS A JUNCTION
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
 3004.00 2908.81 48 36 18 0.013 52.0 18.0 2909.81 2911.31 60.00 45.00

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

ELEMENT NO 27 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 3024.00 2910.72 48 0.013 0.00 0.00 0.00 1

ELEMENT NO 28 IS A JUNCTION
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
 3024.00 2910.72 48 48 0 0.013 18.0 0.0 2912.12 0.00 90.00 0.00

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

ELEMENT NO 29 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 3060.00 2912.43 48 0.013 0.00 0.00 0.00 1

ELEMENT NO 30 IS A SYSTEM HEADWORKS
U/S DATA STATION INVERT SECT W S ELEV
 3060.00 2912.43 48 0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: SLATER HANIFAN GROUP F0515P PAGE 1

WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/DIA	BASE/ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH					
613.00	2823.35	4.010	2827.360	479.5	23.88	8.853	2836.213	0.00	5.621	6.00	0.00	0.00	0	0.00
70.92	0.02498					.020090	1.42		3.757			0.00		
683.92	2825.12	4.102	2829.224	479.5	23.28	8.414	2837.638	0.00	5.621	6.00	0.00	0.00	0	0.00
88.77	0.02498					.018416	1.63		3.757			0.00		
772.69	2827.34	4.284	2831.623	479.5	22.19	7.649	2839.272	0.00	5.621	6.00	0.00	0.00	0	0.00
58.23	0.02498					.016459	0.96		3.757			0.00		
830.92	2828.79	4.483	2833.277	479.5	21.16	6.954	2840.231	0.00	5.621	6.00	0.00	0.00	0	0.00
40.67	0.02498					.014774	0.60		3.757			0.00		
871.59	2829.81	4.700	2834.510	479.5	20.18	6.321	2840.831	0.00	5.621	6.00	0.00	0.00	0	0.00
28.41	0.02498					.013347	0.38		3.757			0.00		
900.00	2830.52	4.944	2835.464	479.5	19.24	5.747	2841.211	0.00	5.621	6.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.018387	0.00					0.00		
900.00	2830.52	3.332	2833.852	391.0	24.25	9.128	2842.980	0.00	5.292	6.00	0.00	0.00	0	0.00
50.00	0.02120					.024400	1.22		3.468			0.00		
950.00	2831.58	3.305	2834.885	391.0	24.49	9.314	2844.199	0.00	5.292	6.00	0.00	0.00	0	0.00
TRANS STR	0.08060					.019055	0.95					0.00		
1000.00	2835.61	4.540	2840.150	391.0	18.64	5.395	2845.545	0.00	5.168	5.50	0.00	0.00	0	0.00
WALL EXIT												0.00		
1000.00	2835.61	4.539	2840.149	391.0	18.65	5.398	2845.547	0.00	5.168	5.50	0.00	0.00	0	0.00
8.18	0.01634					.013339	0.11		4.120			0.00		
1008.18	2835.74	4.560	2840.304	391.0	18.56	5.351	2845.655	0.00	5.168	5.50	0.00	0.00	0	0.00
61.83	0.01634					.012762	0.79		4.120			0.00		

LICENSEE: SLATER HANIFAN GROUP F0515P PAGE 2

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WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

STATION USED FOR
STARTING HGL

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF							
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1070.01	2836.75	4.825	2841.579	391.0	17.70	4.865	2846.444	0.00	5.168	5.50	0.00	0.00	0	0.00
22.99	0.01634					.011978	0.28			4.120		0.00		
1093.00	2837.13	5.168	2842.298	391.0	16.87	4.422	2846.720	0.00	5.168	5.50	0.00	0.00	0	0.00
JUNCT STR	0.00000					.017417	0.00					0.00		
1093.00	2838.13	5.209	2843.339	299.0	18.80	5.488	2848.827	0.00	4.385	4.50	0.00	0.00	0	0.00
296.50	0.00906					.023118	0.05			4.500		0.00		
1389.50	2839.63	10.838	2850.468	299.0	18.80	5.488	2855.956	0.00	4.385	4.50	0.00	0.00	0	0.00
JUNCT STR	0.10000											0.00		
1394.50	2840.13	2.787	2842.917	289.0	30.92	14.841	2857.758	0.00	3.963	4.00	0.00	0.00	0	0.00
237.50	0.06042					.055460	13.17			2.752		0.00		
1632.00	2854.48	2.908	2857.388	289.0	29.54	13.545	2870.933	0.00	3.963	4.00	0.00	0.00	0	0.00
70.99	0.06262					.050304	3.57			2.716		0.00		
1702.99	2858.93	3.014	2861.939	289.0	28.45	12.566	2874.505	0.00	3.963	4.00	0.00	0.00	0	0.00
59.01	0.06262					.045764	2.70			2.716		0.00		
1762.00	2862.62	3.162	2865.782	289.0	27.12	11.424	2877.206	0.00	3.963	4.00	0.00	0.00	0	0.00
15.82	0.04917					.043162	0.68			2.986		0.00		
1777.82	2863.40	3.178	2866.576	289.0	26.99	11.311	2877.887	0.00	3.963	4.00	0.00	0.00	0	0.00
105.18	0.04917					.041003	4.31			2.986		0.00		
1883.00	2868.57	3.347	2871.917	289.0	25.73	10.284	2882.201	0.00	3.963	4.00	0.00	0.00	0	0.00
7.31	0.04927					.038901	0.28			2.984		0.00		
1890.31	2868.93	3.364	2872.294	289.0	25.62	10.189	2882.483	0.00	3.963	4.00	0.00	0.00	0	0.00
60.57	0.04927					.037325	2.26			2.984		0.00		
LICENSEE: SLATER HANIFAN GROUP						F0515P							PAGE	3

WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

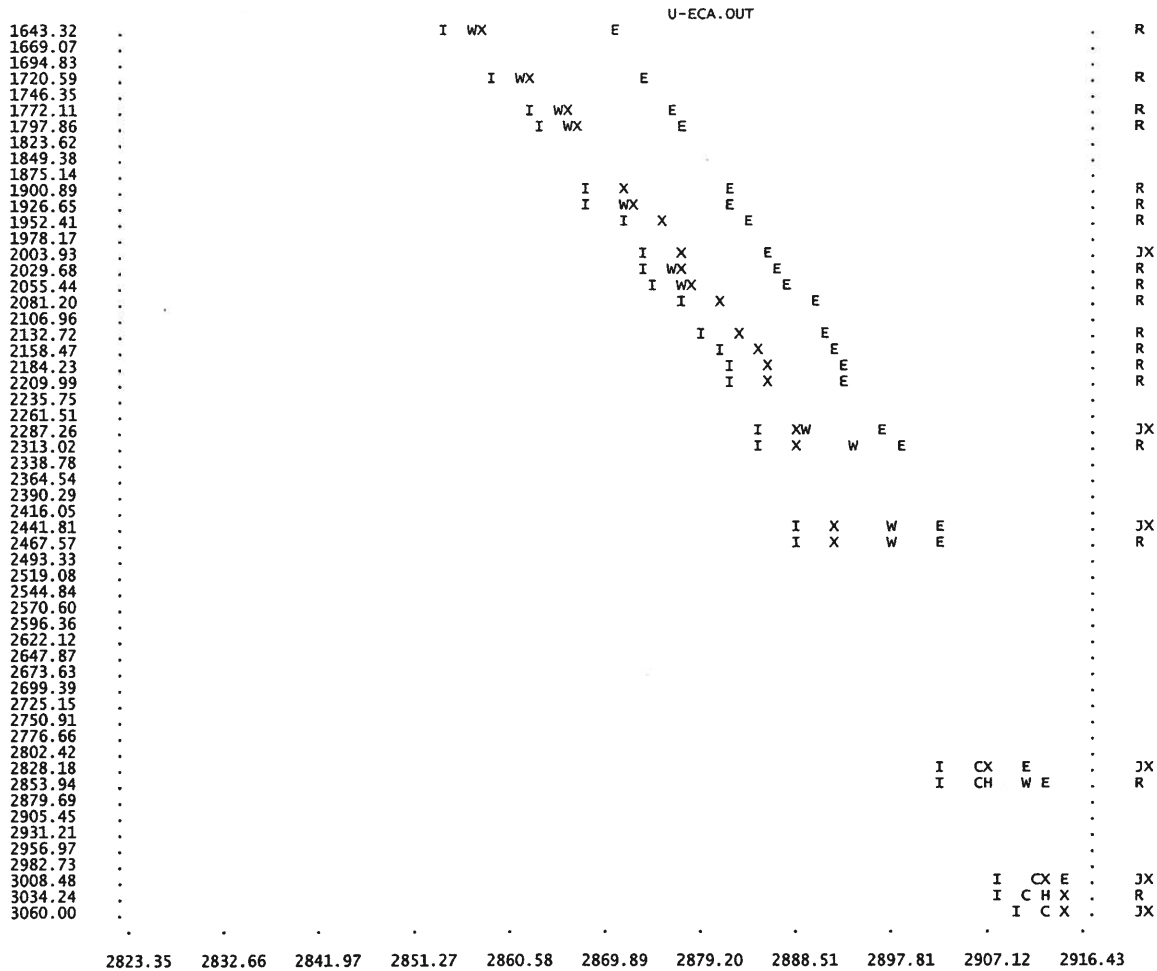
STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF							
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1950.88	2871.91	3.567	2875.481	289.0	24.42	9.262	2884.743	0.00	3.963	4.00	0.00	0.00	0	0.00
41.12	0.04927					.035621	1.46			2.984		0.00		
1992.00	2873.94	3.848	2877.788	289.0	23.29	8.421	2886.209	0.00	3.963	4.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.037623	0.00					0.00		
1992.00	2873.94	3.074	2877.014	269.0	25.96	10.465	2887.479	0.00	3.951	4.00	0.00	0.00	0	0.00
13.53	0.04913					.039592	0.54			2.820		0.00		
2005.53	2874.61	3.096	2877.701	269.0	25.77	10.311	2888.012	0.00	3.951	4.00	0.00	0.00	0	0.00
66.47	0.04913					.037405	2.49			2.820		0.00		
2072.00	2877.87	3.254	2881.124	269.0	24.57	9.373	2890.497	0.00	3.951	4.00	0.00	0.00	0	0.00
39.34	0.04884					.034253	1.35			2.826		0.00		
2111.34	2879.79	3.404	2883.196	269.0	23.60	8.650	2891.846	0.00	3.951	4.00	0.00	0.00	0	0.00
33.77	0.04884					.031859	1.08			2.826		0.00		
2145.11	2881.44	3.617	2885.058	269.0	22.50	7.864	2892.922	0.00	3.951	4.00	0.00	0.00	0	0.00
21.89	0.04884					.031405	0.69			2.826		0.00		
2167.00	2882.51	3.951	2886.461	269.0	21.45	7.148	2893.609	0.00	3.951	4.00	0.00	0.00	0	0.00
2.99	0.02789					.033326	0.10			4.000		0.00		
2169.99	2882.59	4.000	2886.594	269.0	21.41	7.116	2893.710	0.00	3.951	4.00	0.00	0.00	0	0.00
92.01	0.02789					.034835	3.21			4.000		0.00		
2262.00	2885.16	5.005	2890.165	269.0	21.41	7.116	2897.281	0.00	3.951	4.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.028529	0.00					0.00		
2262.00	2885.16	9.449	2894.609	213.0	16.95	4.461	2899.070	0.00	3.879	4.00	0.00	0.00	0	0.00
160.00	0.02275					.021988	3.52			3.220		0.00		
LICENSEE: SLATER HANIFAN GROUP						F0515P							PAGE	4

WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
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WATER SURFACE PROFILE LISTING															
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)															
BY OLYMPIA COMPANIES															
EAGLE CANYON - TRUNK STORM DRAIN															
STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF				NORM DEPTH			ZR	
3053.59	2912.13	3.236	2915.362	36.0	3.31	0.170	2915.532	0.00	1.787		4.00	0.00	0.00	0	0.00
2.97	0.04750					.000677	0.00				0.915		0.00		
3056.56	2912.27	3.080	2915.347	36.0	3.47	0.187	2915.534	0.00	1.787		4.00	0.00	0.00	0	0.00
2.60	0.04750					.000751	0.00				0.915		0.00		
3059.16	2912.39	2.940	2915.330	36.0	3.64	0.205	2915.535	0.00	1.787		4.00	0.00	0.00	0	0.00
0.84	0.04750					.000808	0.00				0.915		0.00		
3060.00	2912.43	2.894	2915.324	36.0	3.70	0.212	2915.536	0.00	1.787		4.00	0.00	0.00	0	0.00

613.00	.	I	W X	E		R
638.76	.	.	.	.	.	.
664.52	.	.	.	.	.	.
690.27	.	I	WCH	E	.	R
716.03	.	.	.	.	.	.
741.79	.	.	.	.	.	.
767.55	.	.	.	.	.	.
793.31	.	I	W X	E	.	R
819.06	.	.	.	.	.	.
844.82	.	I	WCH	E	.	R
870.58	.	.	.	.	.	.
896.34	.	I	WCH	E	.	R
922.09	.	I	XH	E	.	JX
947.85	.	I	W CH	E	.	R
973.61	.	I	W CH	E	.	TX
999.37	.	.	.	.	.	.
1025.13	.	.	IYYYYXH	E	.	WX
1050.88	.	.	I	XH	E	R
1076.64	.	.	I	XH	E	R
1102.40	.	.	I	XH	E	R
1128.16	.	.	I	X	E	JX
1153.92	.	.	I	XW	E	R
1179.67	.	.	.	.	.	.
1205.43	.	.	.	.	.	.
1231.19	.	.	.	.	.	.
1256.95	.	.	.	.	.	.
1282.71	.	.	.	.	.	.
1308.46	.	.	.	.	.	.
1334.22	.	.	.	.	.	.
1359.98	.	.	.	.	.	.
1385.74	.	.	.	.	.	.
1411.49	.	.	I	X	W	E
1437.25	.	.	I	WX	E	JX
1463.01	.	.	.	.	.	R
1488.77	.	.	.	.	.	.
1514.53	.	.	.	.	.	.
1540.28	.	.	.	.	.	.
1566.04	.	.	.	.	.	.
1591.80	.	.	.	.	.	.
1617.56	.	.	.	.	.	.



NOTES

1. GLOSSARY

- I = INVERT ELEVATION
- C = CRITICAL DEPTH
- W = WATER SURFACE ELEVATION
- H = HEIGHT OF CHANNEL
- E = ENERGY GRADE LINE
- X = CURVES CROSSING OVER
- B = BRIDGE ENTRANCE OR EXIT
- Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

PREVIOUSLY APPROVED WSPG
MODEL FOR ONSITE LATERAL

0
T1 SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
T2 BY OLYMPIA COMPANIES
T3 EAGLE CANYON LATERAL P6-L1
SO 1000.002839.13 42
R 1028.002839.49 42 .013
JX 1028.002840.99 24 24 .013 20.5
R 1058.002841.44 24 .013
SH 1058.002841.44 24

2843.34

2840.99

45. 1
90.00 1

ADOPTED
STARTING WSEL
FOR ONSITE
LATERAL

CD 18 4 1.5
CD 24 4 2.
CD 30 4 2.5
CD 36 4 3.
CD 42 4 3.5
CD 48 4 4.
CD 54 4 4.5
CD 60 4 5.
CD 66 4 5.5
CD 72 4 6.
CD 78 4 6.5

→

0
Q
→

17.0

P6-L2.WSQ

DATE: 6/14/2017
TIME: 16: 9

F0515P WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING										PAGE 1									
CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4			1.50														
CD	24	4			2.00														
CD	30	4			2.50														
CD	36	4			3.00														
CD	42	4			3.50														
CD	48	4			4.00														
CD	54	4			4.50														
CD	60	4			5.00														
CD	66	4			5.50														
CD	72	4			6.00														
CD	78	4			6.50														

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)

HEADING LINE NO 2 IS -

BY OLYMPIA COMPANIES

HEADING LINE NO 3 IS -

EAGLE CANYON LATERAL P6-L1

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

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NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

LICENSEE: SLATER HANIFAN GROUP

F0515P

PAGE 1

WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON LATERAL P6-L1

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO													
1000.00	2839.13	4.210	2843.340	37.5	3.90	0.236	2843.576	0.00	1.902	3.50	0.00	0.00	0	0.00
28.00	0.01286					.001389	0.04		1.380			0.00		
1028.00	2839.49	3.936	2843.426	37.5	3.90	0.236	2843.662	0.00	1.902	3.50	0.00	0.00	0	0.00
JUNCT STR	0.00000					.003518	0.00					0.00		
1028.00	2840.99	2.699	2843.689	17.0	5.41	0.455	2844.144	0.00	1.486	2.00	0.00	0.00	0	0.00
30.00	0.01500					.005647	0.17		1.130			0.00		
1058.00	2841.44	2.442	2843.882	17.0	5.41	0.455	2844.337	0.00	1.486	2.00	0.00	0.00	0	0.00

SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON LATERAL P6-L1

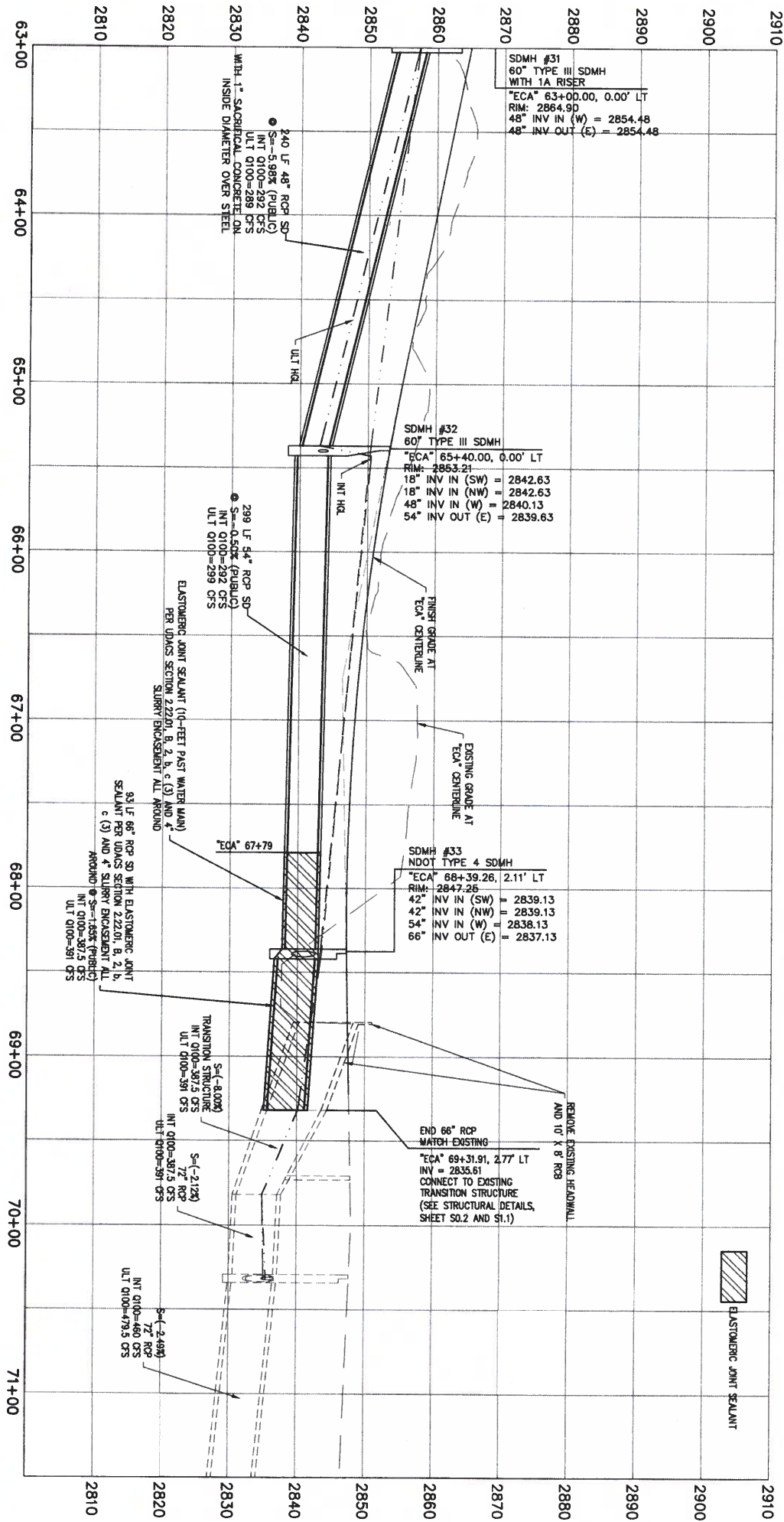
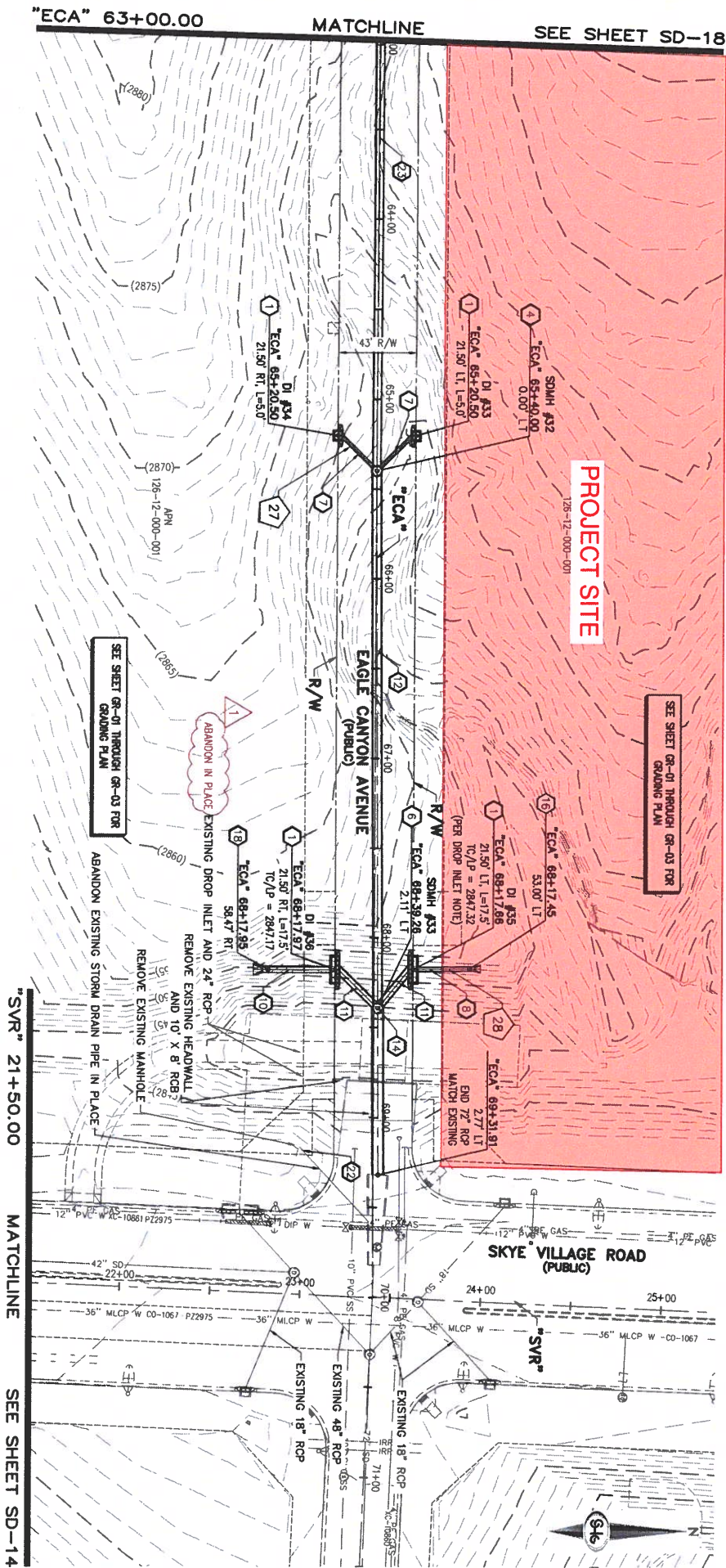
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1. GLOSSARY

- Page 2

Pertinent Improvement Plan Sheets



STORM DRAIN NOTES

1. CONSTRUCT TYPE "CAZ" DROP INLET (USDOCA STD. DWG. NO. 412.1)
2. REMOVE EXISTING LATERAL, STOP AND CONSTRUCT RCP PLUG (SEE DETAIL 5, DRAWING SD-25)
3. CONSTRUCT 60" TYPE I MANHOLE (USDOCA STD. DWG. NO. 403.1)
4. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
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92. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
93. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
94. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
95. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
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97. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
98. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
99. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)
100. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE 1A RISER (USDOCA STD. DWG. NO. 406.1)

NOTES

1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN.
2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCP/RC.
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT SWAMP AND DETAIL PER USDOCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES ARE PUBLICLY MAINTAINED.
6. ADD SPECIAL INSPECTION REQUIRED FOR PIPE SEGMENTS WITH SACRIFICIAL CONCRETE.

APPROVED FOR CONSTRUCTION

LVMW WILL HAVE TO BE PRESENT AND VIEW INSTALLATION OF STORM DRAIN THAT WILL BE INSTALLED THAT MAY AFFECT THE WATER MAINS

LVMW ENGINEERING SERVICES MANAGER

PROJECT NO. 124568 DATE 1ST APPROV. 10/10/16

DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE, CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BUILT, OR FLAT STRIP (WATER, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL).

LEGEND

1 STORM DRAIN LATERAL (SEE SHEETS SD-20 THRU SD-24)

FLOOD ZONE

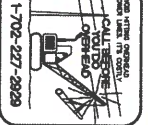
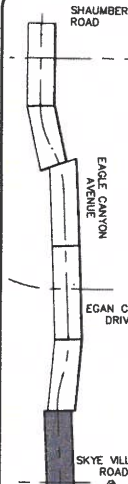
1. PROPERTY THAT THE GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY (SD-47) ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED FLOOD ZONE (OUTSIDE THE 500-YEAR FLOOD PLAIN) ON THE FLOOD INSURANCE RATE MAP (FIRM) PANEL 300030101C, DATED SEPTEMBER 27, 2002.

NOTE:

PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES, EROSION CONTROL, AND TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF VEGETATION.

KEY MAP



NINETY-FIVE MANAGEMENT LLC

SKYE CANYON II PHASE 2 MASS GRADING EAGLE CANYON AVENUE PLAN AND PROFILE "ECA" 63+00.00 TO "ECA" 71+50.00

DATE: 8/3/16

DRAWN: JAS

CHECKED: JSR

DESIGNER: DAM

PROJECT NO. OLY1501-001

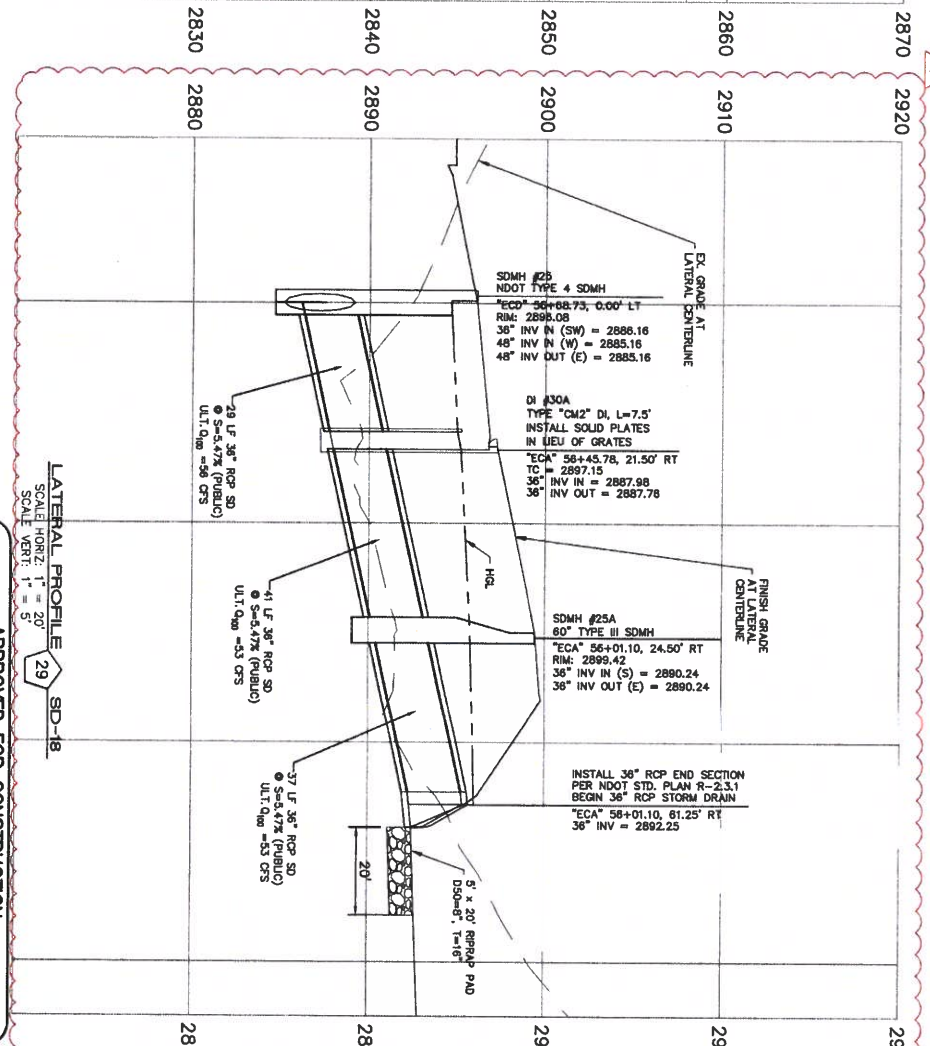
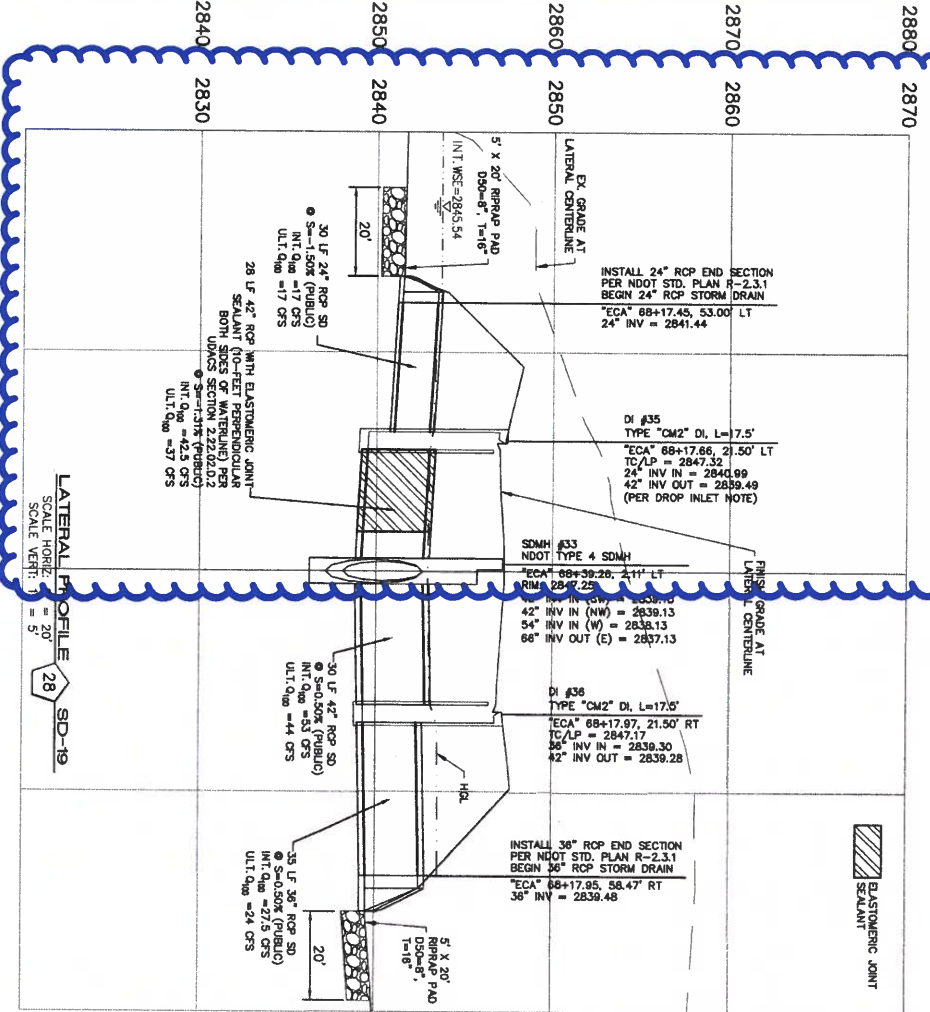
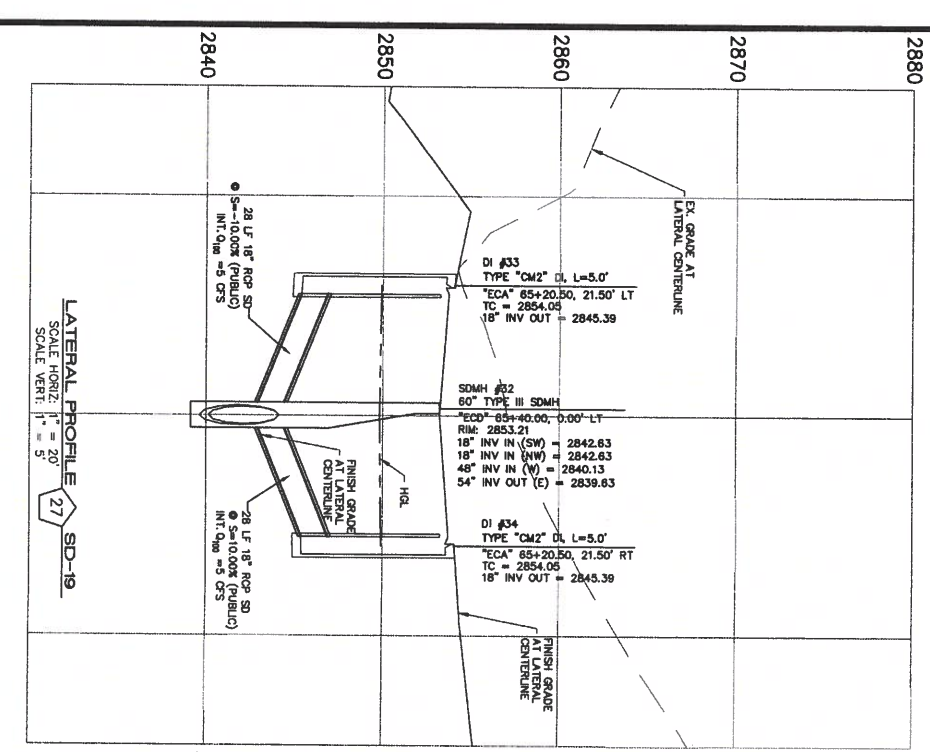
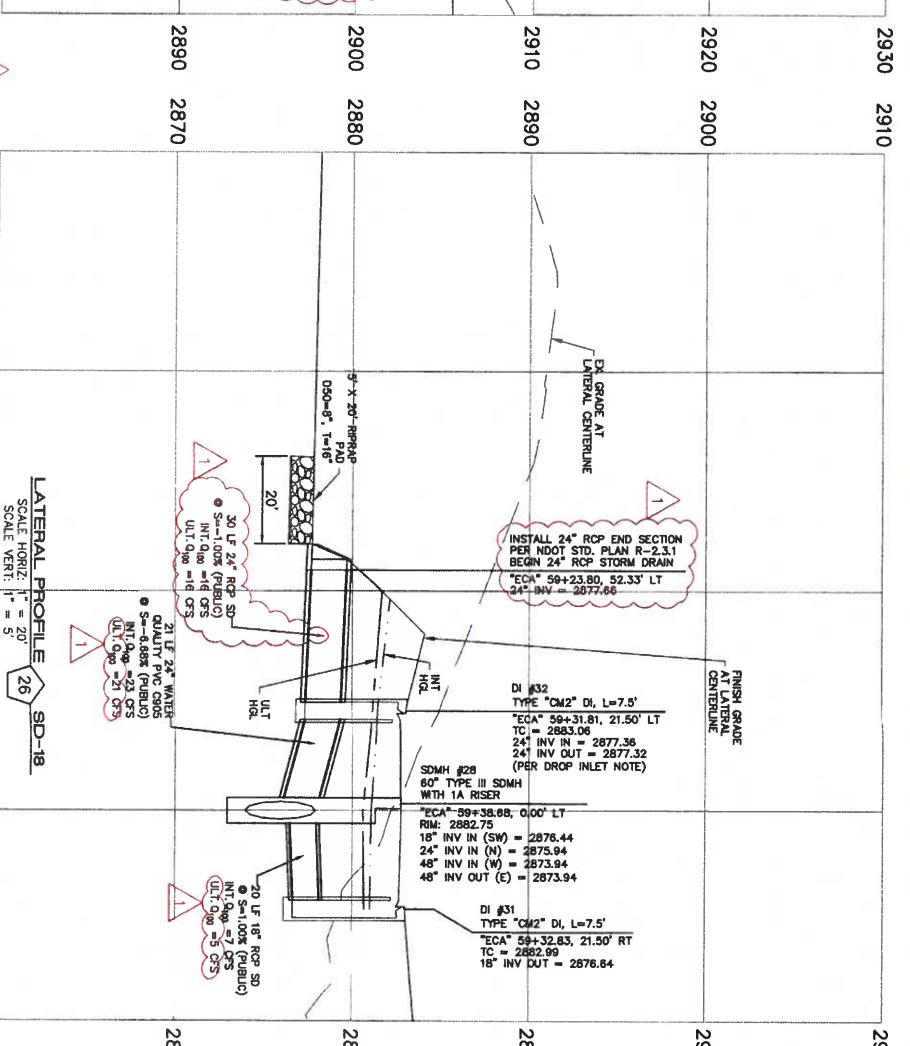
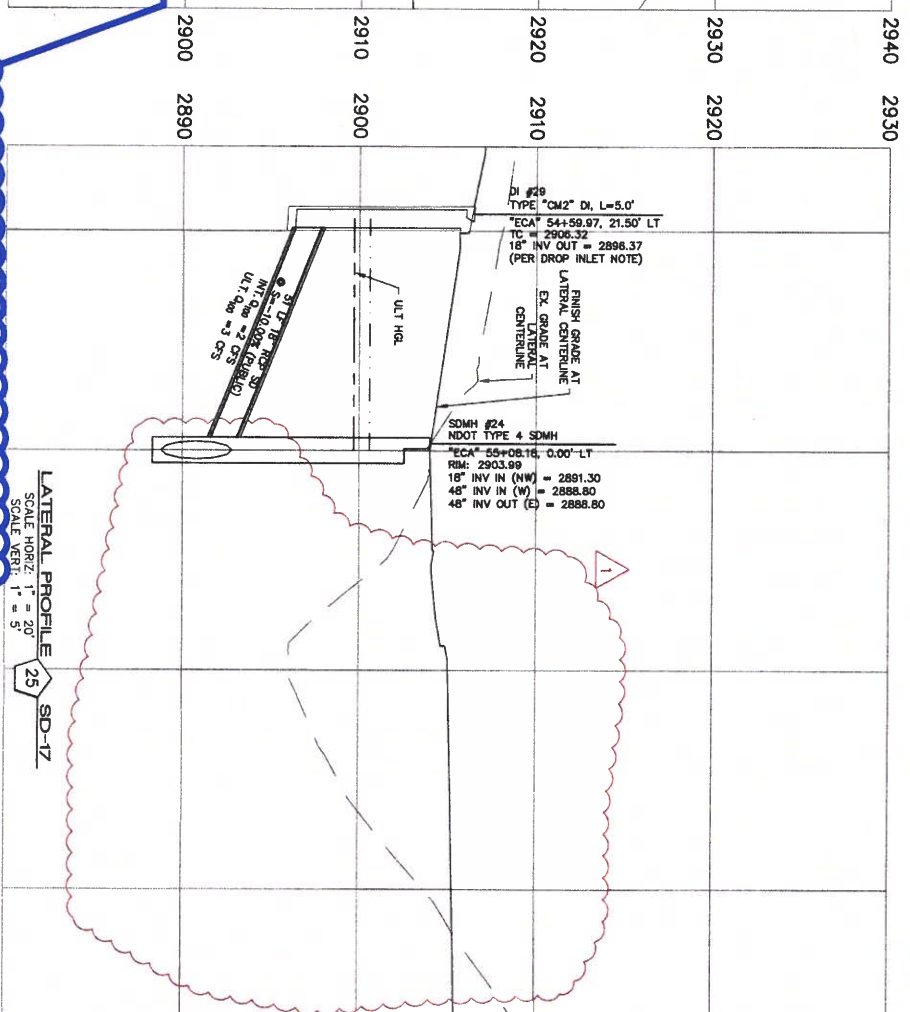
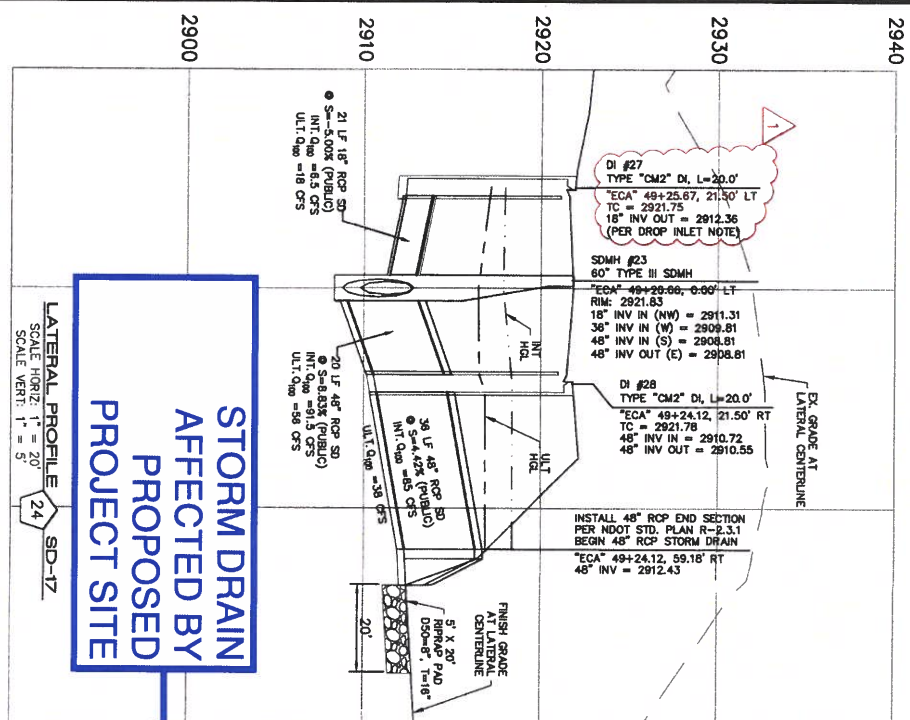
NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1	REVISED STORM DRAIN	8/2/17	JUS		

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

SD-19
SHEET 22 OF 32

PROFESSIONAL ENGINEER
JERRY SLATER
No. 14181
State of Nevada

Call before you dig
1-800-267-2800



DROP INLET NOTE

APPROVED FOR CONSTRUCTION
LYVVO WILL HAVE TO BE PRESENT AND VIEW INSTALLATION OF STORM DRAIN THAT WILL BE INSTALLED THAT MAY AFFECT THE WATER MAINS

[illegible]

APPENDIX F

Reference Material

Technical Drainage Study for Skye Canyon – Phase 1 Infrastructure, by SHG

Approval Letter

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		July 11, 2015
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Drainage Study for: Skye Canyon – Phase 1 Infrastructure - Update #6		COPIES TO: Slater Hanifan Group
Cross Streets:	NEC of Grand Teton Blvd. & Hualapai Way	K A G Development South, LLC / Ninety-Five Management, LLC
File Number:	F:\Depot\DSMemos\DS4661K.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-07-301-001 & 125-07-301-002; 125-07-401-001 & 125-07-401-002	CCRFC
Zoning Action:	TMP-53058	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES X NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	3/19/2014	4/17/2014	Not Approved	\$400.00	351277: \$400
2 nd Submittal	5/14/2014	6/12/2014	Conditionally Approved	\$400.00	356797: \$400
Supplemental	8/25/2014	9/15/2014	Approved	----	----
3 rd Submittal	11/25/2014	12/10/2014	See Comments Below	\$100.00	377769: \$100
4 th Submittal	12/10/2014	1/7/2015	Approved	\$100.00	379537: \$100
5 th Submittal	12/18/2014	1/8/2015	Approved	\$100.00	380446: \$100
6 th Submittal	3/5/2015	3/9/2015	Approved	\$100.00	388162: \$100
7 th Submittal	5/18/2015	6/2/2015	Approved	\$100.00	397877: \$100
8 th Submittal	6/8/2015	6/22/2015	Approved	\$100.00	400871: \$100
9 th Submittal	7/5/2016	7/11/2016	See Comments Below	\$100.00	449985: \$100
TOTAL FEES (LDDRS):				\$1,500.00	----

REMARKS:

9th Submittal: Update #6 for As-Built Final Location of Storm Drain System in Horse Drive

8th Submittal: Update #5 for Phasing a Stockpile Permit

7th Submittal: Update #4 for minor lateral profile revision in Skye Canyon Parkway at Sta. 95+28

6th Submittal: Update #3 for minor storm drain profile revision in Skye Park Drive at Skye Canyon Drive (aka Horse Drive)

5th Submittal: Update #2 for Stockpile Permit at additional locations

4th Submittal: Update for revision of storm drains alignment in Grand Canyon Drive, Eagle Canyon Avenue, Mountain Landing Street and Hualapai Way

3rd Submittal: Update for Stockpile Permit Only

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

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

The following comments are repeated until they are complete:

1. The *Kyle Canyon Master Drainage Study* is proposing to revise the hydrology and facilities identified in the *Clark County Regional Flood Control District's (CCRFCD) 2008 Las Vegas Valley Flood Control Master Plan Update*. A *Master Plan Amendment (MPA)* must be submitted to the *City of Las Vegas* for approval. The *City of Las Vegas* will coordinate the MPA submittal to CCRFCD for approval. The Master Developer will be responsible for preparing all submittals needed for CCRFCD along with any and all presentations. The MPU must be approved by the *City of Las Vegas City Council* prior to the final approval of the *Master Drainage Study*.
2. For all culvert entrances or exits located outside of the Public Right-of-Way or dedicated "Public Drainage Easement to be Privately Maintained" must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map. Also, show the easement on the grading plan.
3. In an overview perspective for the proposed *Phase 1 Infrastructures*, *Racel Street* with its regional storm drain act as the sole perpetuation pathway for offsite flows during a major storm event in the interim condition (reference Sheets GR-01 & GR-02).

In a worst case scenario that the upstream culvert entrance is completely clogged, ie, the 100-year flow will be conveyed on the *Racel Street* surface. Provide a hydraulic calculation for the worst case 100-year water surface in *Racel Street*. The finish floor elevation of future houses in the PODs adjacent to *Racel* shall be above the corresponding water surface or flood wall for protection to that effect. This shall serve as a guideline in the future technical drainage studies for the PODs.

4. Provide a detail grading around the culvert entrance at *Racel Street Storm Drain* and make sure freeboard requirements are satisfied.
5. All drainage facilities proposed in this *Phase 1 Infrastructure Study* are considered interim facilities and must be maintained by the master developer until the facilities are formally accepted by the *City of Las Vegas*.
6. Structural plans for the storm drain improvements must be submitted for review. Provide a soil report, structural calculations and specifications, wet stamped structural sets and a grading plan to the *City of Las Vegas Building Department* for processing (call *Building Department* to confirm their submittal requirements). The engineer must provide a copy of *Building Department* approval of the structures to *Flood Control* prior to final acceptance of the technical drainage study.
7. The project proposes to build a temporary drainage facility on the west side of *Hualapai Way*. Prior to final plan approval the developer must complete a ***Maintenance and Liability Agreement*** for the interim drainage improvements (off-site berms or channels) and post a minimum maintenance bond of \$50,000 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 exhibit that adequately shows the location and limits of the drainage facility to *Flood Control* for approval. Once the drainage study is conditionally approved, the engineer/developer should contact the *City's Land Development Section (229-6371)* to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update / letter will be required to justify that the offsite berms / channels are no longer necessary and can be removed.

8. **Sheet SD-09:** Review and revise an appeared low point "61.95TC" in *Grand Canyon Drive* at the intersection with *Grand Teton Drive*.
9. Technical drainage studies are required for each of the POD's. The technical drainage studies for the POD's may not be conditional approved until the final approval of the pertinent infrastructure drainage study is obtained.
10. Building permits for the homes within the individual POD's will not be issued until construction of the street and flood control infrastructure around the POD is substantially complete or interim protection is provided per the approved technical drainage study.

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.

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

END OF REMARKS

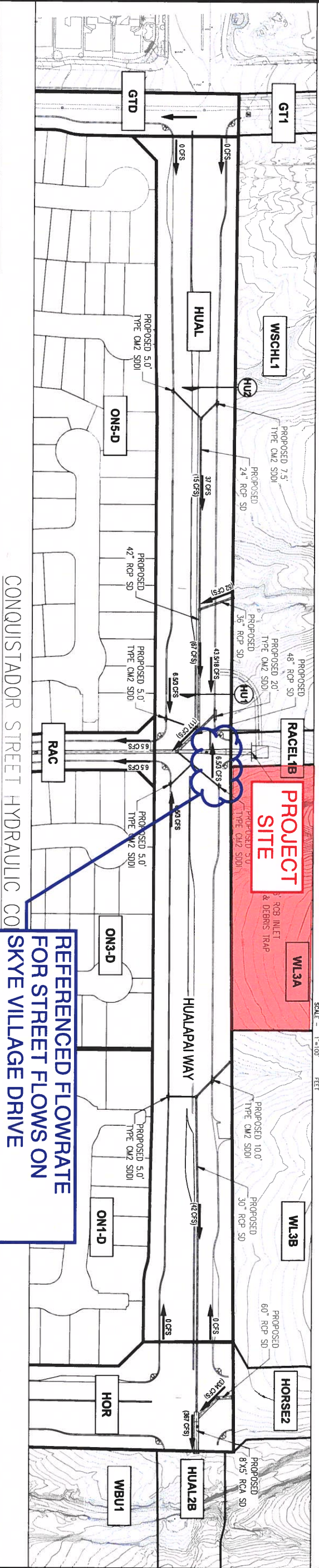
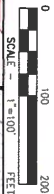
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T/R/S: T19S/R60E/07

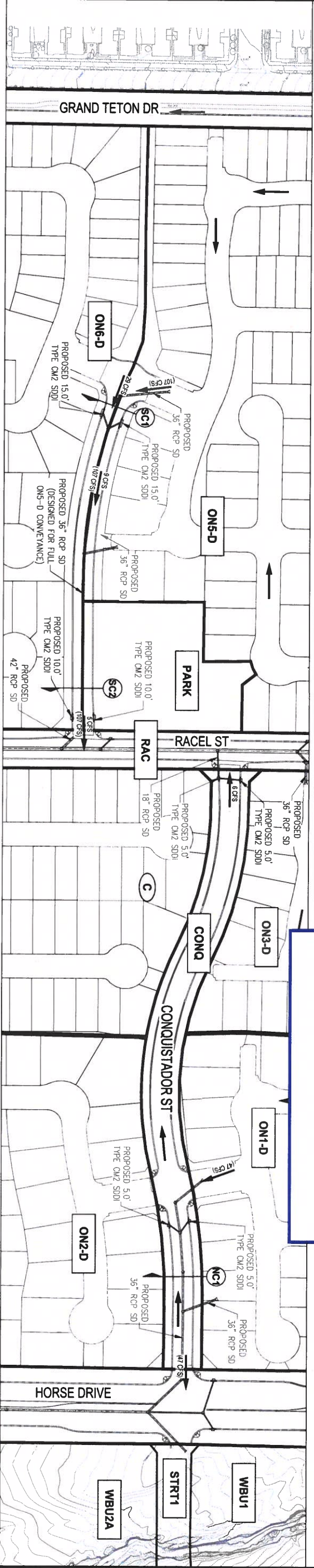
AREA G-07

Drainage Exhibits

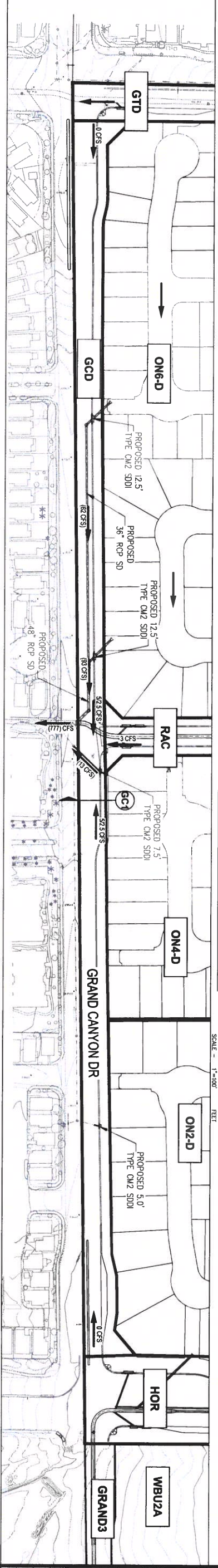
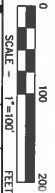
HUALAPAI WAY HYDRAULIC CONDITION



REFERENCED FLOWRATE
FOR STREET FLOWS ON
SKYE VILLAGE DRIVE



GRAND CANYON DRIVE HYDRAULIC CONDITION



10-Year & 100-Year Street Flow Summary

Hualapai Way						
Cross Section	Slope (%)	Q ₁₀ (cfs)	Depth (ft)	Velocity (fps)	D.V. (ft)	Dry Lane (ft)
HU1 (100-YR)	0.57	43.5	0.83	3.6	2.9	N/A
HU1 (10-YR)	0.57	18	0.63	2.9	1.8	14.0
HU2 (100-YR)	0.57	32	0.88	3.7	3.3	N/A
HU2 (10-YR)	0.57	24	0.69	3.1	2.1	11.0

100-Year Street Flow Summary

Conquistador Street						
Cross Section	Slope (%)	Q ₁₀₀ (cfs)	Depth (ft)	Velocity (fps)	D.V. (ft)	Dry Lane (ft)
NC1	0.61	6	0.36	2.1	0.8	
SC1	1.59	29	0.51	4.1	2.1	
SC2	1.59	13	0.40	3.6	1.4	

10-Year & 100-Year Street Flow Summary

Grand Canyon Drive						
Cross Section	Slope (%)	Q ₁₀ (cfs)	Depth (ft)	Velocity (fps)	D.V. (ft)	Dry Lane (ft)
GC1 (100-YR)	0.50	10	0.54	2.4	1.3	N/A
GC1 (10-YR)	0.50	5	0.44	2.1	0.9	19.5

LEGEND

- BASIN BOUNDARY
- BASIN ID
- FLOW DIRECTION
- FLOWMASTER SECTION
- 100-YR STREET FLOW
- 100-YR STORM DRAIN FLOW



NINETY-FIVE MANAGEMENT, LLC.

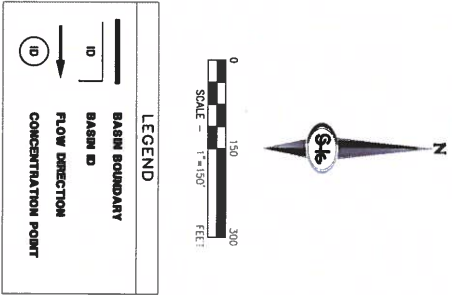
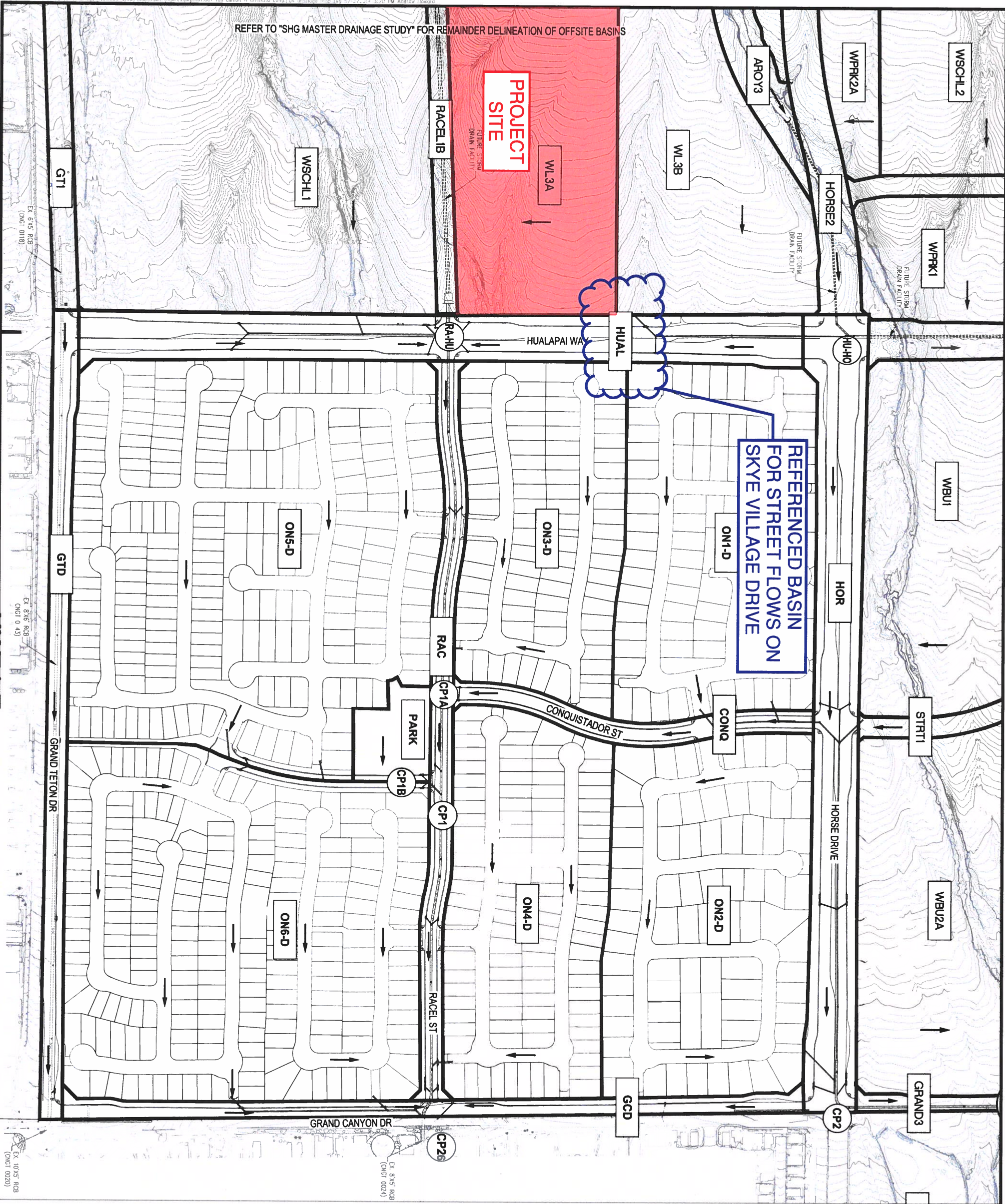
SKYE CANYON - PHASE 1 INFRASTRUCTURE
STREET HYDRAULIC CONDITION MAP
(NORTH/SOUTH STREETS)

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89116
PHONE (702) 284-5300 FAX (702) 284-5399

DATE: MAY 2014
DRAWN BY: AJH
DESIGNER: AJH
CHECKED: SJM
PROJECT NO: OLY1401.001

EXHIBIT I
SHEET 2 OF 2



Basin Flow Rate Summary (Ultimate Condition)				
Basin/Concentration Point ID	Area (ac)	Q _{avg} (cfs)	Q ₁₀ (cfs)	Q ₅ (cfs)
ON1-D	17.8	47	47	21
ON2-D	19.3	46	46	18
ON3-D	14.6	39	39	17
ON4-D	16.1	49	49	24
ON5-D	37.3	107	52	
ON6-D	32.3	93	46	
CONQ	2.2	6	3	
RAC	4.6	13	6	
PARK	1.8	4	1	
HOR	10.4	30	14	
GCD	3.4	10	5	
GTD	4.7	14	7	
HUAL	9.2	26	11	
WBUI	22.9	70	35	
*STRT1	3.1	10	6	

Concentration Points Summary (Ultimate Condition)				
Basin/Concentration Point ID	Area (ac-mi)	Q _{avg} (cfs)	Q ₁₀ (cfs)	Q ₅ (cfs)
RA-HU (Refer to SHG Master Drainage Study for contributing basins)	0.26	477		228
HL-HO (Refer to SHG Master Drainage Study for contributing basins)	1.12	367		172
CP1 (CP1A + CP1B + RAC + CONQ)	0.35	629		303
CP2 (ON1-D + ON2-D + HOR + WBUI + STRT1)	0.11	197		90
CP1A (RAC + STRT1A)	0.28	501		241
(RAC + CP1B + WBUI) (ON5-D + WBUI)	0.06	110		53
CP26 (CP1 + ON4-D + ON5-D + GCD)	0.43	777		376

NOTE: SHG MASTER DRAINAGE STUDY WATERSHEDS CONTRIBUTING TO CONCENTRATION POINTS RA-HU HAVE BEEN MODIFIED BY THIS STUDY. REFER TO "SKYE CANYON HYDROLOGY EVALUATION" HEC-1 MODEL FOR FURTHER DETAIL.

NINETY-FIVE MANAGEMENT, LLC.

SKYE CANYON - PHASE 1 INFRASTRUCTURE

ULTIMATE CONDITION DRAINAGE MAP

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

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

HEC-1 Model

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
* RUN DATE 13MAR14 TIME 11:35:06
*
*****

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DEV-100.OUT

```

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

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

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

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

1 HEC-1 INPUT PAGE 1

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

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*DIAGRAM
ID SLATER HANIFAN GROUP
ID OLYMPIA COMPANIES
ID SKYE CANYON - PHASE 1 INFRASTRUCTURE
ID DEVELOPED CONDITION (100-YR STORM)
ID
ID RETURN PERIOD ----- 100-YEAR
ID DISTRIBUTION ----- 6-HOUR SDN3
ID PROJECT NO. ----- OLY1401.001
ID FILENAME ----- DEV-100.H1
ID DATE ----- 03/10/14
ID MODELED BY ----- AJH/SMJ
ID
ID SIX HOUR DEPTH-AREA REDUCTION FACTORS
ID DRAINAGE AREA (MI^2) DARF
ID 0.0-0.49 1.00
ID 0.5-0.99 0.98
ID 1.0-1.99 0.97
ID
ID IT 5 0 0 300
ID IO 5 0 0
ID IN 5 0 0
ID JR PREC 1.00 0.98 0.97
*

```

REFERENCED
FLOW WITHIN SKYE
VILLAGE ROAD

```

23 KK HUAL
24 KM OFFSITE STREET BASIN FOR HUALAPAI WAY
25 PB 2.93
26 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
27 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
28 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
29 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
30 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
31 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
32 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
33 PC 0.998 0.999 1
34 BA .0144
35 LS 0 93.2
36 UD 0.136
*

```

```

37 KK OFF20
38 KM REFERENCED FROM OGW MASTER DRAINAGE STUDY
39 BA .0656
40 PB 3.01
41 LS 0 86.2
42 UD 0.190
*
43 KK ROFF20
44 KM ROUTE OFF20 TO PT2
45 RD 6020 0.034 0.035 0 TRAP 15 1
*

```

1 HEC-1 INPUT PAGE 2

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

```

46 KK OFF2-E
47 KM LOCAL OFFSITE BASIN
48 BA .1355
49 PB 3.00
50 LS 0 86.2
51 UD 0.243
*
52 KK PT2
53 KM COMBINES OFF20 AND OFF2-E

```

DEV-100.OUT

54	HC	2					
	*						
55	KK	OFF21					
56	KM	REFERENCED FROM GCW MASTER DRAINAGE STUDY					
57	BA	.5280					
58	PB	3.10					
59	LS	0	85.7				
60	UD	0.446					
	*						
61	KK	ROFF21					
62	KM	ROUTE OFF21 TO PT3					
63	RD	5655 0.037 0.035	0	TRAP	0	100	
	*						
64	KK	OFF3-E					
65	KM	LOCAL OFFSITE BASIN					
66	BA	.1581					
67	PB	3.00					
68	LS	0	82.8				
69	UD	0.302					
	*						
70	KK	PT3					
71	KM	COMBINES OFF21 AND OFF3-E					
72	HC	2					
	*						
73	KK	CP0					
74	HC	2					
	*						
75	KK	OFF1-E					
76	KM	LOCAL OFFSITE BASIN					
77	PB	3.00					
78	BA	.0917					
79	LS	0	86.2				
80	UD	0.202					
	*						

1

HEC-1 INPUT

PAGE 3

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
81	KK RA-HU
82	KM COMBINES OFF20, OFF21, OFF1-E, OFF2-E, OFF3-E, HUAL
83	HC 3
	*
84	KK RRA-HU
85	KM ROUTE RA-HU TO CP26
86	RK 2700 0.040 0.013 0 CIRC 6
	*
87	KK ON3-D
88	KM ONSITE BASIN NORTH OF RACEL AND WEST OF CONQUISTADOR
89	PB 2.93
90	BA .0232
91	LS 0 91.2
92	UD 0.116
	*
93	KK CP1A
94	KM COMBINES RA-HU, ON3-D
95	HC 2
	*
96	KK ON5-D
97	KM SOUTHWEST QUAD ONSITE BASIN
98	PB 2.93
99	BA .0583
100	LS 0 94.6
101	UD 0.139
	*
102	KK PARK
103	KM ONSITE BASIN FOR COMMUNITY PARK
104	PB 2.93
105	BA .0028
106	LS 0 81.5
107	UD 0.082
	*
108	KK CP1B
109	KM COMBINES ON5-D, PARK
110	HC 2
	*
111	KK RAC
112	KM STREET BASIN FOR RACEL ST
113	PB 2.93
114	BA .0071
115	LS 0 92.5
116	UD 0.097
	*

1

HEC-1 INPUT

PAGE 4

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
117	KK CONQ
118	KM STREET BASIN FOR CONQUISTADOR ST
119	PB 2.93
120	BA .0035
121	LS 0 92.5

DEV-100.OUT

122	UD	0.133	
	*		
123	KK	CP1	
124	KM	COMBINES RA-HU, ON3-D, ON5-D, RAC, CONQ AND PARK	
125	HC	4	
	*		
126	KK	ON4-D	
127	KM	ONSITE BASIN NORTH OF RACEL AND EAST OF CONQUISTADOR ST	
128	PB	2.93	
129	BA	.0252	
130	LS	0	94.6
131	UD	0.105	
	*		
132	KK	ON6-D	
133	KM	SOUTHEAST QUAD ONSITE BASIN	
134	PB	2.93	
135	BA	.0505	
136	LS	0	94.6
137	UD	0.128	
	*		
138	KK	GCD	
139	KM	OFFSITE (HALF) STREET BASIN FOR GRAD CANYON DR	
140	PB	2.93	
141	BA	.0053	
142	LS	0	93.8
143	UD	0.137	
	*		
144	KK	CP26	
145	KM	COMBINES CP1, ON4-D, ON6-D AND GCD	
146	HC	4	
	*		
147	KK	ON1-D	
148	KM	NORTHWEST QUAD ONSITE BASIN	
149	PB	2.93	
150	BA	.0278	
151	LS	0	91.2
152	UD	0.114	
	*		

1

HEC-1 INPUT

PAGE 5

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
153	KK ON2-D
154	KM NORTHEAST QUAD ONSITE BASIN
155	PB 2.93
156	BA .0301
157	LS 0 88.8
158	UD 0.152
	*
159	KK HOR
160	KM OFFSITE STREET BASIN FOR HORSE DR
161	PB 2.93
162	BA .0163
163	LS 0 93.3
164	UD 0.108
	*
165	KK CP2
166	KM COMBINES ON1-D, ON2-D AND HOR
167	HC 3
	*
168	KK OFF18
169	KM REFERENCED FROM GCW MASTER DRAINAGE STUDY
170	BA .5491
171	PB 3.05
172	LS 0 86.3
173	UD 0.445
	*
174	KK ROFF18
175	KM ROUTE OFF18 THRU EX-W5
176	RM 2 0.171 0.15
	*
177	KK EX-W5
178	KM REFERENCED FROM GCW MASTER DRAINAGE STUDY
179	BA .4460
180	PB 2.86
181	LS 0 86.3
182	UD .308
	*
183	KK CP12
184	KM COMBINES OFF18 AND EX-W5
185	HC 2
	*
186	KK CP3
187	KM COMBINES CP2 AND CP12
188	HC 2
	*

1

HEC-1 INPUT

PAGE 6

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

DEV-100.OUT
 190 KM OFFSITE (HALF) STREET BASIN FOR GRAD TETON DR
 191 PB 2.93
 192 BA .0073
 193 LS 0 93.9
 194 UD 0.105
 *
 195 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
23	HUAL	
	.	
37	OFF20	
	V	
43	ROFF20	
	.	
46		OFF2-E
	.	
52	PT2.....	
	.	
55		OFF21
	.	V
61		ROFF21
	.	
64		OFF3-E
	.	
70		PT3.....
	.	
73	CP0.....	
	.	
75		OFF1-E
	.	
81	RA-HU.....	
	V	
84	RRA-HU	
	.	
87	ON3-D	
	.	
93	CP1A.....	
	.	
96	ON5-D	
	.	
102		PARK
	.	
108	CP1B.....	
	.	
111		RAC
	.	
117		CONQ
	.	
123	CP1.....	
	.	
126	ON4-D	
	.	
132		ON6-D
	.	
138		GCD
	.	
144	CP26.....	
	.	
147	ON1-D	
	.	
153		ON2-D
	.	
159		HOR
	.	
165	CP2.....	
	.	
168		OFF18
	.	V
174		ROFF18
	.	

DEV-100.OUT

177 . . . EX-W5
183 . . . CP12.....
186 . . . CP3.....
189 . . . GTD

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 13MAR14 TIME 11:35:06 *

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

SLATER HANIFAN GROUP
OLYMPIA COMPANIES
SKYE CANYON - PHASE 1 INFRASTRUCTURE
DEVELOPED CONDITION (100-YR STORM)

RETURN PERIOD ----- 100-YEAR
DISTRIBUTION ----- 6-HOUR SDN3
PROJECT NO. ----- OLY1401.001
FILENAME ----- DEV-100.H1
DATE ----- 03/10/14
MODELED BY ----- AJH/SMJ

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

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

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .98 .97

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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	HUAL	.01	1	FLOW	26.	25.	25.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	OFF20	.07	1	FLOW	85.	82.	81.
+				TIME	3.58	3.58	3.58
ROUTED TO	ROFF20	.07	1	FLOW	85.	83.	82.
+				TIME	3.83	3.83	3.83
HYDROGRAPH AT	OFF2-E	.14	1	FLOW	160.	155.	153.
+				TIME	3.67	3.67	3.67
2 COMBINED AT	PT2	.20	1	FLOW	232.	225.	222.
+				TIME	3.75	3.75	3.75
HYDROGRAPH AT	OFF21	.53	1	FLOW	475.	461.	454.
+				TIME	3.92	3.92	3.92
ROUTED TO	ROFF21	.53	1	FLOW	477.	462.	455.
+				TIME	4.08	4.08	4.08
HYDROGRAPH AT	OFF3-E	.16	1	FLOW	146.	142.	139.
+				TIME	3.75	3.75	3.75
2 COMBINED AT	PT3	.69	1	FLOW	557.	540.	531.
+				TIME	4.08	4.08	4.08
2 COMBINED AT	CP0	.89	1	FLOW	676.	655.	644.
+				TIME	4.00	4.00	4.00
HYDROGRAPH AT	OFF1-E	.09	1	FLOW	114.	111.	109.
+				TIME	3.58	3.58	3.58
3 COMBINED AT	RA-HU	.99	1	FLOW	727.	704.	693.
+				TIME	4.00	4.00	4.00
ROUTED TO	RRA-HU	.99	1	FLOW	726.	703.	692.
+				TIME	4.00	4.00	4.00
HYDROGRAPH AT	ON3-D	.02	1	FLOW	39.	38.	38.
+				TIME	3.58	3.58	3.58
2 COMBINED AT	CP1A	1.02	1	FLOW	734.	711.	700.
+				TIME	4.00	4.00	4.00
HYDROGRAPH AT	ON5-D	.06	1	FLOW	107.	104.	103.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	PARK	.00	1	FLOW	4.	3.	3.
+				TIME	3.50	3.50	3.50
2 COMBINED AT	CP1B	.06	1	FLOW	110.	107.	106.
+				TIME	3.58	3.58	3.58

REFERENCED
FLOW WITHIN SKYE
VILLAGE ROAD

DEV-100.OUT

HYDROGRAPH AT				FLOW			
+	RAC	.01	1	TIME	13.	13.	13.
					3.50	3.50	3.50
HYDROGRAPH AT	CONQ	.00	1	FLOW	6.	6.	6.
+				TIME	3.58	3.58	3.58
4 COMBINED AT	CP1	1.09	1	FLOW	763.	740.	728.
+				TIME	4.00	4.00	4.00
HYDROGRAPH AT	ON4-D	.03	1	FLOW	49.	47.	47.
+				TIME	3.50	3.50	3.50
HYDROGRAPH AT	ON6-D	.05	1	FLOW	93.	91.	90.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	GCD	.01	1	FLOW	10.	9.	9.
+				TIME	3.58	3.58	3.58
4 COMBINED AT	CP26	1.17	1	FLOW	799.	773.	760.
+				TIME	3.92	3.92	3.92
HYDROGRAPH AT	ON1-D	.03	1	FLOW	47.	46.	45.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	ON2-D	.03	1	FLOW	45.	44.	44.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	HOR	.02	1	FLOW	30.	29.	29.
+				TIME	3.50	3.50	3.50
3 COMBINED AT	CP2	.07	1	FLOW	121.	118.	116.
+				TIME	3.58	3.58	3.58
HYDROGRAPH AT	OFF18	.55	1	FLOW	495.	480.	473.
+				TIME	3.92	3.92	3.92
ROUTED TO	ROFF18	.55	1	FLOW	473.	459.	452.
+				TIME	4.08	4.08	4.08
HYDROGRAPH AT	EX-W5	.45	1	FLOW	443.	429.	423.
+				TIME	3.75	3.75	3.75
2 COMBINED AT	CP12	1.00	1	FLOW	792.	768.	756.
+				TIME	3.92	3.92	3.92
2 COMBINED AT	CP3	1.07	1	FLOW	833.	808.	795.
+				TIME	3.83	3.83	3.83
HYDROGRAPH AT	GTD	.01	1	FLOW	14.	13.	13.
+				TIME	3.50	3.50	3.50

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL	TIME TO	VOLUME
		(MIN)	(CFS)	PEAK	(IN)	(MIN)	PEAK	PEAK	(IN)
FOR PLAN = 1	RATIO=	.00							
ROFF20	MANE	5.00	85.42	230.00	1.69	5.00	85.42	230.00	1.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5899E+01 EXCESS= .0000E+00 OUTFLOW= .5917E+01 BASIN STORAGE= .6045E-02 PERCENT ERROR= -.4

FOR PLAN = 1	RATIO=	.00							
ROFF20	MANE	5.00	83.10	230.00	1.64	5.00	83.10	230.00	1.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5719E+01 EXCESS= .0000E+00 OUTFLOW= .5736E+01 BASIN STORAGE= .5980E-02 PERCENT ERROR= -.4

FOR PLAN = 1	RATIO=	.00							
ROFF20	MANE	5.00	81.93	230.00	1.61	5.00	81.93	230.00	1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5628E+01 EXCESS= .0000E+00 OUTFLOW= .5646E+01 BASIN STORAGE= .5764E-02 PERCENT ERROR= -.4

FOR PLAN = 1	RATIO=	.00							
ROFF21	MANE	5.00	476.60	245.00	1.73	5.00	476.60	245.00	1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4859E+02 EXCESS= .0000E+00 OUTFLOW= .4862E+02 BASIN STORAGE= .5083E-02 PERCENT ERROR= -.1

DEV-100.OUT

FOR PLAN = 1	RATIO= .00								
ROFF21	MANE	5.00	461.93	245.00	1.67	5.00	461.93	245.00	1.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4709E+02 EXCESS= .0000E+00 OUTFLOW= .4713E+02 BASIN STORAGE= .5011E-02 PERCENT ERROR= -.1

FOR PLAN = 1	RATIO= .00								
ROFF21	MANE	5.00	454.60	245.00	1.65	5.00	454.60	245.00	1.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4635E+02 EXCESS= .0000E+00 OUTFLOW= .4638E+02 BASIN STORAGE= .4975E-02 PERCENT ERROR= -.1

FOR PLAN = 1	RATIO= 1.00								
RRA-HU	MANE	.43	726.67	240.46	1.67	5.00	726.02	240.00	1.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8864E+02 EXCESS= .0000E+00 OUTFLOW= .8864E+02 BASIN STORAGE= .1383E-10 PERCENT ERROR= .0

FOR PLAN = 1	RATIO= .98								
RRA-HU	MANE	.45	703.76	240.73	1.62	5.00	703.06	240.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8590E+02 EXCESS= .0000E+00 OUTFLOW= .8589E+02 BASIN STORAGE= .1354E-10 PERCENT ERROR= .0

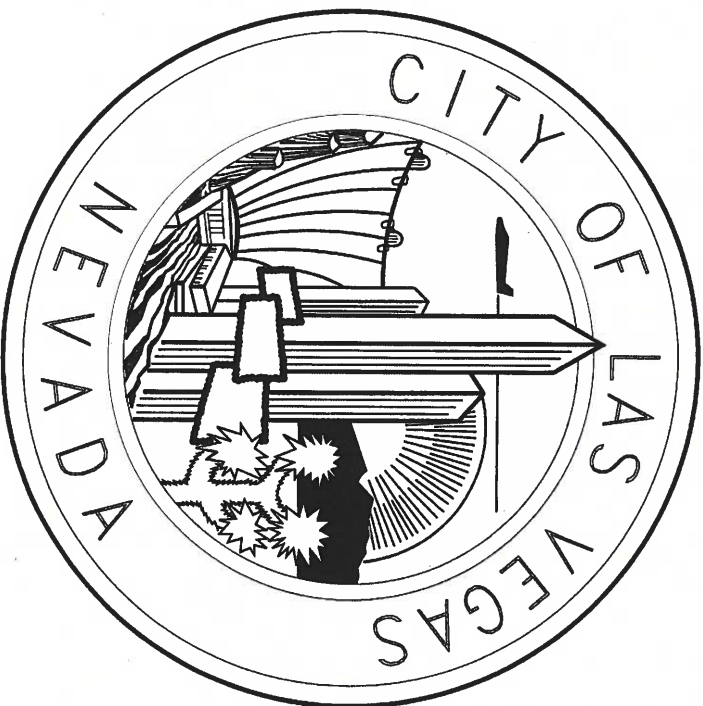
FOR PLAN = 1	RATIO= .97								
RRA-HU	MANE	.41	692.62	240.66	1.60	5.00	691.63	240.00	1.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8453E+02 EXCESS= .0000E+00 OUTFLOW= .8453E+02 BASIN STORAGE= .1380E-10 PERCENT ERROR= .0

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

Pertinent Improvement Plan Sheets

IMPROVEMENT PLANS FOR SKYE CANYON PHASE 1



QTY ENGINEER-DAVID BOWEN P.E. PAGE #16/36 DATE	APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DESIGNATED OF RIGHT-OF-WAY, AND/OR IMPROVED EXISTENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OR CONSTRUCTION OF ANY OTHER TYPE OF IMPROVEMENTS. ANY DEVIATIONS FROM SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARDS, THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND RECONSTRUCTION, CLARK COUNTY AREA, NEVADA.
LAS VEGAS FIRE AND RESCUE DATE	CHRS KNIGHT DIRECTOR, BUILDING AND SAFETY DATE
LAS VEGAS FIRE AND RESCUE DATE	APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER SHEETS: X NO. BOOK: DATE: _____	APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM THE LAS VEGAS VALLEY WATER DISTRICT.
LAS VEGAS FIRE AND RESCUE DATE	DATE
IN ENERGY DATE	AN ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NO OTHER COMMENTS OR CONCERNS. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.
CENTRAL TELEPHONE CO. DBA CENTURILINK DATE	THE AFFECTED CENTRAL TELEPHONE CO. DBA CENTURILINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH ANY EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVENUE STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.
SOUTHWEST GAS DATE	DATE
COT COMMUNICATIONS LAS VEGAS, INC. DATE	DATE

INDEX OF DRAWINGS

DESCRIPTION

SHT. NO.	DWG. NO.	DESCRIPTION
1	C-1	COVER SHEET
2	C-2	GENERAL NOTES
3	G-3	ABREVIATIONS, KEY MAP, LEGEND AND QUANTITIES
4	SD-01	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GTD 66+00.00 TO GTD 73+00.00
5	SD-02	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GTD 73+00.00 TO GTD 84+50.00
6	SD-03	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GTD 84+50.00 TO GTD 94+00.00
7	SD-04	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GTD 94+00.00 TO GTD 101+00.00
8	SD-05	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HW 74+00.00 TO HW 76+50.00
9	SD-06	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HW 76+50.00 TO HW 78+00.00
10	SD-07	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HW 78+00.00 TO HW 83+00.00
11	SD-08	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HW 83+00.00 TO HW 84+50.00
12	SD-09	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GCD 7+00.00 TO GTD 16+50.00
13	SD-10	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GCD 16+50.00 TO GTD 26+00.00
14	SD-11	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GCD 26+00.00 TO GTD 33+00.00
15	SD-12	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GCD 33+00.00 TO GTD 42+50.00
16	SD-13	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE GCD 42+50.00 TO GTD 45+50.00
17	SD-14	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE RS 66+00.00 TO RS 74+00.00
18	SD-15	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE RS 74+00.00 TO RS 80+00.00
19	SD-16	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE RS 80+00.00 TO RS 89+00.00
20	SD-17	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE RS 89+00.00 TO RS 96+50.00
21	SD-18	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HD 64+00.00 TO HD 73+50.00
22	SD-19	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HD 73+50.00 TO HD 79+50.00
23	SD-20	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HD 79+50.00 TO HD 89+00.00
24	SD-21	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE HD 89+00.00 TO HD 94+50.00
25	SD-22	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE CS 57+00.00 TO CS 63+00.00
26	SD-23	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE CS 63+00.00 TO CS 65+00.00
27	SD-24	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE CS 65+00.00 TO CS 72+00.00
28	SD-25	GRAND TETON DRIVE STORM DRAIN PLAN AND PROFILE CS 72+00.00 TO CS 80+00.00
29	SD-26	STORM DRAIN LATERAL PROFILES
30	SD-27	STORM DRAIN LATERAL PROFILES
31	SD-28	STORM DRAIN LATERAL PROFILES
32	SD-29	STORM DRAIN LATERAL PROFILES
33	SD-30	STORM DRAIN LATERAL PROFILES
34	SD-31	STORM DRAIN LATERAL PROFILES
35	SD-32	ROADWAY SECTIONS
36	SD-33	STORM DRAIN DETAILS
37	SD-34	STORM DRAIN DETAILS
38	SD-35	STORM DRAIN DETAILS
39	GR-01	GRADING PLAN - 1
40	GR-02	GRADING PLAN - 2
41	GR-03	GRADING PLAN - 3
42	GR-04	GRADING DETAILS

[illegible]

S-I-E SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #210, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NINETY-FIVE MANAGEMENT LLC

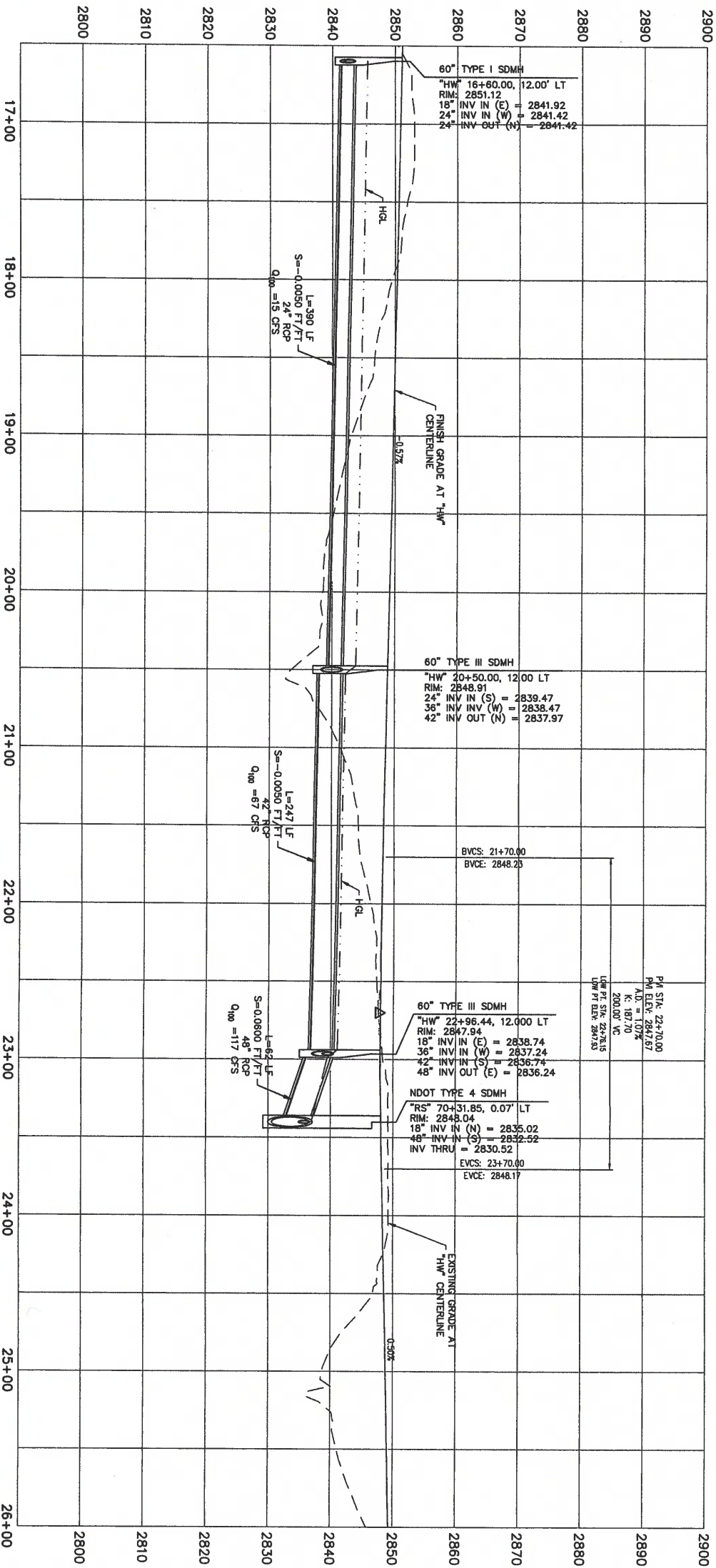
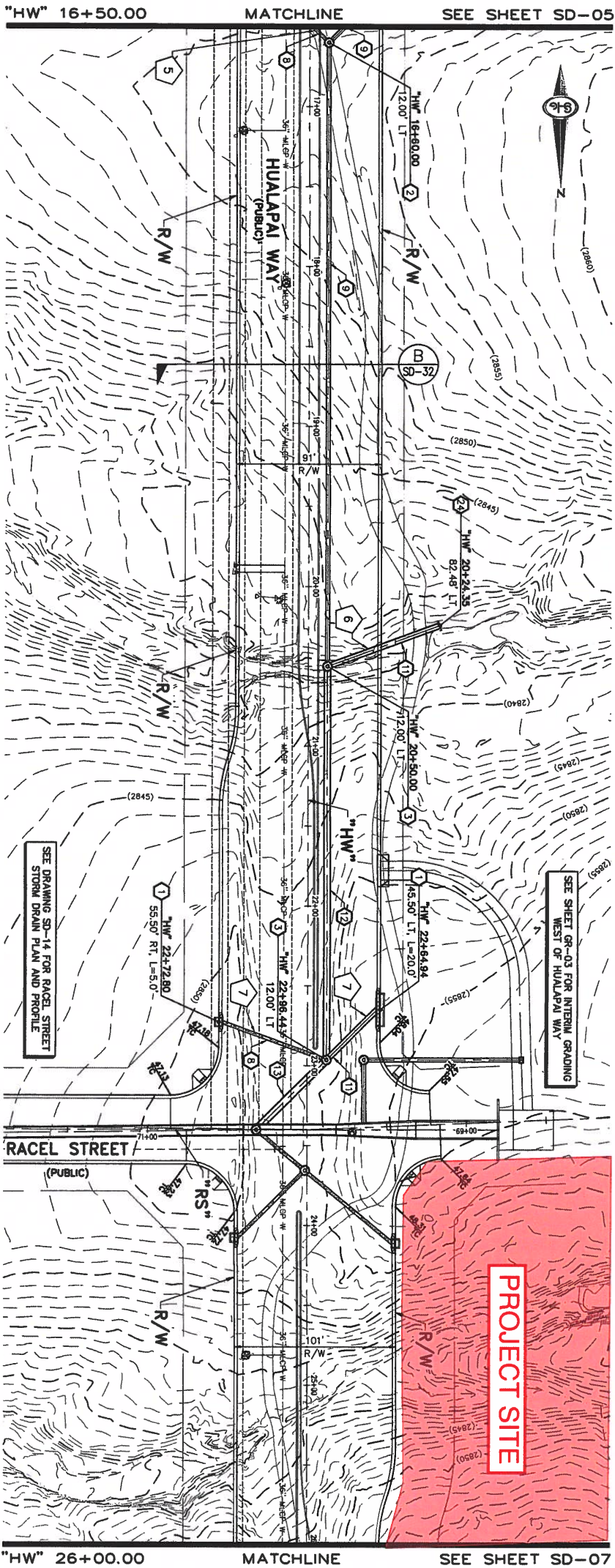
SKYE CANYON PHASE 1

COVER SHEET

DATE:	5/13/14
DRAFTER:	JAS
DESIGNER:	DAM
CHECKED:	JSR
PROJECT NO.	OLY1401-001



G-01
SHEET 1 OF 42



- STORM DRAIN NOTES**
1. CONSTRUCT TYPE "C" DROP INLET (USDOCA STD. DWG. NO. 412.1)
 2. CONSTRUCT 60" TYPE I MANHOLE (USDOCA STD. DWG. NO. 403.1)
 3. CONSTRUCT 60" TYPE III MANHOLE (USDOCA STD. DWG. NO. 406.1)
 4. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE IV RISER (USDOCA STD. DWG. NO. 404.1 AND 406.1)
 5. CONSTRUCT INDOT TYPE 4 MANHOLE (INDOT STD. PLAN R-4.3.2)
 6. CONSTRUCT RCA ACCESS MANHOLE
 7. CONSTRUCT 48" ACCESS MANHOLE
 8. INSTALL 18" RCP (USDOCA STD. DWG. NO. 503.2)
 9. INSTALL 24" RCP (USDOCA STD. DWG. NO. 503.2)
 10. INSTALL 30" RCP (USDOCA STD. DWG. NO. 503.2)
 11. INSTALL 36" RCP (USDOCA STD. DWG. NO. 503.2)
 12. INSTALL 42" RCP (USDOCA STD. DWG. NO. 503.2)
 13. INSTALL 48" RCP (USDOCA STD. DWG. NO. 503.2)
 14. INSTALL 60" RCP (USDOCA STD. DWG. NO. 503.2)
 15. INSTALL 72" RCP (USDOCA STD. DWG. NO. 503.2) W/ 1" SACRIFICIAL CONCRETE
 16. INSTALL 30" RCP END SECTION (INDOT STD. PLAN R-2.3.1)
 17. INSTALL 36" RCP END SECTION (INDOT STD. PLAN R-2.3.1)
 18. INSTALL 42" RCP END SECTION (INDOT STD. PLAN R-2.3.1)
 19. CONSTRUCT 6' x 4' RCP (SEE STRUCTURAL DETAILS BY OTHERS)
 20. CONSTRUCT 8' x 5' RCP (SEE STRUCTURAL DETAILS BY OTHERS)
 21. CONSTRUCT 8' x 6' RCP (SEE STRUCTURAL DETAILS BY OTHERS)
 22. W/ 1" SACRIFICIAL CONCRETE
 23. CONSTRUCT 10' x 8' PRECAST RCP (INDOT STD. PLAN R-20.1.5 AND R-20.1.5.1)
 24. CONSTRUCT BRICK AND MORTAR PLUG (SEE DETAIL 1, DRAWING SD-34)
 25. CONSTRUCT CONCRETE COLLAR (SEE DETAIL 2, DRAWING SD-34)
 26. INSTALL INDOT TYPE 2 DROP INLET WITH 3" CONCRETE APRON (INDOT STD. PLAN R-4.2.1)
 27. CONSTRUCT JUNCTION STRUCTURE (SEE STRUCTURAL DETAILS BY OTHERS)
 28. CONSTRUCT TRANSITION STRUCTURE (SEE STRUCTURAL DETAILS BY OTHERS)
 29. CONSTRUCT INDOT TYPE 2B DROP INLET (INDOT STD. PLAN R-4.2.2)
 30. CONSTRUCT CONCRETE CROSS GUTTER (USDOCA STD. DWG. NO. 228)
 31. CONSTRUCT TYPE "C" DROP INLET (USDOCA STD. DWG. NO. 413)

NOTES

1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN.
2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCP/RCA.
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDOCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES ARE PUBLICLY MAINTAINED.

LEGEND

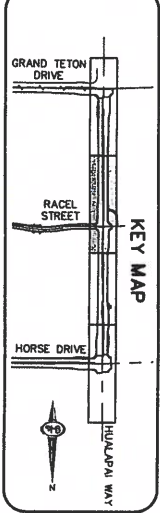
- 1 STORM DRAIN LATERAL (SEE SHEETS SD-25 THRU SD-31)

FLOOD ZONE

I CERTIFY THAT THE GRADING PLAN IS IN ACCORDANCE WITH THE CITY OF LAS VEGAS FLOOD CONTROL DIVISION'S FLOOD HAZARD STUDY (S-481) ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

STEVEN JONES, P.E. 019638 DATE

THE PROJECT SITE IS LOCATED WITHIN A FLOOD HAZARD STUDY (S-481) ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT. THE FLOOD HAZARD STUDY (S-481) ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT. 300001796, ALL DATED SEPTEMBER 21, 2002.



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

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 1

HUALAPAI WAY STORM DRAIN PLAN AND PROFILE

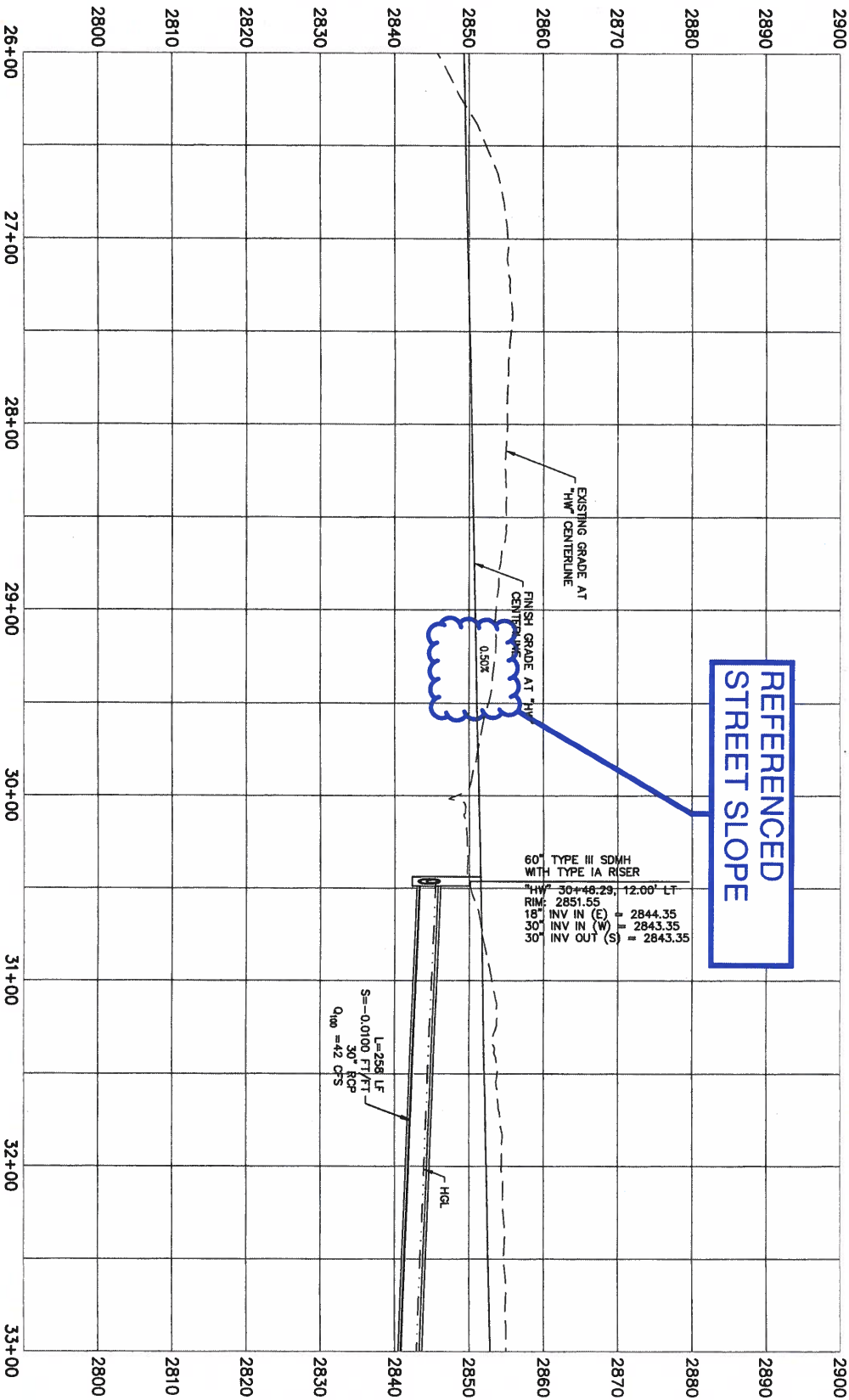
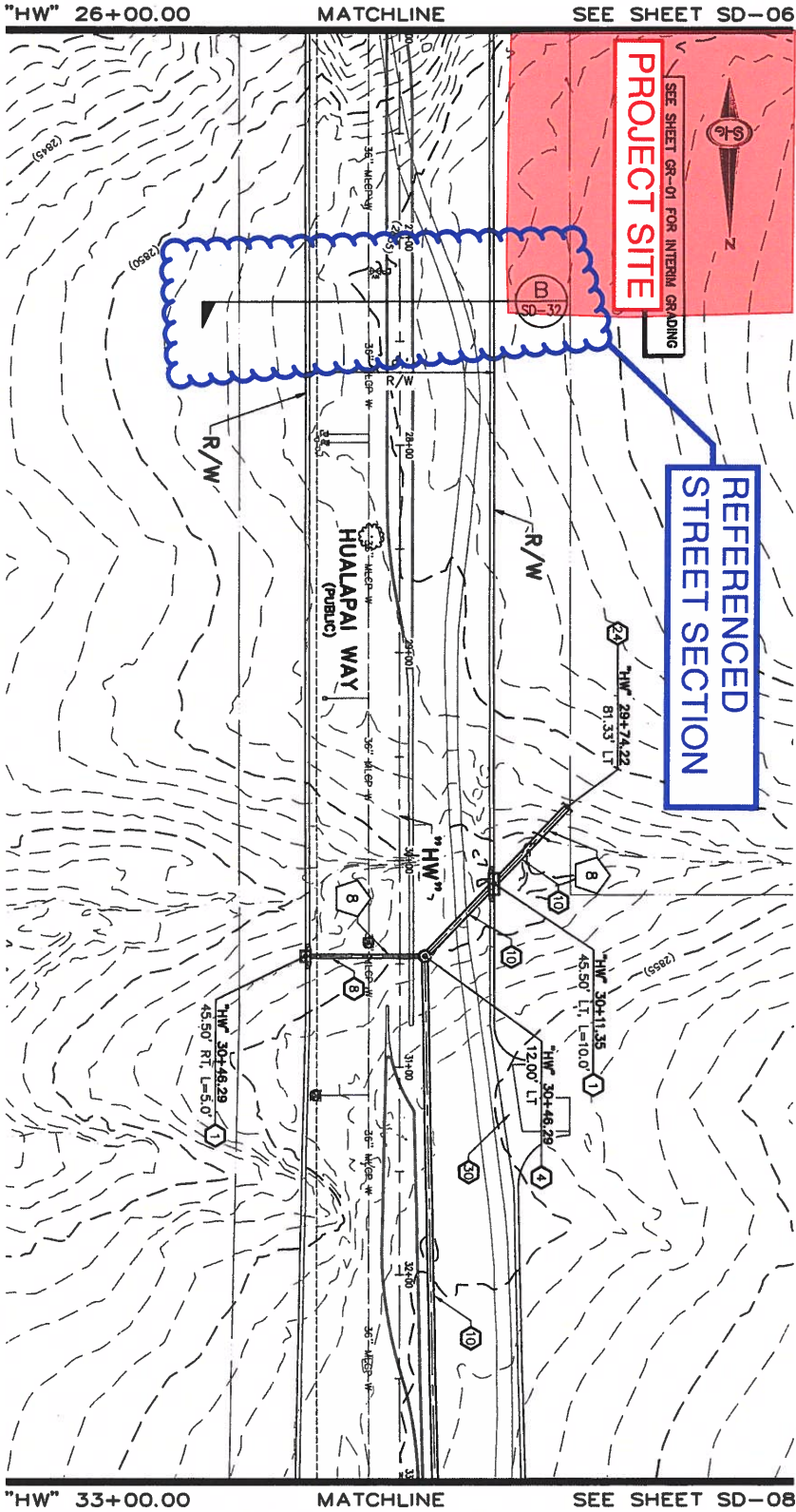
"HW" 16+50.00 TO "HW" 26+00.00

SD-06

SHEET 9 OF 42

DATE: 5/13/14
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JLS
PROJECT NO.: OLY1401-001

PROFESSIONAL ENGINEER
STEVEN J. JONES
No. 019638
State of Nevada
S. Jones



STORM DRAIN NOTES

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2. CONSTRUCT 60" TYPE I MANHOLE (USDOCA STD. DWG. NO. 403.1)
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4. CONSTRUCT 60" TYPE III MANHOLE WITH TYPE IA RISER (USDOCA STD. DWG. NO. 404.1 AND 406.1)
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20. CONSTRUCT 6" X 5" RCA (SEE STRUCTURAL DETAILS BY OTHERS)
21. CONSTRUCT 6" X 6" RCA (SEE STRUCTURAL DETAILS BY OTHERS)
22. W/ 1" SACRIFICIAL CONCRETE
23. CONSTRUCT 10' X 8' PRECAST RCB (INDOT R-20.1.2) W/ 1" SACRIFICIAL CONCRETE
24. CONSTRUCT INDOT TYPE II HEADWALL (INDOT STD. PLAN B-20.1.5 AND B-20.1.5.1)
25. CONSTRUCT BRICK AND MORTAR PLUG (SEE DETAIL 1, DRAWING SD-34)
26. CONSTRUCT CONCRETE COLLAR (SEE DETAIL 2, DRAWING SD-34)
27. INSTALL INDOT TYPE 2 DROP INLET WITH 3" CONCRETE APRON (INDOT STD. PLAN R-4.2.1)
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29. CONSTRUCT TRANSITION STRUCTURE (SEE STRUCTURAL DETAILS BY OTHERS)
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32. CONSTRUCT TYPE "C" DROP INLET (USDOCA STD. DWG. NO. 413)

NOTES

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2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCP/RCA.
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDOCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES ARE PUBLICLY MAINTAINED.

LEGEND



STORM DRAIN LATERAL # (SEE SHEETS SD-25 THRU SD-31)

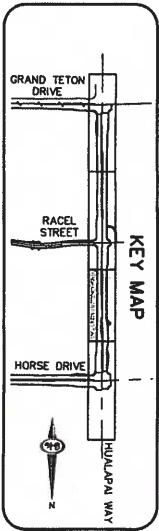
FLOOD ZONE

1. DETERMINE THE FLOODING RISK TO THE PROJECT SITE BY CONSULTING THE FLOOD INSURANCE RATE MAP (FIRM) PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) OR US VEHICLES FOR THE SUBJECT PROJECT.

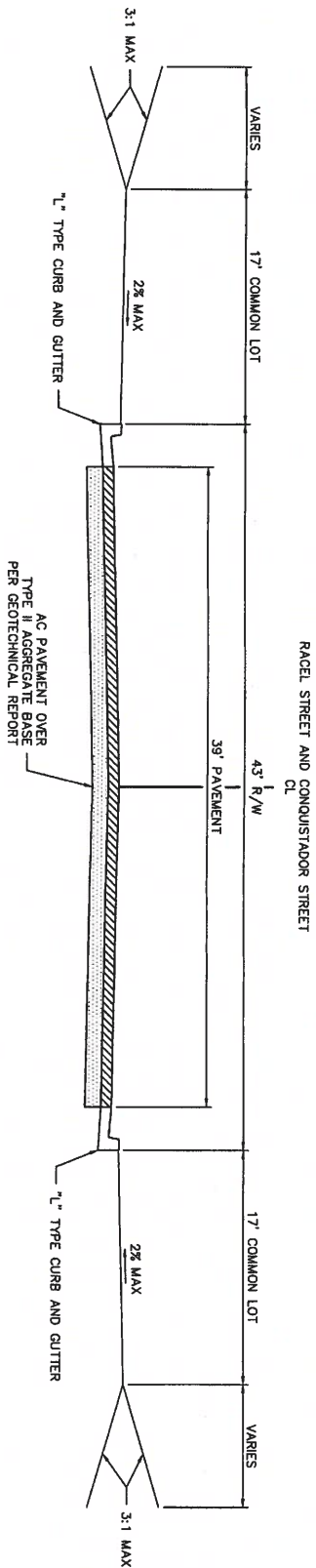
THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED FLOOD ZONE (FLOOD INSURANCE RATE MAP (FIRM) PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) OR US VEHICLES FOR THE SUBJECT PROJECT. ALL DRAINAGE STRUCTURES SHALL BE DESIGNED TO WITHSTAND THE FLOODING RISK TO THE PROJECT SITE.

STEPHEN JONES, P.E. (005538)

DATE

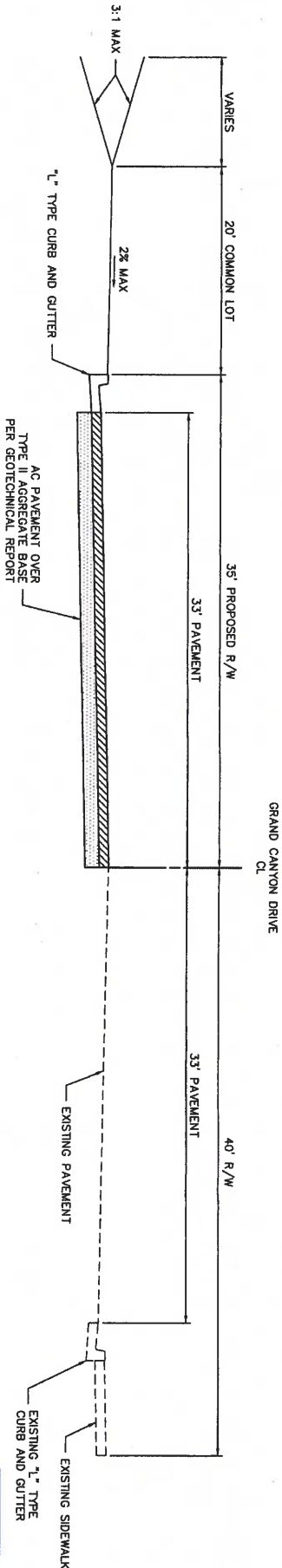


NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.



RACEL AND CONQUISTADOR STREET (ULTIMATE)

NOT TO SCALE

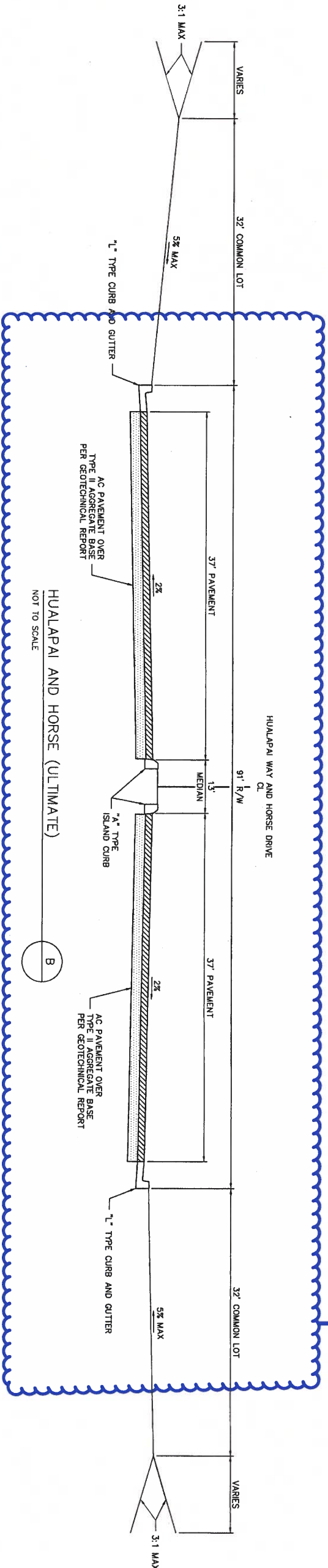


GRAND CANYON (ULTIMATE)

NOT TO SCALE

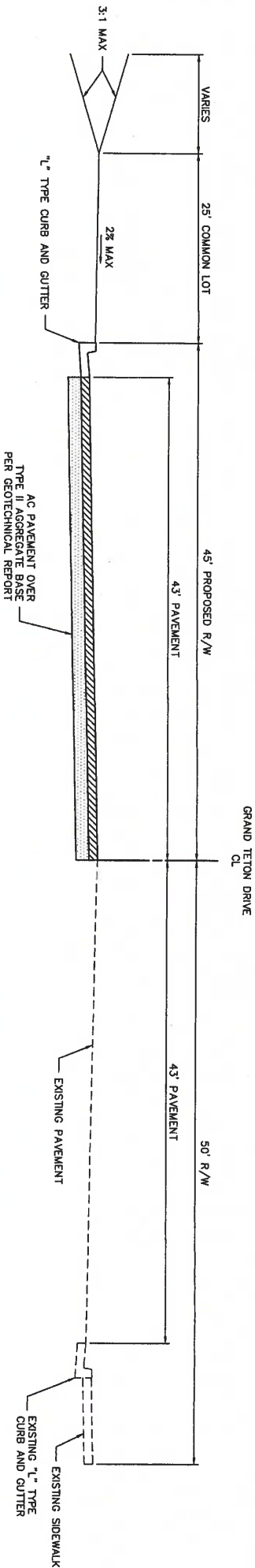


REFERENCED
STREET SECTION



HUAPAI AND HORSE (ULTIMATE)

NOT TO SCALE



GRAND TETON (ULTIMATE)

NOT TO SCALE



NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC
SKYE CANYON PHASE 1
ROADWAY SECTIONS

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89116
PHONE (702) 284-6300 FAX (702) 284-6399

DATE: 5/13/14
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JJS
PROJECT NO. 0LY1401-001

SD-32
SHEET 35 OF 42



APPENDIX G

Reference Material

Technical Drainage Study for Skye Canyon Master Drainage Study, by SHG

Approval Letter

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: August 15, 2016
TO: Land Development Services Department of Public Works			FROM: Oh Sang Kwon, P.E. Flood Control Section Department of Public Works
SUBJECT: Drainage Study for: Skye Canyon Master Drainage Study – Update #3			COPIES TO: Slater Hanifan Group
Cross Streets:	Fort Apache Road & Moccasin Road		KAG Development South, LLC
File Number:	F:\Depot\DSMemos\DS4420N.doc		Bart Anderson, P.E., DevCo
Parcel Number:	125-06-001-001		CCRFCFCD
Zoning Action:			CCPW
FEMA Flood Zone	YES	NO X	NDOT; NV Energy
Proposed Storm Drain	YES X	NO	PB America, Inc.

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1 st Submittal	6/22/2010	7/13/2010	Not Approved	\$1,000.00	147216: \$1000
2 nd Submittal	9/17/2010	10/4/2010	Not Approved	\$400.00	153788: \$400
3 rd Submittal	10/15/2011	11/14/2011	Not Approved	\$400.00	153788: \$400
4 th Submittal	2/13/2012	3/1/2012	Conditional Approval	\$400.00	274196: \$400
CCRFCFCD	5/23/2012	5/24/2012	Concurrence Recv'd	N/C	N/C
5 th Submittal NDOT Comments	9/10/2012	9/19/2012	Conditional Approval	N/C	N/C
6 th Submittal	12/4/2014	12/30/2014	Conditional Approval	\$400.00	378889: \$400
7 th Submittal	2/17/2015	3/3/2015	Conditional Approval	\$400.00	385987: \$400
8 th Submittal	3/16/2015	4/6/2015	See Comments Below	\$400.00	388961: \$400
CCRFCFCD	4/2/2015	4/6/2015	Concurrence Recv'd	N/C	N/C
9 th Submittal	6/23/2015	7/21/2015	See Comments Below	\$400.00	403025: \$400
Revised Memo	8/12/2015	8/12/2015	See Comments Below	N/A	N/A
10 th Submittal	10/19/2015	11/23/2015	Conditional Approval	\$400.00	N/A
11 th Submittal	4/19/2016	5/16/2016 & 8/15/2016	See Comments Below	\$400.00	440941: \$400
TOTAL FEES (LDDRS):				\$4,600.00	----

REMARKS: 11th Submittal: Update # 3 – Overall Master Plan Revision of Skye Canyon development. The proposed size and location of MPU facilities are being changed with the concept of allowing development without impacting the National Monument.

Skye Canyon Master Drainage Study Update #3 proposes substantial changes to amend the previously approved Master Plan Amendment (MPA). A new MPA must be submitted to City of Las Vegas and CCRFCFCD for approval and shall be adopted by the City of Las Vegas City Council prior to the final approval of the subject Master Study Update #3.

The City of Las Vegas will not allow further residential development outside of the limits of Phase 2 at this time until the New Master Plan is approved.

10th Submittal - Phase 2 interim impacts.

Revised Memo – National Monument Drainage Impacts

The Master 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 Department of Public Works concurrence.
X	is conditionally approved subject to Nevada Department of Transportation concurrence.
X	is conditionally approved subject to BLM concurrence/approval.

1. The overall concept presented in the Master Plan Update #3 for Skye Canyon appears to satisfy the intent of providing regional connectivity of proposed Master Planned facilities without impacting the National Monument. Specific Technical Drainage Studies shall be required to address the specific impacts of each proposed Master Planned facility and the interaction with proposed facilities needed for each phase of development.
2. The Regional Flood Control District has requested that engineering consultants utilize the latest NRCS soils data as a part of the drainage study parameters. The Master Plan Update shall discuss the soil data used in the analysis and discuss the impacts on the overall hydraulic analysis. Provide an updated HEC-1 analysis and address local and MPU facility size modifications, if necessary based upon the revised Soil Survey data. Update the NRCS soils data in the References (Section 7). Review and revise Exhibit & Figures accordingly. This needs to be addressed as supplemental information prior to the MPA approval.
3. The Master Plan shall clearly define when the proposed interim facilities will be taken out of service and the construction of the required MPU facilities. A complete Phasing Plan shall be updated and approved by the City of Las Vegas and Regional Flood Control prior to the approval of the MPA.
4. This Update proposes to construct the *Log Cabin Detention Basin #3* with flows that will increase the runoff volume routed towards the *Tule Springs North Environmental Detention Basin* (TSNEDB). The engineer proposes to modify the TSNEDB by removing the orifice plate at the detention basin outfall pipe to increase the outflow. Detention basin design uses the orifice plate to insure that the basin outfall remains under inlet control parameters per the HCDDM, Section 1200. Discuss the impact of removing the orifice plate and provide calculations verifying that the existing outfall will convey the proposed 78 cfs under inlet control conditions. Discuss the drain time impacts to the TSNEDB and the impacts to the downstream development. Alternatively, the TSNEDB may need modifications to meet the HCDDM requirements. This could include the expansion of the TSNEDB basin to increase the storage volume accordingly or replacement of the TSNEDB outfall. These or other modifications need to be conceptually addressed as supplemental information prior to the MPA approval.
5. The premise of the Master Plan Update #3 for Skye Canyon is to add two (2) new CCRFCD Master Plan Detention Basins that are located outside of the Skye Canyon development. The City of Las Vegas is in the process of applying for BLM grants for these detention basin sites. These ultimate facilities shall be included in the MPA as CCRFCD facilities. The intent of the Detention Basin (157DB) is to reduce developed flows to maintain the existing condition flow rate in the ultimate condition and reduce the size of the downstream regional facilities. The intent of the Log Cabin Detention Basin (DB3) is to reduce developed flows to reduce the size of the downstream regional facilities that impact the TSNEDB. The concept for the addition of these two detention basins to the CCRFCD Master Plan is acceptable and will require the submittal of technical studies to refine the facility parameters. The construction of DB3 shall be the responsibility of the Skye Canyon

development and will be of sufficient size to reduce the flow impacts to development downstream and ultimately the TSNEEDB.

6. This Master Study notes that drainage study updates for both Phase 1 and Phase 2 to accommodate the increased system flows impacting these Phases are necessary. A detailed analysis & review of the required updates will determine the system impacts and if any needed system upgrades are necessary to maintain HCDDM criteria.
7. **Exhibit 1:** The developed condition Exhibit 1 shall be updated to include the coordinated Kyle Canyon Interchange drainage improvements. The size of the downstream facilities shall be reviewed based upon the interchange improvements.
8. **Exhibit 1:** The developed condition Exhibit 1 shows that a portion of the developed flows will drain north of Moccasin into the BLM land and the National Monument to mimic existing drainage patterns. Concentrated flow discharges to the north shall require BLM and National Park Service concurrence.
9. **Exhibit J:** The proposed facility 14 that drains from EC18 easterly to the proposed DB3 shall be a permanent facility meeting the requirements of Title 20 and shall be constructed as a permanent MPU facility with this development.
10. **Exhibit J:** The proposed onsite DB1 & DB2 facilities shall include the collection facilities as a part of the detention basins areas.
11. **Exhibit J:** The proposed changes to DB1 will impact the alignment and size of the ultimate collection facility that drains to DB1. The proposed facility shall remain an open channel to allow flow interception from the west in this undeveloped drainage.
12. The **Master Land Use Plan** has been provided however, any further changes to the adopted Master Land Use Plan shall require a complete update to the Master Drainage Study.
13. A copy of the approved 404 Permit from the Army Corps of Engineers has been provided.
14. The Phasing Plan for Phase 1 & 2 have addressed the interim condition and associated downstream impacts to address the impact of the long term discharge from the outfall of the Detention Basin #1. This includes upgrading the existing storm drain system near the intersection of Brent Lane and Fort Apache. These improvements have been included in the Detention Basin #1 improvements.
15. Flood Control requires an interim condition drainage analysis in support of the Phasing Plan that clearly shows the impacts to each Phase, existing washes, upstream concentration points and the downstream concentration points. Flood Control needs to make sure that each Phase of Development is protected during the interim and full build-out of this overall project. The current Phasing Plan does not adequately address these issues beyond Phase 2.
16. The interim conditions of the Phasing Plan need to address the impact of the long term discharge from the outfall of any future detention basins. It is noted that Only Detention Basin #1 has been reviewed. The technical review of Detention Basin #2 will determine the impacts downstream along the Iron Mountain Road alignment and/or other needed facilities to mitigate that impact. The provided Basin Attenuated Outfall Exhibit is only conceptual in nature and is subject to further review as a part of the technical reviews. Existing flow conditions do not have a drawn out discharge from a detention basin. This discharge impact must be accounted for in the interim condition without negatively impacting the existing downstream neighborhoods.
17. CCRFCD concurrence has previously been provided. A new concurrence for Update #3 shall be provided from CCRFCD after Conditional Approval by the City of Las Vegas.

18. CCPW concurrence has previously been provided. A new concurrence for Update #3 shall be provided from CCPW after Conditional Approval by the City of Las Vegas.
19. NDOT concurrence has previously been provided. A new concurrence for Update #3 shall be provided from NDOT after Conditional Approval by the City of Las Vegas.

The following comments are repeated until they are complete:

1. Please note that the Traffic Study must be approved prior to final approval of the Master Drainage Study. If the street layout does not match the Master Drainage Study, an update to the Master Drainage Study must be submitted to address the changes.
2. Per a meeting held in August 18, 2011 between the developer and the *City of Las Vegas*, it was agreed that NV Energy's approval of any proposed drainage facilities within their access easements (such as the proposed detention basins) must be obtained prior to the final approval of the Master Drainage Study. Please provide documentation for such approval or acknowledgment.
3. Please note that any future technical drainage study submittals that differ from the Master Drainage Study (ie. Changes in pods, infrastructure, flows etc.) will require an update to the Master Drainage Study and this update must be approved by the *City of Las Vegas Flood Control Section* prior to final approval of technical drainage study.
4. The proposed detention basins will require coordination with the State of Nevada, Division of Water Resources Dam Safety and will require the State's approval prior to permitting.
5. Please note that the proposed 100-year flood protection facilities identified on Exhibit J must be constructed by the Master Developer as a part of the master planned infrastructure. Technical drainage studies are required for each phase of the master planned infrastructure improvements. The technical drainage studies for the infrastructure improvements may be submitted with conditional approval of this Master Drainage Study. However, final approval for the Master Drainage Study must be obtained prior to conditional approval of the infrastructure drainage studies.
6. Technical drainage studies are required for each of the Pod's. The technical drainage studies for the Pod's may not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study must be obtained prior to conditional approval of the impacted Pod drainage studies.
7. Building permits for the homes within the individual Pod's will not be issued until construction of the street and flood control infrastructure around the Pod is substantially complete or interim protection is provided per the approved technical drainage study.
8. The design of debris basins at all major culvert entrances to limit the amount of sediment and debris entering the storm drain facilities will be required in a future infrastructure study.
9. Please note that all detention basins must be designed per CCRFCD criteria including a low flow facility around the detention basin.
10. Please note that all proposed interim facilities must be maintained by the master developer.
11. Provide a legal description of the proposed detention basins prior to recordation of the parent final map.
12. Coordinate the proposed drainage facilities with *Sheep Mountain Parkway* project. Please contact Greg McDermott, P.E., at 702-229-2143 to coordinate the proposed drainage facilities.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved master drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1)

year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

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

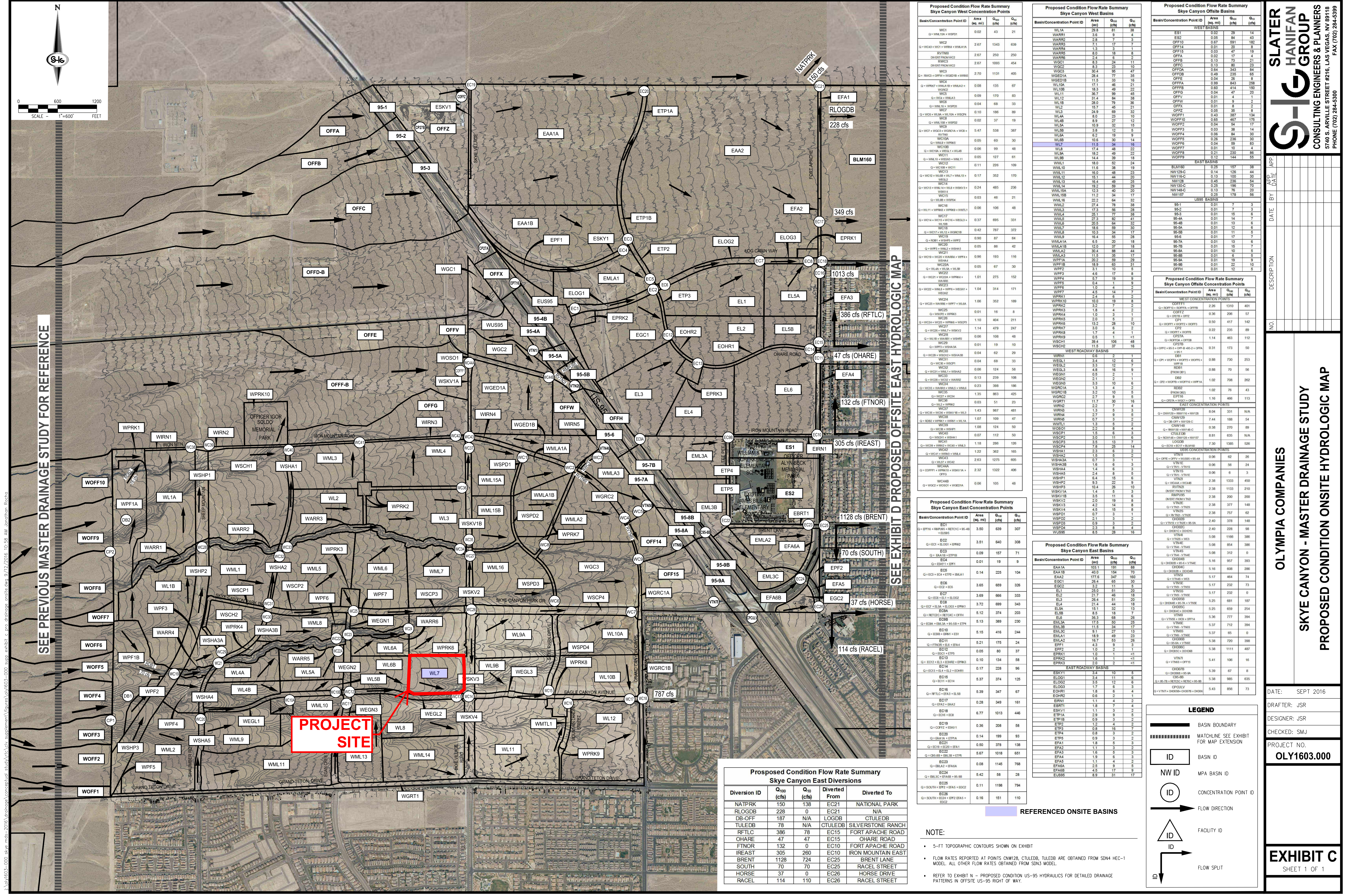
END OF REMARKS

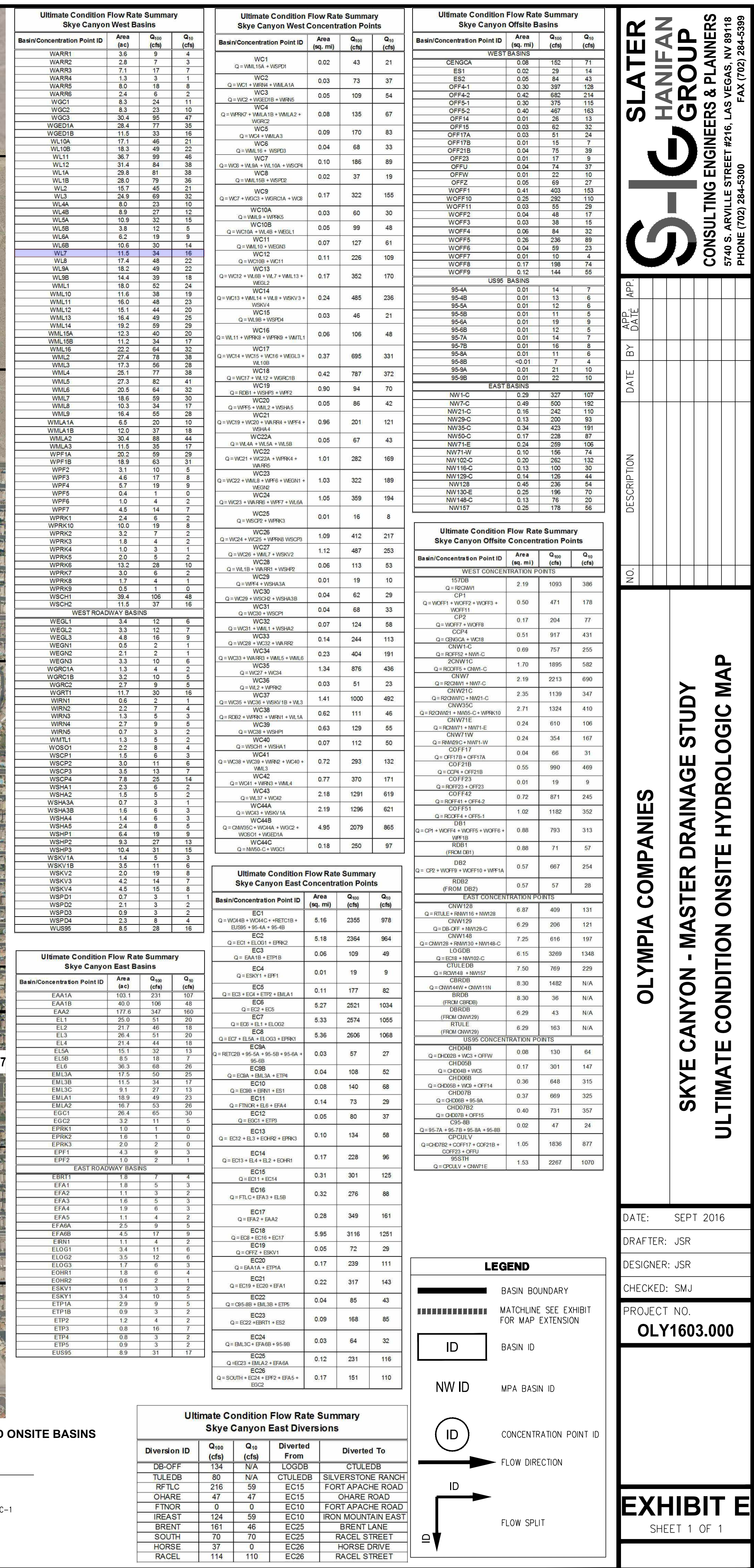
Osk/pbj

T/R/S: T19S/R60E/6 & 7

AREA G-6, 7, & F-12

Drainage Exhibits





APPENDIX H

CD of Electronic Files and Improvement Plans

F:\91719-000-Skye canyon parcel 2.14\Draw\Improvements\91719-000.dwg 4/25/2018 5:24 PM Dominic Hamilton

STORMWATER RUNOFF MANAGEMENT

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

LEGAL DESCRIPTION

BEING A PORTION OF SECTION 12, TOWNSHIP 19 SOUTH, RANGE 59 EAST M.D.M., CLARK COUNTY, NEVADA.

BENCHMARK

BM 7LVB0 7NWS CITY OF LAS VEGAS RIVET AND ROUND PLATE IN CONCRETE CYLINDER, SOUTHEAST CORNER OF HUALAPAI WAY AND IRON MOUNTAIN ROAD.
ELEV: 2840.13 FEET (865.67 METERS) (NAVD 1988)

BASIS OF BEARINGS

SOUTH 00°34'18" EAST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 12, TOWNSHIP 19 SOUTH, RANGE 59 EAST M.D.M., AS PER FILE 151, PAGE 14, OF SURVEYS ON FILE IN THE COUNTY RECORDER'S OFFICE.

2.2 CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS, ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVNYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS, STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" "S" SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

LVVWD PROJECT # _____ (REVISED 01/09/2017)

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLANS, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES. LATEST REVISION, OR SPECIFICALLY APPROVED BY THESE PLANS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.
14. THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.

ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ADJUTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

IS NO LEAD COMPLIANCE NOTE TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKS BRASS PRODUCTS PROPOSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE USED.

GRADING NOTES

1. INDICATED GRADES OTHER THAN T.C., F.G. & GUTTER F.L. ARE ROUGH GRADES.
2. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLANS WILL RESULT IN QUANTITY CHANGES.
3. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.
4. ROUGH PAD ELEVATIONS SHALL BE GRADED TO WITHIN 0.1' OF THE PAD ELEVATIONS SHOWN ON THE PLANS. WHEN GRADING IS COMPLETE PER THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE LOTS CAN BE INSPECTED. AT THAT TIME THE ENGINEER SHALL ALSO DECIDE IF ANY ADDITIONAL DITCHES OR BERMS ARE REQUIRED. THE CONTRACTOR IS REQUESTED NOT TO REMOVE ANY OF HIS ROUGH GRADING EQUIPMENT UNTIL HE RECEIVES GRADING APPROVAL FROM THE ENGINEER.
5. SOLS REPORT PREPARED BY ?????, PROJECT NO. #####, DATED ##/##/####.
6. EARTHWORK QUANTITIES (RAW):
- CUT = ###.### CUBIC YARDS
- FILL = ###.### CUBIC YARDS

A) THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SUBSIDENCE OR SHRINKAGE.
B) THE ABOVE QUANTITIES DO REFLECT USING NATIVE MATERIAL IN LIEU OF TYPE I GRAVEL BASE MATERIAL FOR STREET SECTIONS.
C) THE ABOVE QUANTITIES DO NOT REFLECT ANY EARTHWORK WHICH MAY BE REQUIRED BY THE ENGINEER TO CONSTRUCT ADDITIONAL PROTECTIVE DITCHES OR BERMS NOT SHOWN ON THESE DRAWINGS.

CITY OF LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 6325, FOR HYDRANT SPECIFICATIONS, AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICTS - APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR ALL INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK [IFC 105.7.12]
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC 3310, 3312]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC 507.5.7.3]
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC 106.3]
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC 507.2.1, NFPA 24]
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC 507]
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [IFC 507.5.7.1]
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC 507]
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [IFC C102]
• RESIDENTIAL - 300 FT UNSPRINKLERED; 600 FT SPRINKLERED.
• COMMERCIAL - 500 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE NEW WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1,000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS, WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [IFC C102.6]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FEET OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANT SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.4]
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.7]
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC C102.6]
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE ARE 4 OR MORE FIRE HYDRANTS/SPRINKLER LEADS. ONE SOURCE SHALL BE INSTALLED ON A SINGLE STREET SECTION. CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC C104]
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC 503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FEET PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC 503.2.7, 503.2.8]
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FEET OUTSIDE AND 28 FEET INSIDE TURNING RADII. [IFC 503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FT 6 INS. [IFC 503.2.1]
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNSTRUCTURED WIDTH OF NOT LESS THAN 40 FT. FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES, NOT LESS THAN 32 FT WIDE. FLOW LINE TO FLOW LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD, NOT LESS THAN 24 FT WIDE. WHERE NO PARKING IS PERMITTED ON EITHER SIDE, FIRE LINES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [IFC 503.2.1.1]
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THE DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC 503.1.1]
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROADS(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT, COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. [IFC 503.1.2]
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LINES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [IFC 503.2.5]
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LINE, ONE SIGN AT THE END OF THE FIRE LINE AND WITH SIGNS AT INTERVALS OF 100 FEET ALONG THE DESIGNATED FIRE LINES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC 503.3]
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC 503.6 AND IFC APPENDIX M.

2.5 CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

	HORIZONTAL	VERTICAL COMPACTION	
A. PAVEMENT AREA SUBGRADE	0.1"	+0.0' TO -0.1'	SEE SOLS REPORT
B. ENGINEERED FILL	0.5"	+0.1' TO -0.1'	SEE SOLS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.
7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE IMMEDIATELY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE, AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

UTILITY LOCATION NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS. CALL BEFORE YOU DIG: 1 (800) 227-2600; SOUTHWEST GAS CORPORATION: 702-400-1789 (STANDBY CONTACT NUMBER)

2.1 CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST EDITION, THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS OVERSEEN BY THE CONTROLLING AGENCY, THE UNIFORM BUILDING CODE, AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CIVIL PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE UP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOLS REPORT AS PREPARED BY ADD GEO. REPORT #ADD FIELD. ADD FIELD APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATION.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.E.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.
16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS, FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTANTIES OF ±0.09 METERS (±0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

SOUTHERN NEVADA - SOUTHWEST GAS CORPORATION GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020
 2. THERE SHALL BE A MINIMUM HORIZONTAL AND VERTICAL CLEARANCE OF 12-INCHES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND FACILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC
 3. FOR VALVE ADJUSTMENT CONTACT 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION.
 4. IN THE EVENT OF NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099
- CAUTION: HIGH PRESSURE GAS
- CALL SOUTHWEST GAS AT 702-400-1789 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION



DEVIATIONS FROM STANDARDS

NONE

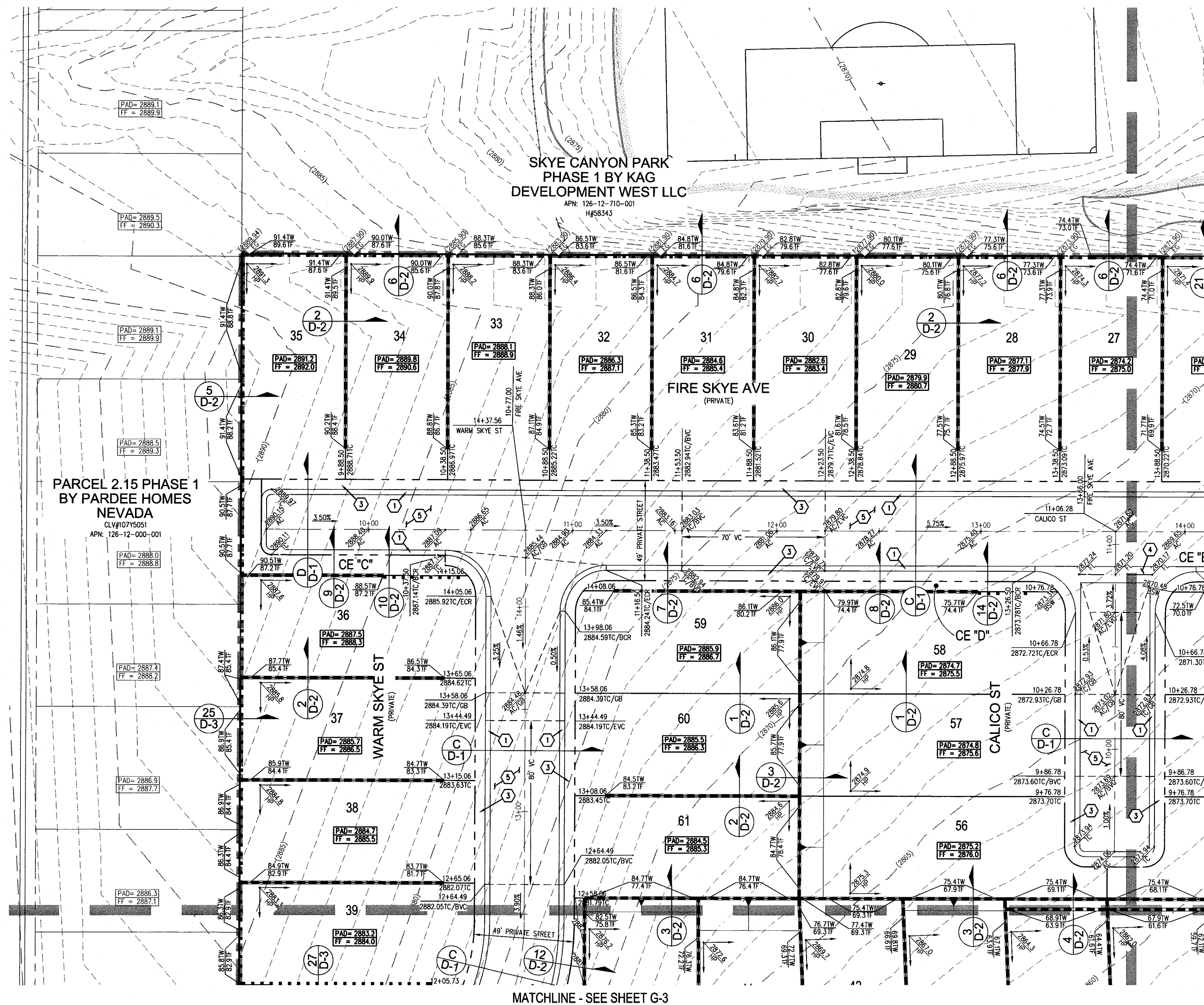
APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT No. LVVWD APPROVED FIRE FLOW FIRST APPROVED DATE: 07M AT 20 PSI RESIDUAL

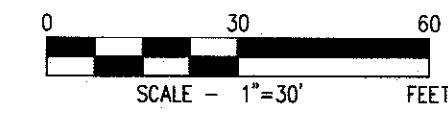
\\cny1719.000 skye canyon parcel 2.14\\dwg\\improv\\cny1719-000 cvr.dwg 4/25/2018 5:24 PM Dominic Pandiligan

1-10/17/19 000 skye canyon parcel 2.14.dwg (projected) 7/19/2018 5:51 PM Dominie Pandolfi



MATCHLINE - SEE SHEET G-2

MATCHLINE - SEE SHEET G-3



CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES.

SURVEY NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DISTURBED, DESTROYED, OR OBLISCURED DURING CONSTRUCTION.

ELEVATION NOTE

ADD 2800 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 1801.00).

SOILS REPORT

SOILS REPORT BY GEOTEK RESIDENTIAL, LLC
PROJECT NO. 12208-LVR DATED MARCH 30, 2016

EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= ### CU YDS
FILL= ### CU YDS
EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.

DISCLAIMER NOTE

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- FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED TOP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

GRADING NOTES

- FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
- THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
- ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SHMPP.
- MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
- SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
- ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
- CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
- CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLENISHING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
- NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

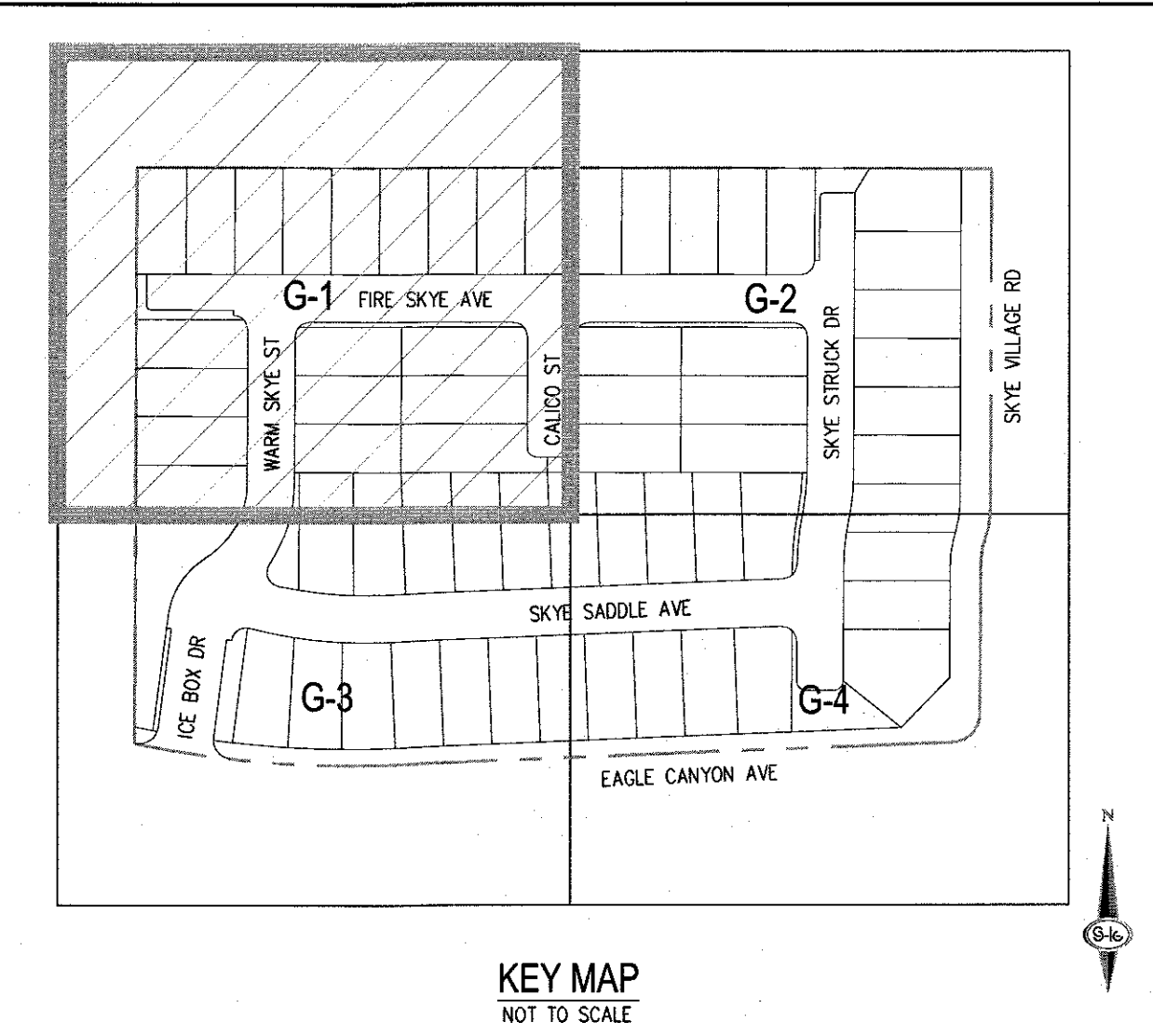
LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

- THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
- ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
- TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
- AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
- ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT. WHOEVER IS EARLIEST TO REMOVE SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (UNSHADED). AREA OUTSIDE THE 0.2% ANNUAL CHANCE (500 YEAR) FLOODPLAIN, PER THE FEMA FIRM PANELS 32003C1750E DATED SEPTEMBER 27, 2002.



GRADING NOTES

- CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.51. CURB FLOW LINES LESS THAN 0.60% GRADE SHALL BE WATER TESTED. ANY CURB THAT DOES NOT FLOW SHALL BE REMOVED AND REPLACED AT NO COST TO THE CITY.
- INSTALL "L" TYPE CURB AND GUTTER PER CCAUSD #216.
- INSTALL 5" WIDE CONCRETE SIDEWALK (5" THICK OVER 6" TYPE II AGGREGATE BASE) PER CCAUSD #214.
- INSTALL 8" FT CROSS GUTTER PER DETAIL 26 ON SHEET D-3.
- INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE.
- CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT CCAUSD NO. 235, CASE 1 & 235.1.
- CONSTRUCT 10" TRANSITION FROM "L" CURB TO ROLL CURB PER DETAIL 32 ON SHEET D-3.
- PERIMETER LANDSCAPE TO BE CONSTRUCTED BY MASTER DEVELOPER.
- INSTALL 20" WIDE GATE PER CCAUSD DWG NO. 425.51.
- INSTALL WROUGHT IRON FENCE WITH PEDESTRIAN ACCESS GATE PER DETAIL 30 ON SHEET D-3.
- INSTALL "A" TYPE ISLAND CURB PER CCAUSD NO. 219.
- INSTALL 15 LF TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421.
- INSTALL 24" CLASS III RCP STORM DRAIN.

DRAINAGE EASEMENT NOTE

ALL PRIVATE STREETS, DRAINAGE EASEMENTS AND COMMON LOTS ARE PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA.

BONDABLE DRAINAGE QUANTITIES (PRIVATE)

8" WIDE CONCRETE VALLEY GUTTER W/10" TYPE I AGGREGATE BASE	SF	2718
24" RCP CLASS III STORM DRAIN	LF	72
15.0" TYPE "CM2" DROP INLET	EA	1

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY _____ ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

STANLEY OKEY AMADI, P.E. 21724 _____ DATE _____



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

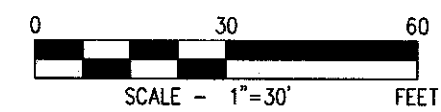
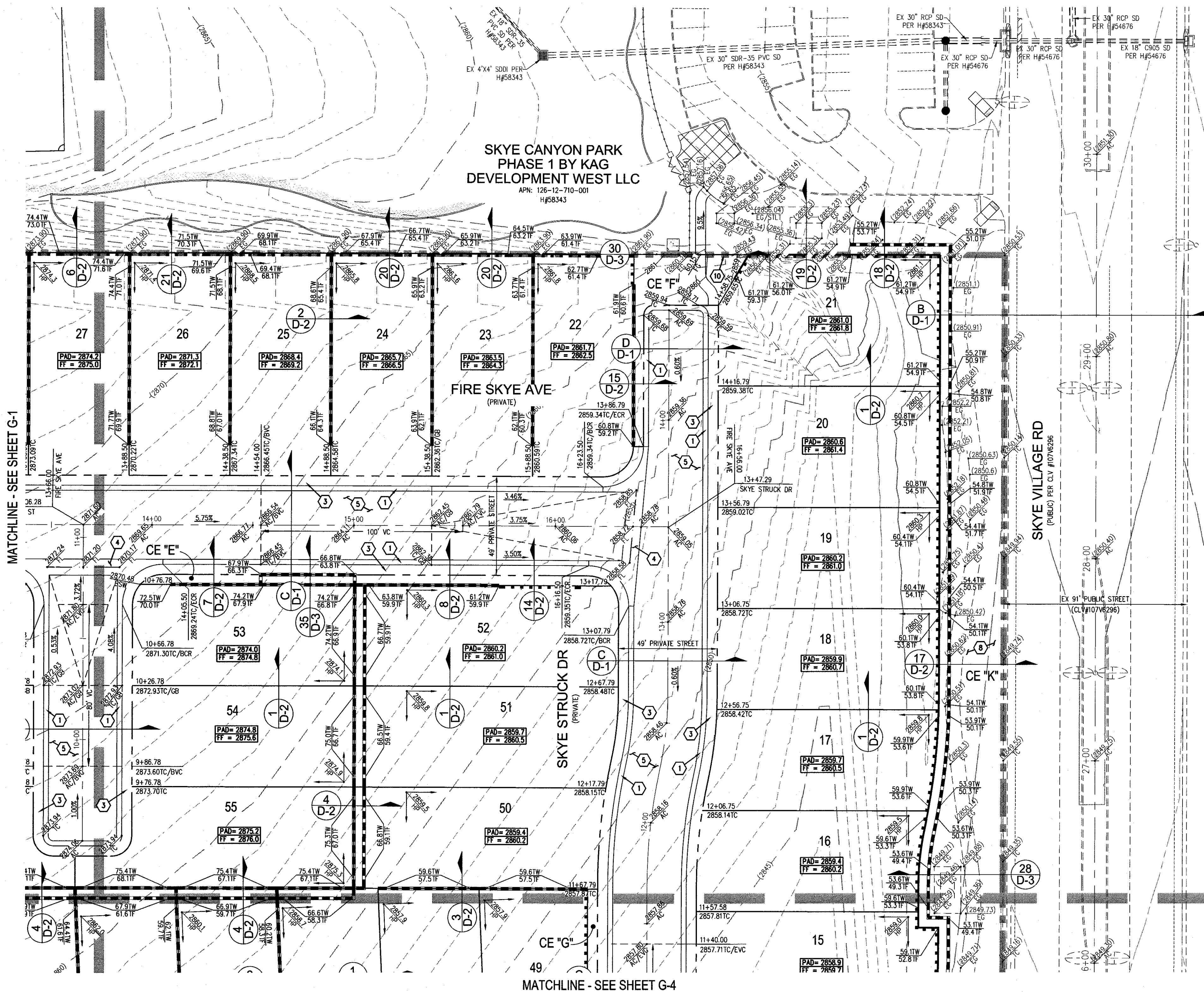
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DRAFTER: DNP
DESIGNER: DNP
CHECKED: STS
PROJECT NO. OLY1719-000

STANLEY OKEY AMADI
Exp. 12/31/2018
CIVIL
No. 21724
G-1
SHEET 4 OF 20

CITY OF LAS VEGAS, NV

NINETY-FIVE MANAGEMENT, LLC
SKYE CANYON II PARCEL 2.14
GRADING PLAN - I

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CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

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SOILS REPORT BY GEOTEK RESIDENTIAL, LLC
PROJECT NO. 12208-LVR DATED MARCH 30, 2016

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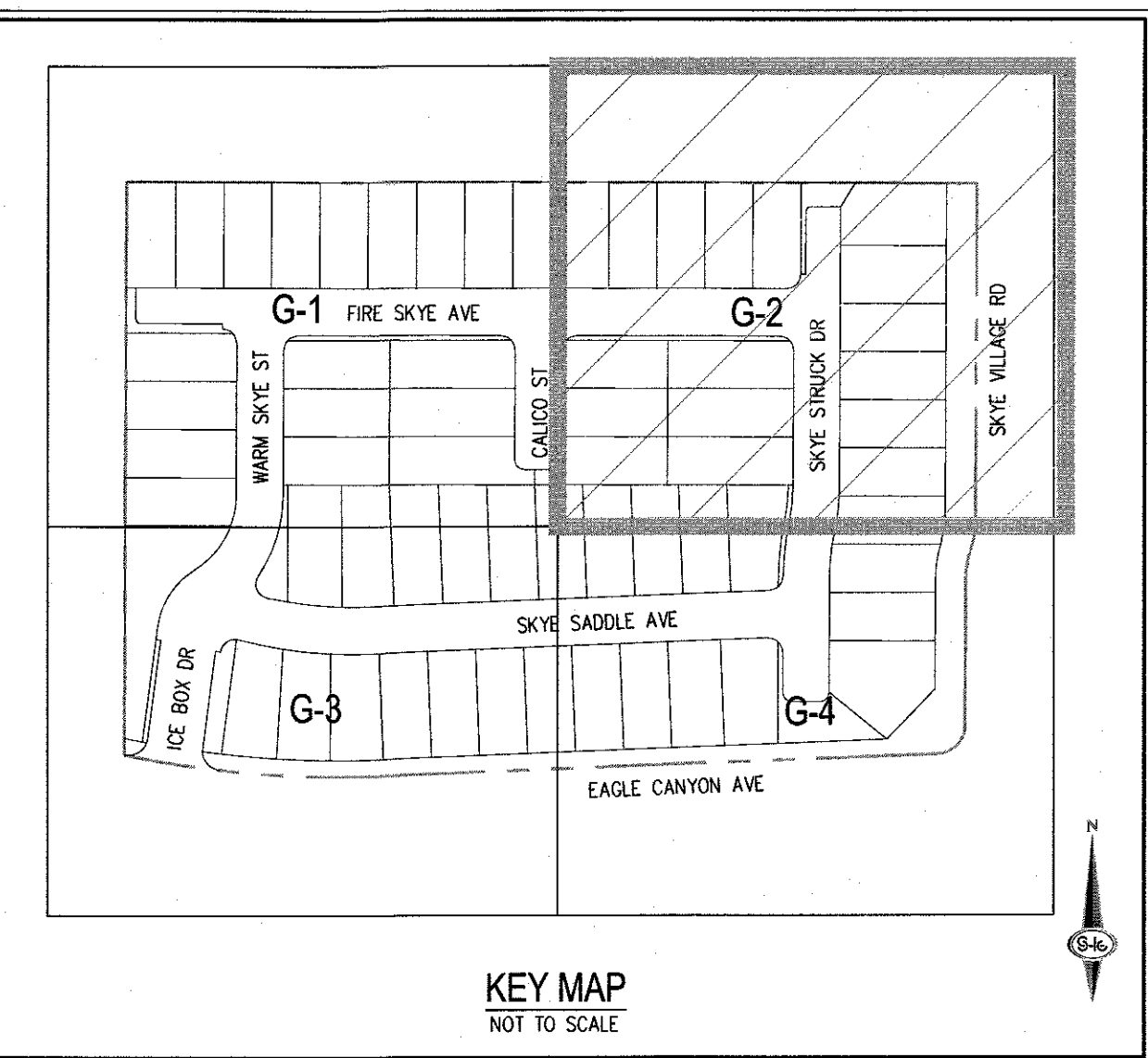
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FLOOD ZONE

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GRADING NOTES

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- INSTALL 8-FT CROSS GUTTER PER DETAIL 26 ON SHEET D-3
- INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE
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- CONSTRUCT 10" TRANSITION FROM "L" CURB TO ROLL CURB PER DETAIL 32 ON SHEET D-3
- PERIMETER LANDSCAPE TO BE CONSTRUCTED BY MASTER DEVELOPER
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- INSTALL 15 LF TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
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DRAINAGE EASEMENT NOTE

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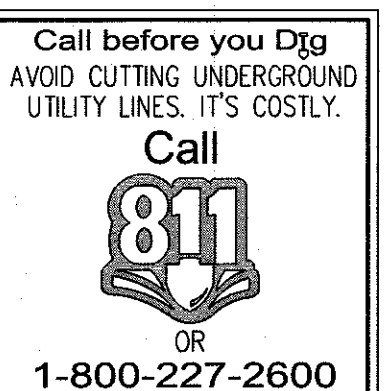
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8" WIDE CONCRETE VALLEY GUTTER W/10" TYPE I AGGREGATE BASE	SF	2718
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STANLEY OKEY AMADI, P.E. 21724 _____ DATE _____



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

DATE	BY	APP.

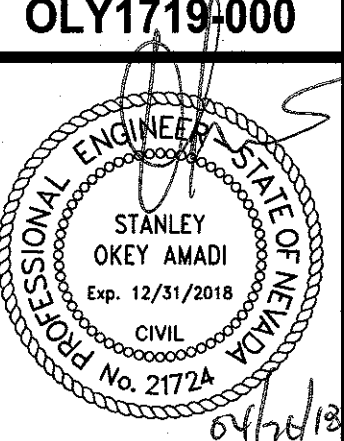
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CITY OF LAS VEGAS, NV

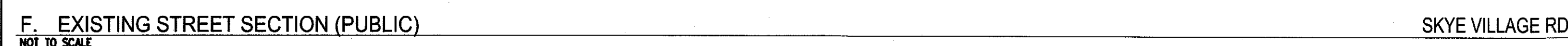
NINETY-FIVE MANAGEMENT, LLC
SKYE CANYON II PARCEL 2.14
GRADING PLAN - II

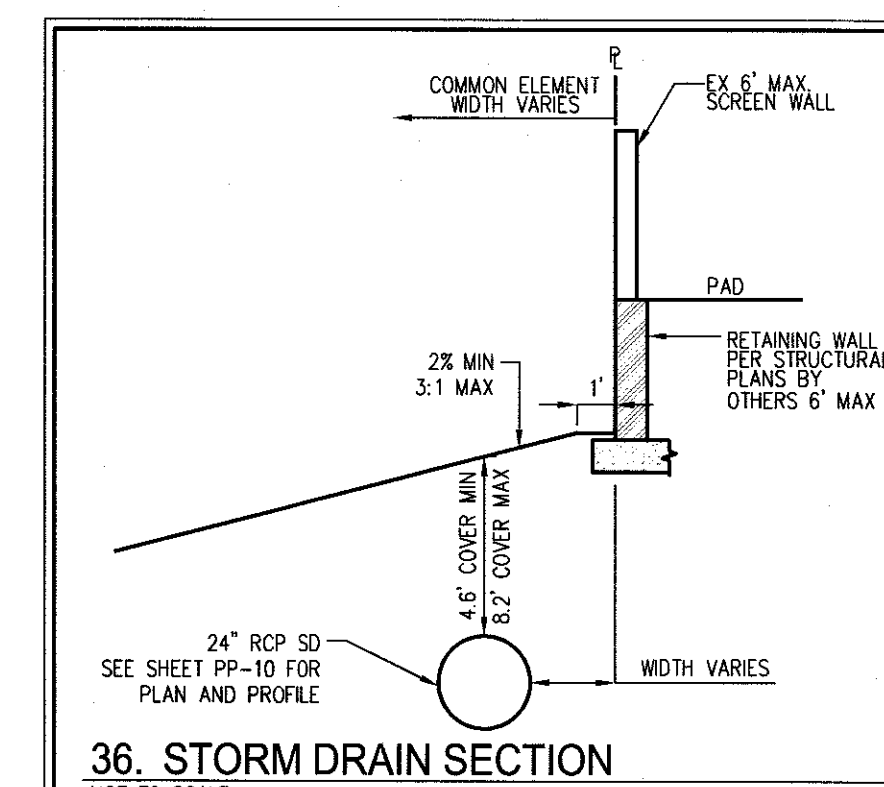
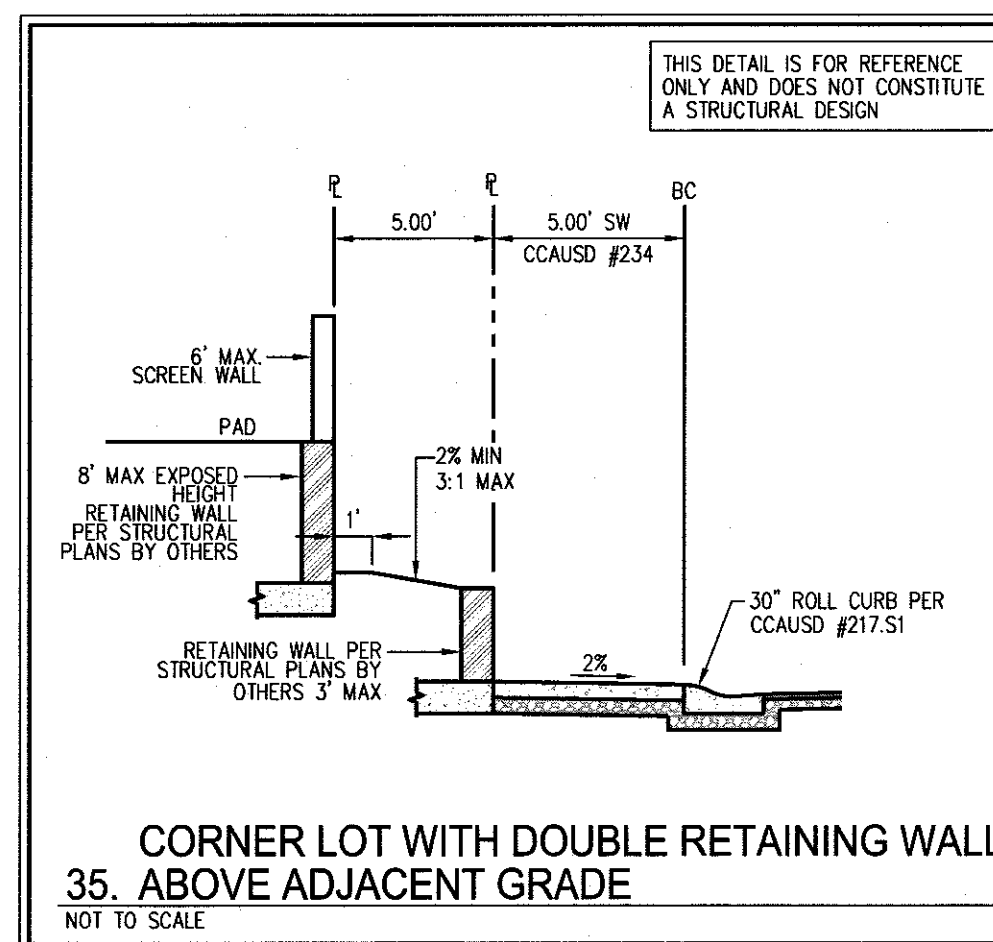
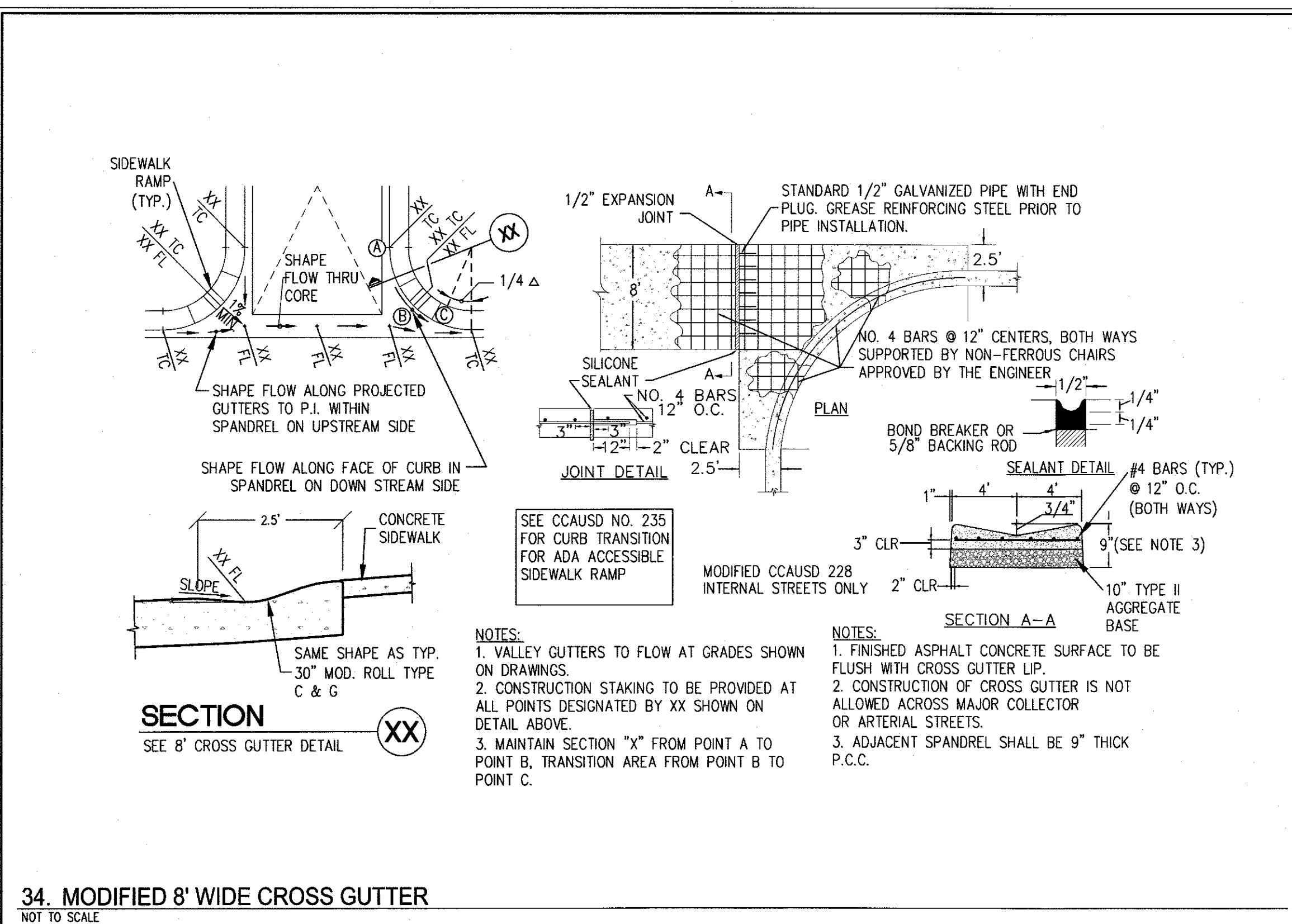
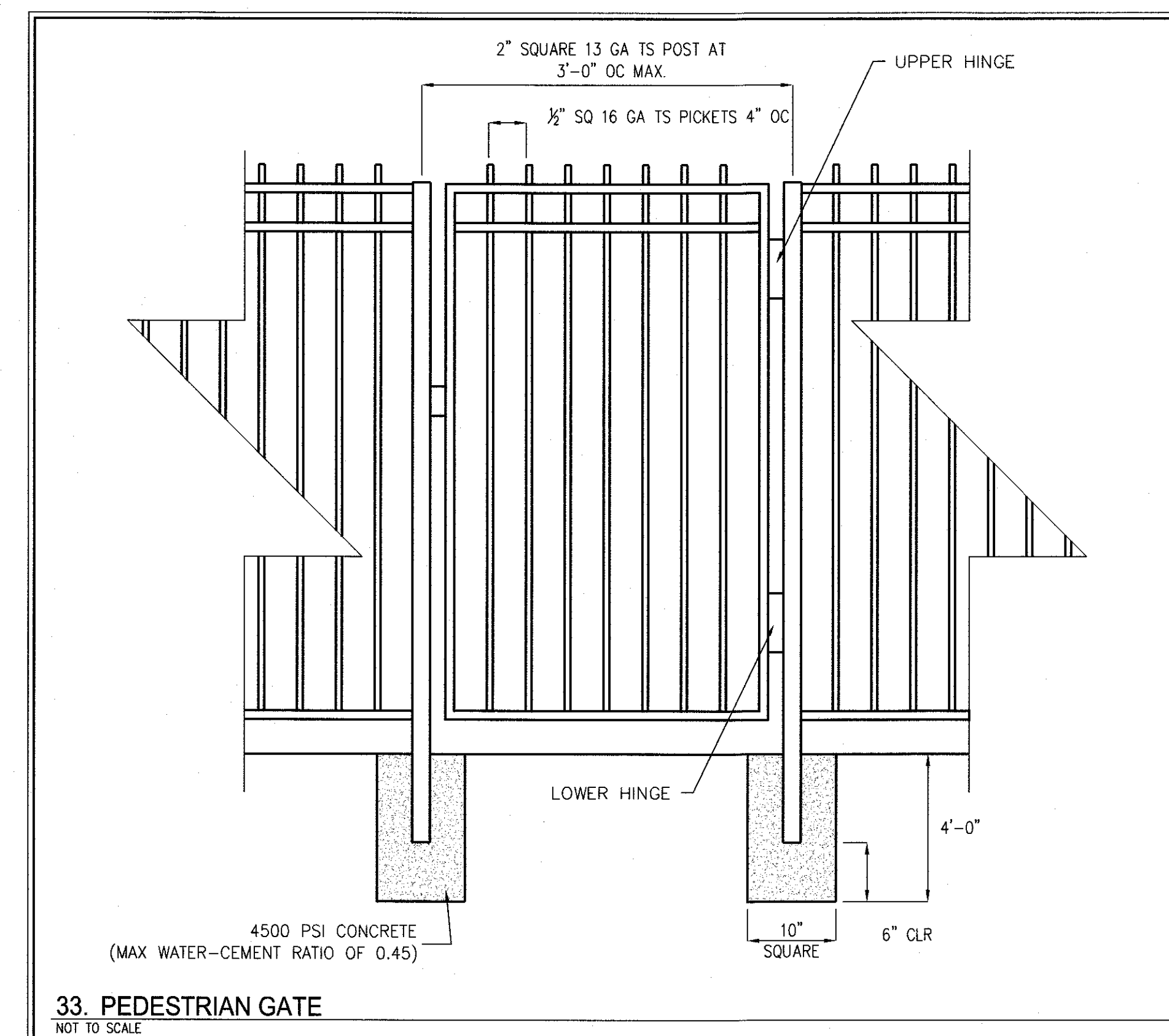
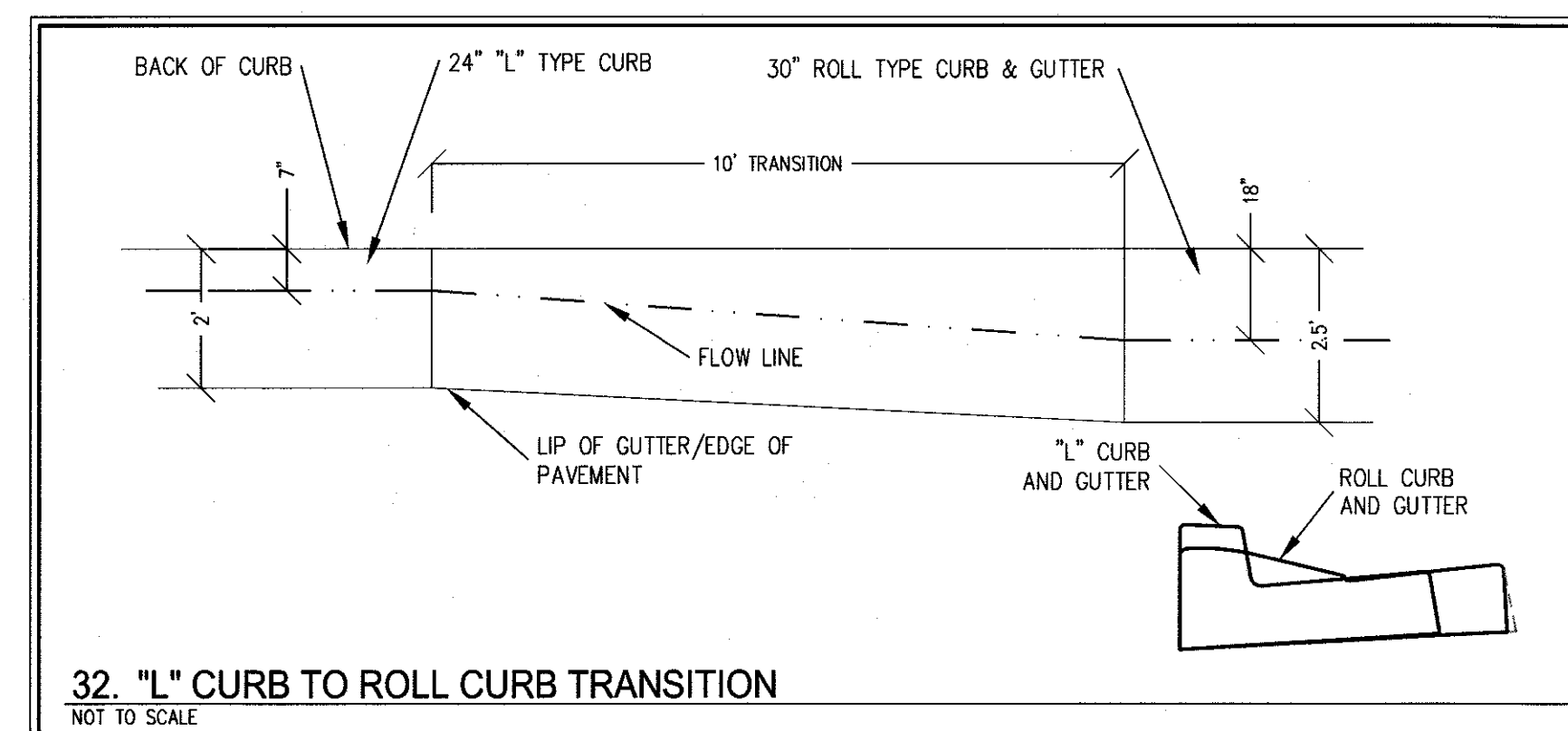
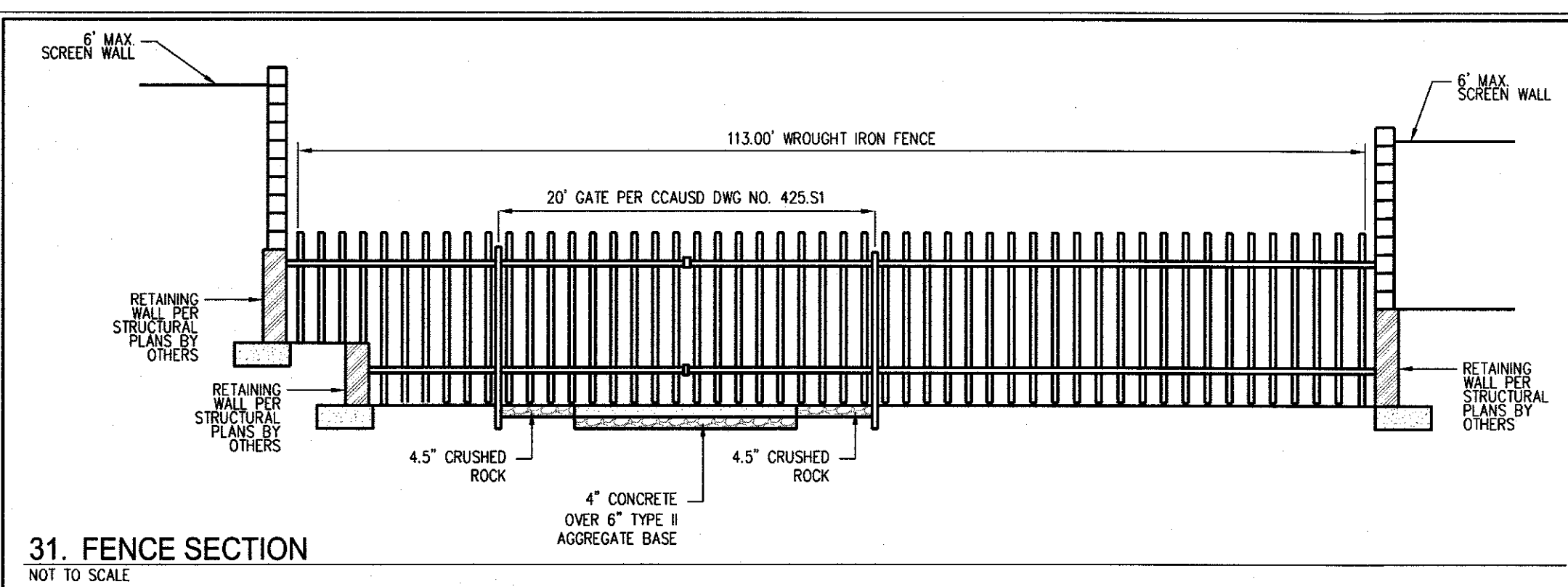
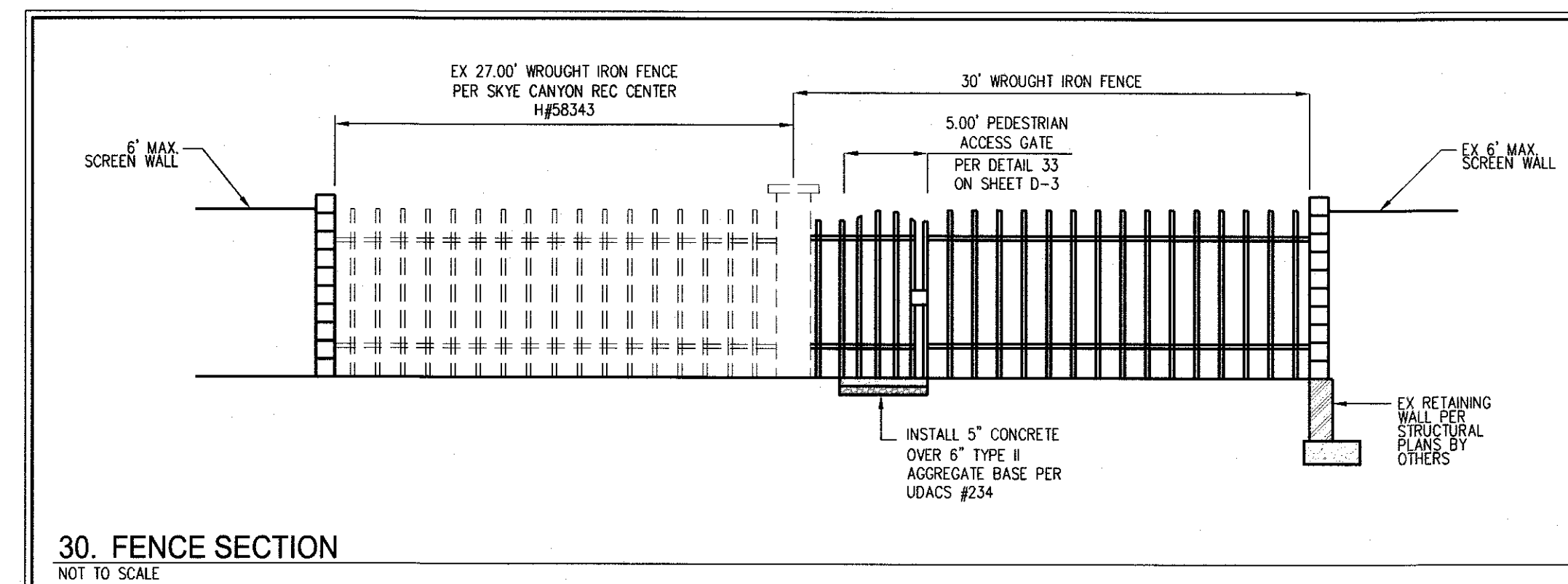
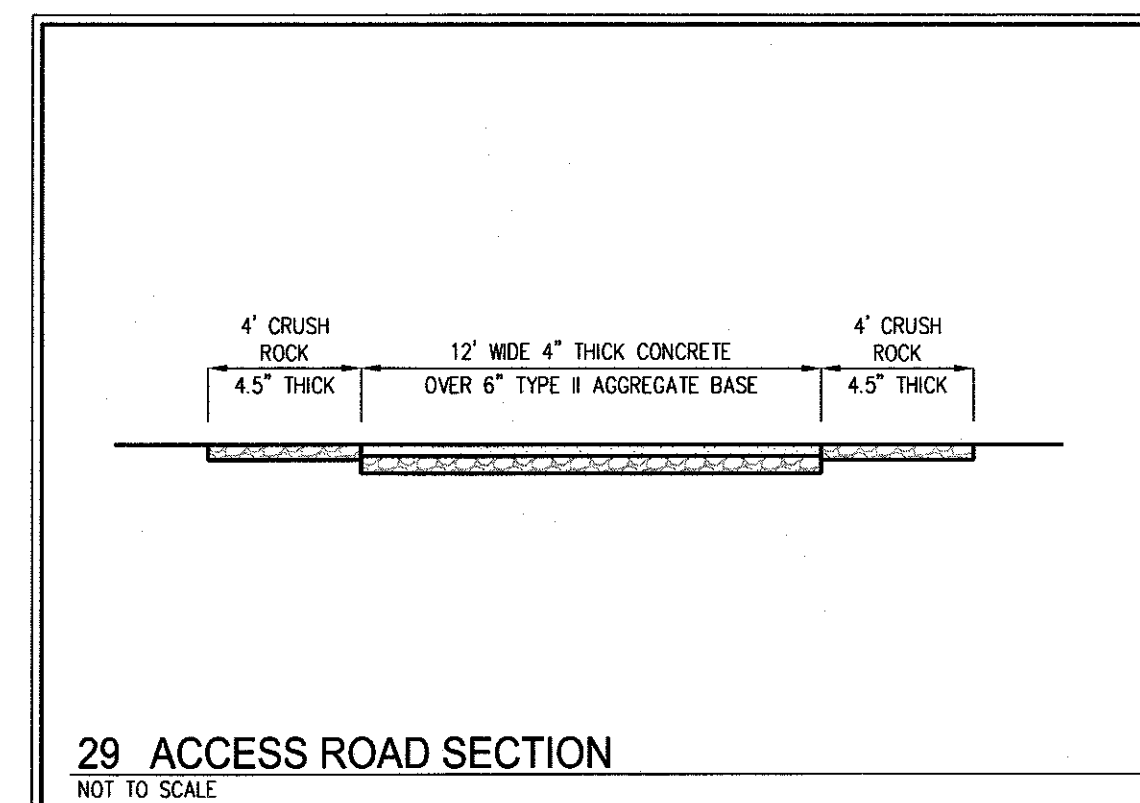
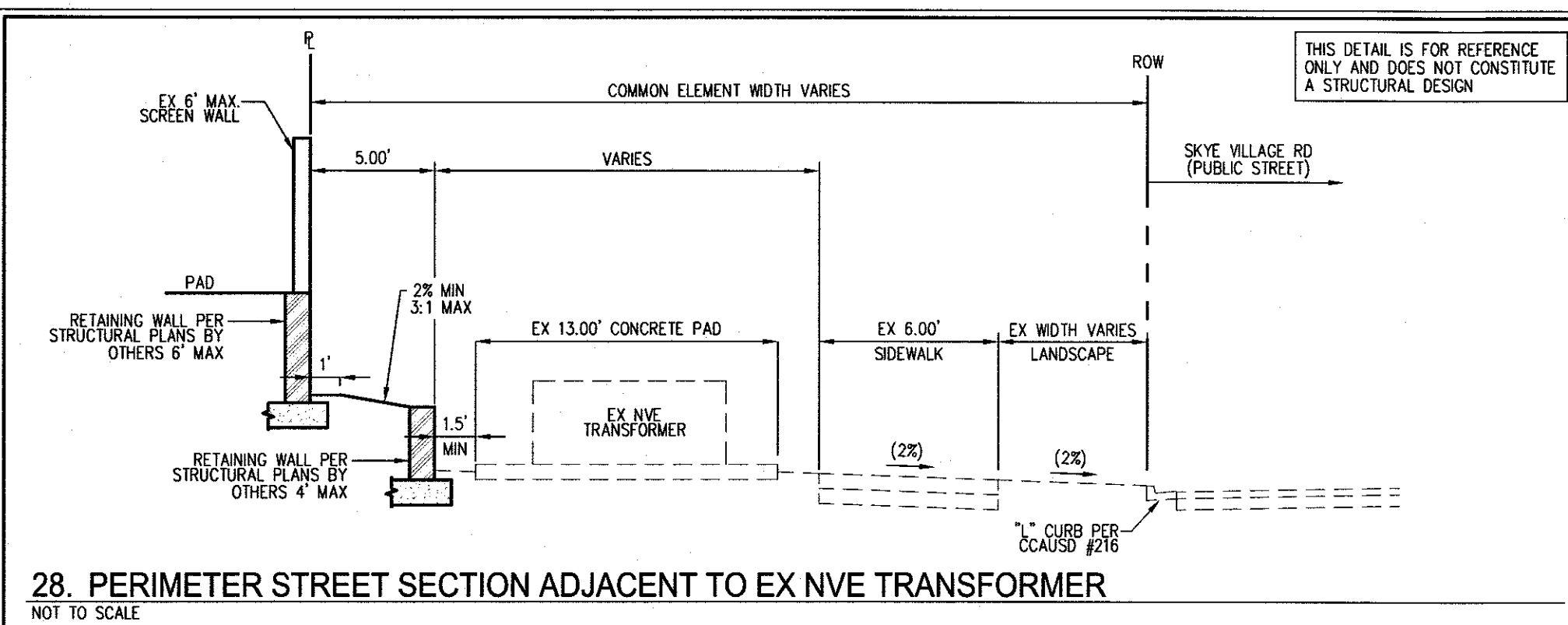
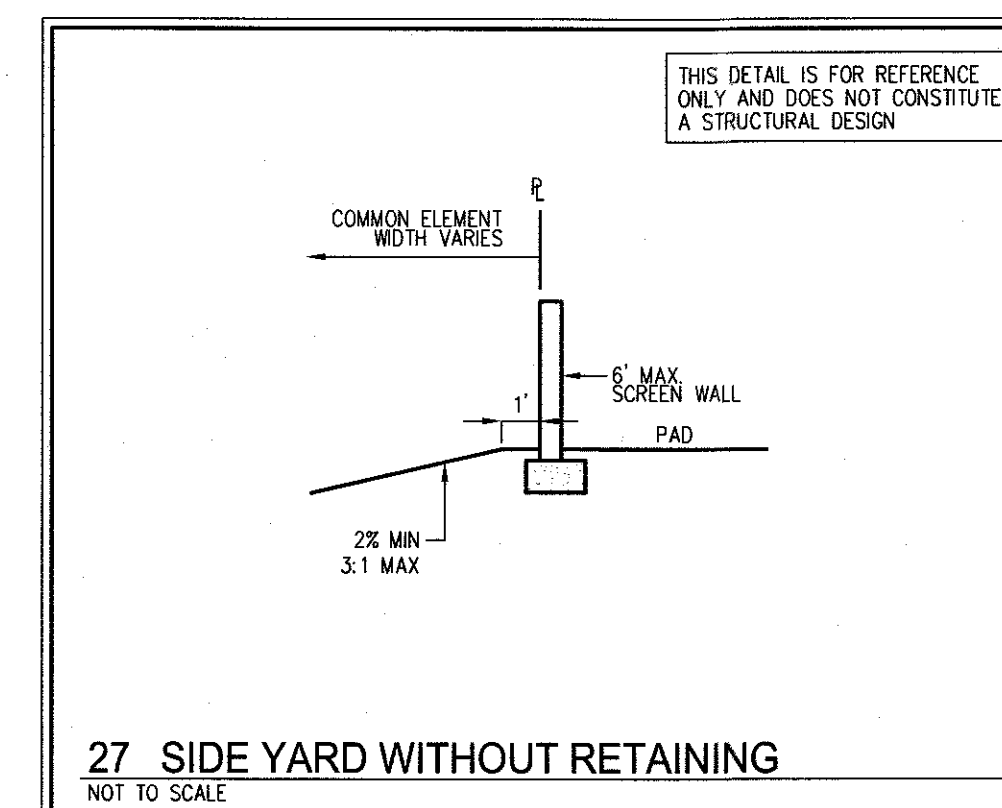
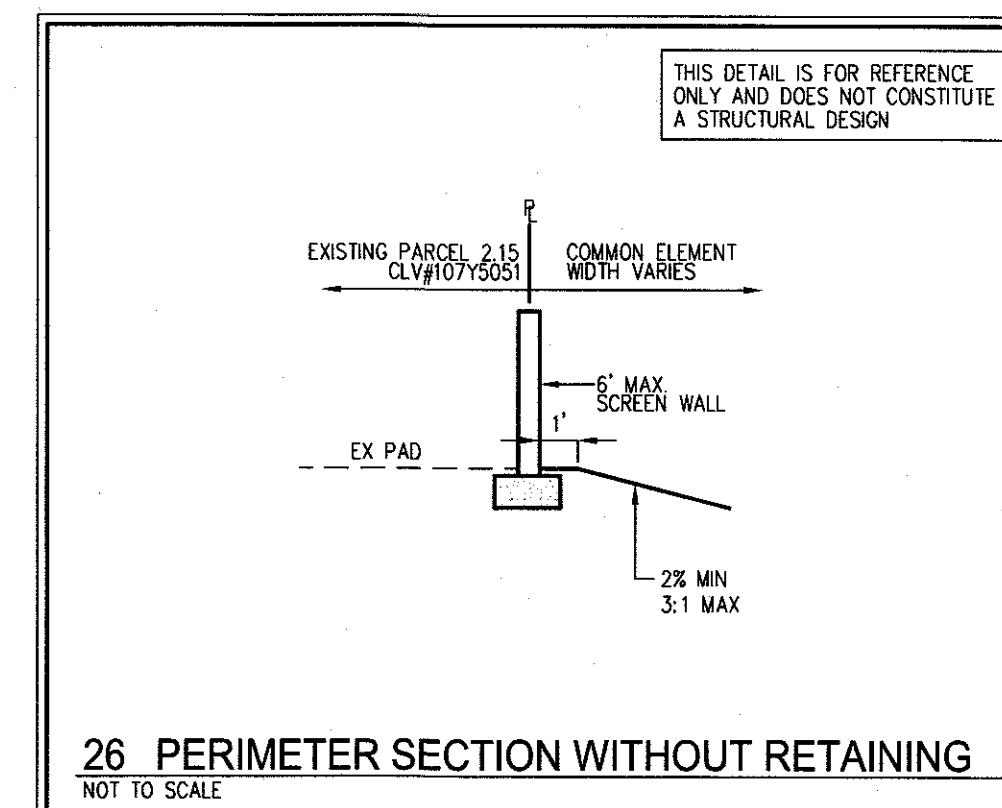
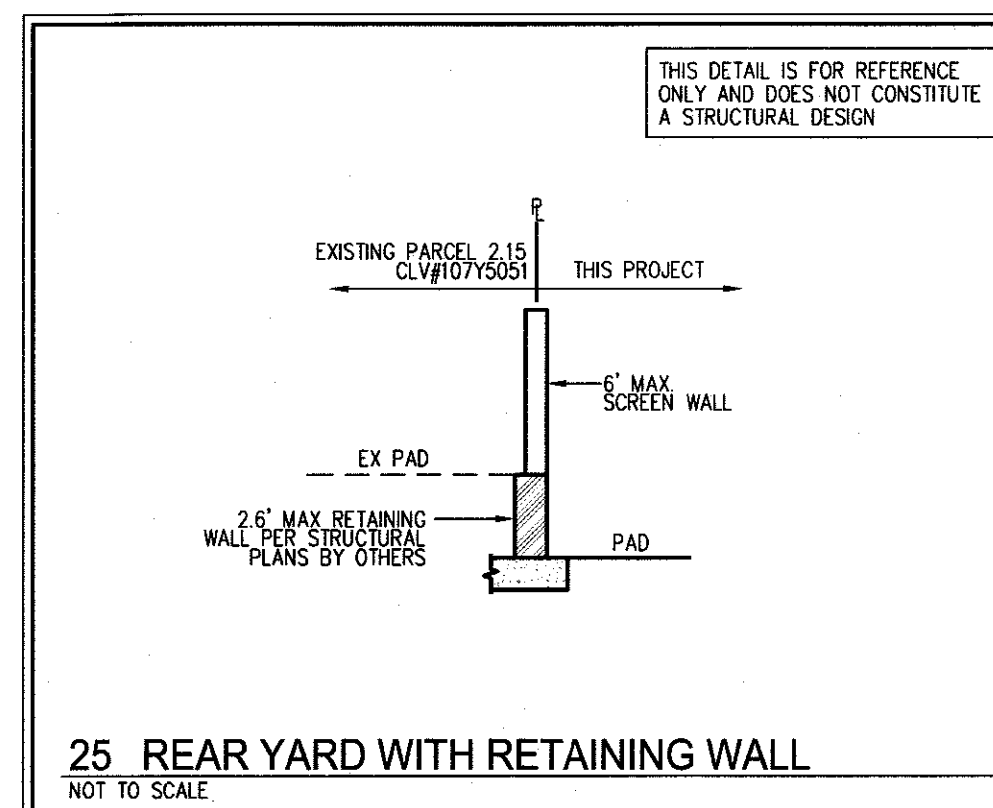
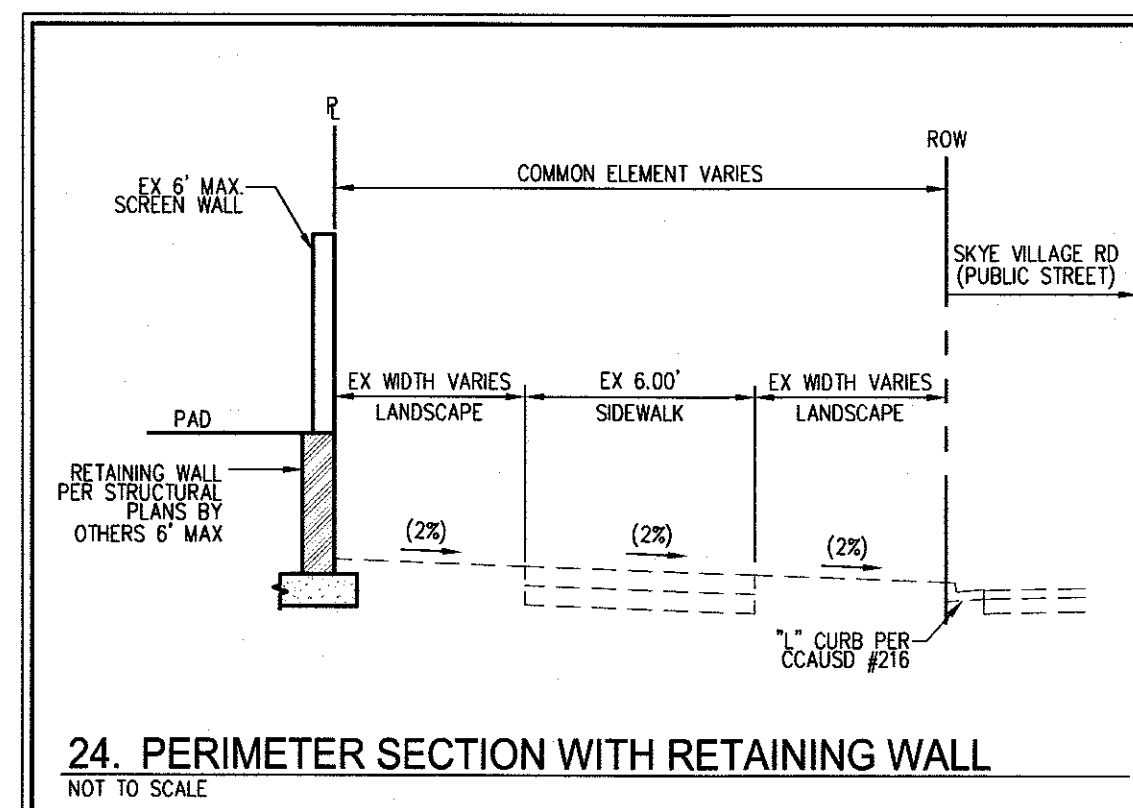
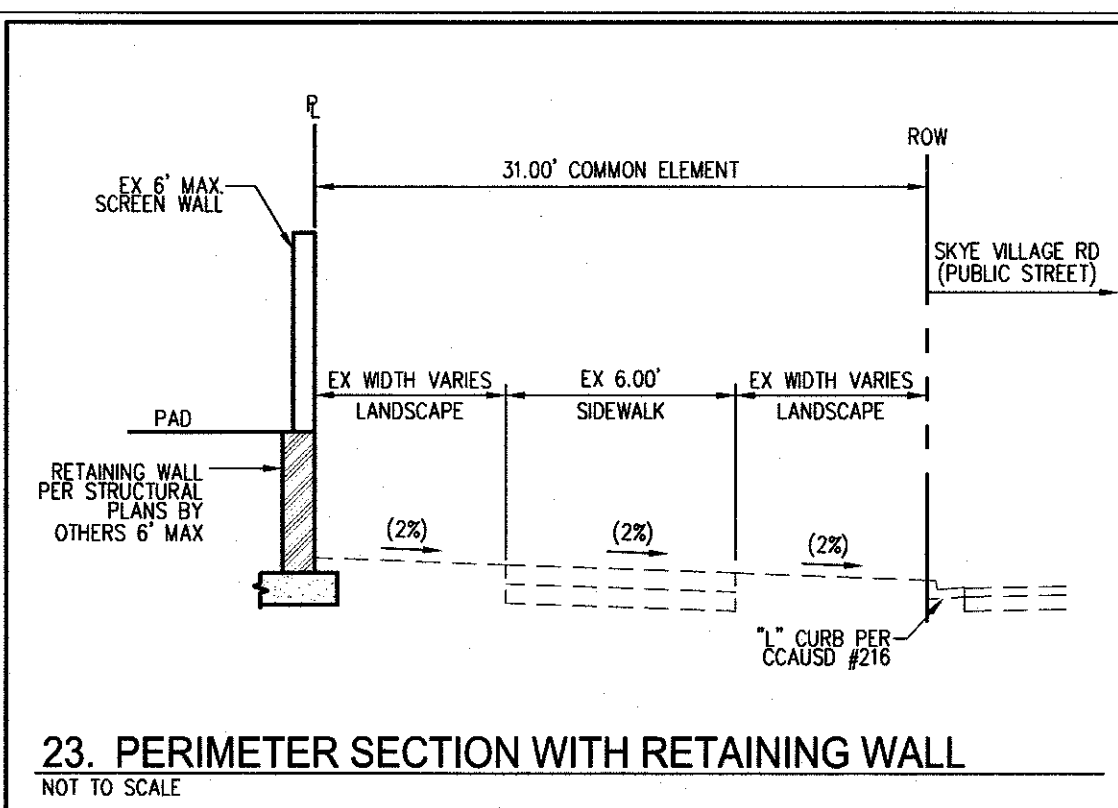
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DRAWN:	DNP
DESIGNER:	DNP
CHECKED:	STS
PROJECT NO.	OLY1719:000

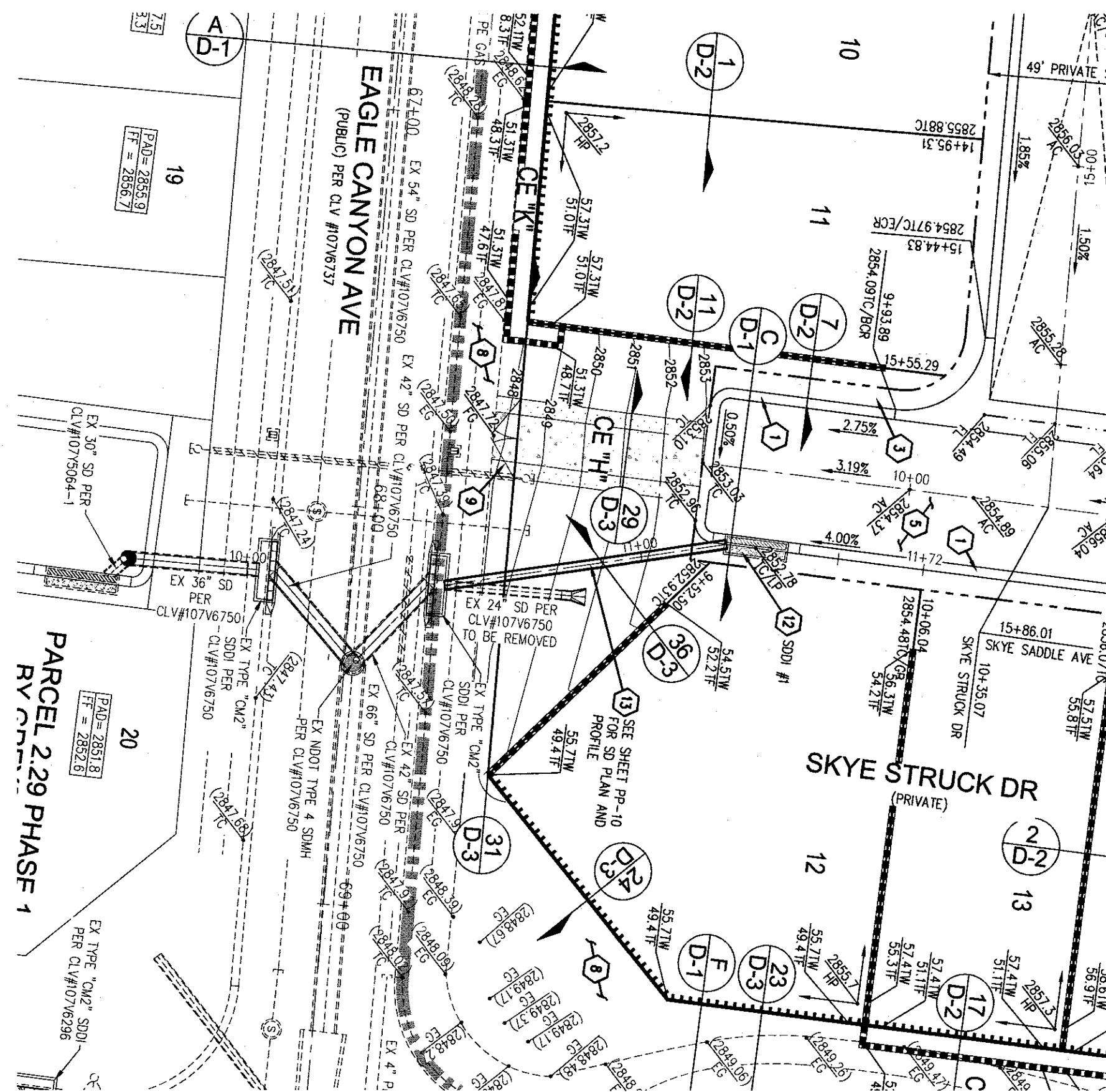
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DESIGNER: DNP
CHECKED: STS
PROJECT NO. OLY1719:000



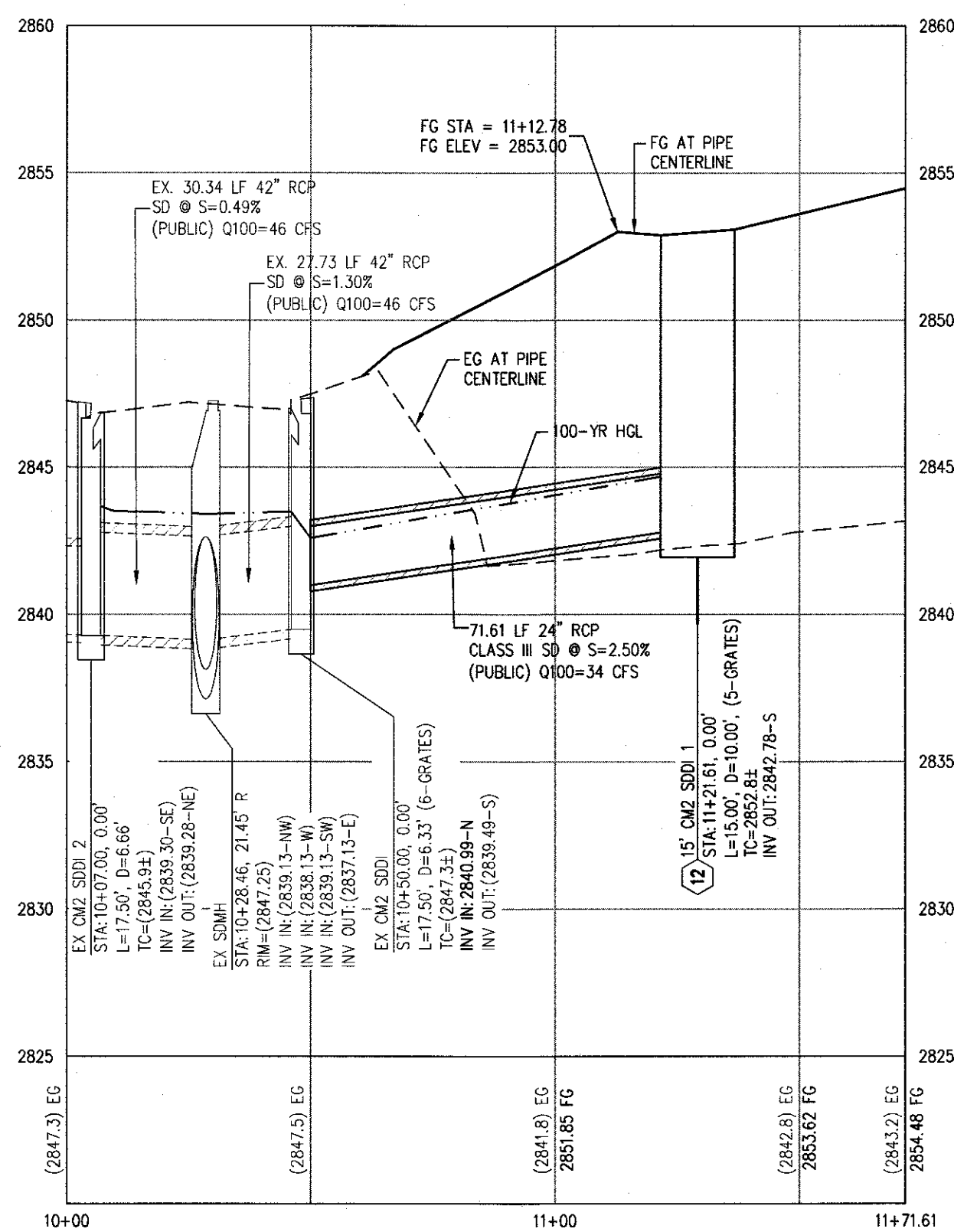
G-2
SHEET 5 OF 20



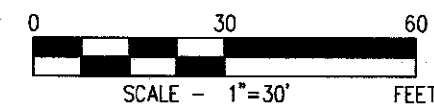




SD #1 - PLAN VIEW
(PUBLIC)



SD #1 - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'



CALL SOUTHWEST GAS AT 702-651-2111 FOR
STANDBY WHEN EXCAVATING OVER OR NEAR HIGH
PRESSURE GAS LINES.

SURVEY NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS
SHOWN AND TO REPAIR ALL SURVEY MONUMENTATION DAMAGED,
DISTURBED, DESTROYED, OR OBTAINED DURING CONSTRUCTION.

ELEVATION NOTE

ADD 2800 TO ALL SPOT GRADES WHERE THE HUNDREDS AND
THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E.
01.00 REPRESENTS 1801.00)

SOILS REPORT

SOILS REPORT BY GEOTEK RESIDENTIAL, LLC
PROJECT NO. 12208-LVR DATED MARCH 30, 2016

EARTHWORKS

EARTHWORK QUANTITIES (RAW):

CUT= ### CU YDS

FILL= ### CU YDS

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED
LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED
AND ACTIVE GRADING PERMIT.

DISCLAIMER NOTE

- EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE
CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF
ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS
MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY
FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.
- FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY CROSS
SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED
TOP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF
MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL
NOTIFY THE ENGINEER.

GRADING NOTES

- FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION
2304.11.2.2.
- THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO
THE ENGINEER.
- ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
- MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH
REPORT.
- SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
- ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
- CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY
OF LAS VEGAS BUILDING DEPARTMENT.
- CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES
AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN
PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING
FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLETING
FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION
COMMENCING.
- NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24)
INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXISTS) WITHIN THE
SIGHT VISIBILITY ZONES.

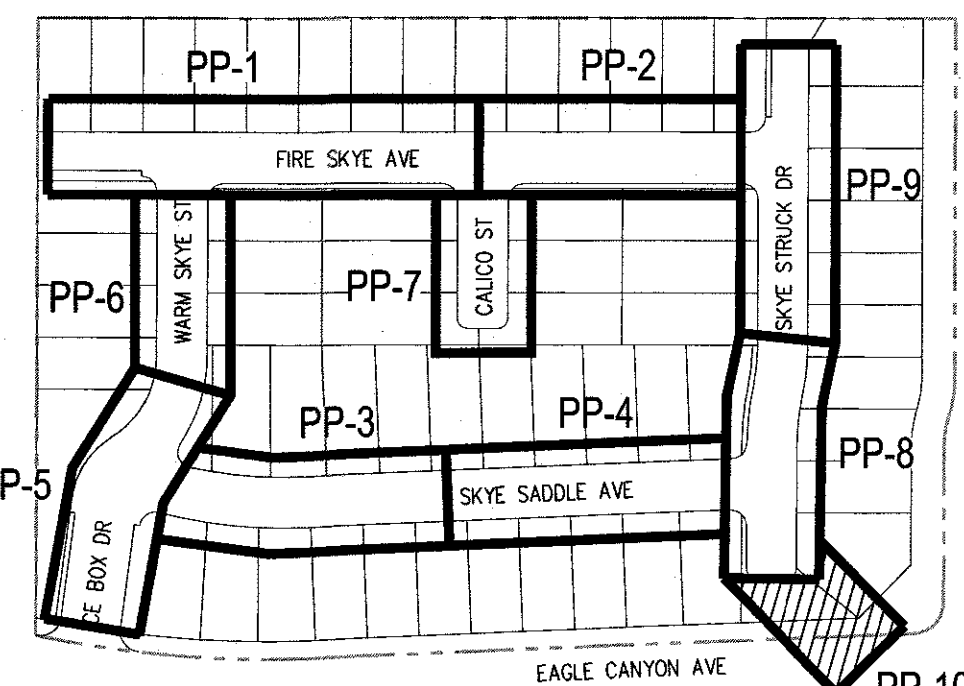
LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

- THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY
REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY
HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY
AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR
CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER
SYSTEM.
- ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF
THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE
SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE
24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
- TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS
SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT
PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY;
REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000,
SECTION III.A.5.
- AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS
USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE
ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN
EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE
STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY
INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE
NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
- ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER
RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER.
SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR
MORE.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (UNSHADED). AREA OUTSIDE THE
0.2% ANNUAL CHANCE (500 YEAR) FLOODPLAIN, PER THE FEMA FIRM PANELS 32003C1750E DATED
SEPTEMBER 27, 2002.



KEY MAP
NOT TO SCALE

GRADING NOTES

- CONSTRUCT 30" ROLL CURB AND GUTTER PER CCAUSD NO. 217.S1. CURB FLOW
LINES LESS THAN 0.00% GRADE SHALL BE WATER TESTED. ANY CURB THAT DOES
NOT FLOW SHALL BE REMOVED AND REPLACED AT NO COST TO THE CITY.
- INSTALL "L" TYPE CURB AND GUTTER PER CCAUSD #216
- INSTALL 5" WIDE CONCRETE SIDEWALK (5" THICK OVER 6" TYPE II AGGREGATE
BASE) PER CCAUSD #234
- INSTALL 8-FT CROSS GUTTER PER DETAIL 26 ON SHEET D-3
- INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE
- CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR
EQUIVALENT CCAUSD NO. 235, CASE 1 & 235.1
- CONSTRUCT 10" TRANSITION FROM "L" CURB TO ROLL CURB PER DETAIL 32 ON
SHEET D-3
- PERIMETER LANDSCAPE TO BE CONSTRUCTED BY MASTER DEVELOPER
- INSTALL 20" WIDE GATE PER CCAUSD DWG NO. 425.S1
- INSTALL WROUGHT IRON FENCE WITH PEDESTRIAN ACCESS GATE PER DETAIL 30
ON SHEET D-3
- INSTALL "A" TYPE ISLAND CURB PER CCAUSD NO. 219
- INSTALL 15 LF TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
- INSTALL 24" CLASS III RCP STORM DRAIN

DRAINAGE EASEMENT NOTE

ALL PRIVATE STREETS, DRAINAGE EASEMENTS AND COMMON LOTS ARE
PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA

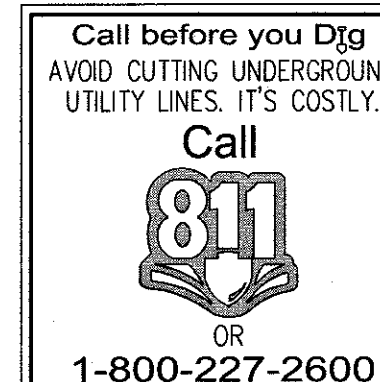
BONDABLE DRAINAGE QUANTITIES (PRIVATE)

8" WIDE CONCRETE VALLEY GUTTER W/10" TYPE I AGGREGATE BASE	SF	2718
24" RCP CLASS III STORM DRAIN	LF	72
15.0" TYPE "CM2" DROP INLET	EA	1

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED
TECHNICAL DRAINAGE STUDY _____ ON FILE AT CITY OF LAS VEGAS FOR THE
SUBJECT PROJECT.

STANLEY OKEY AMADI, P.E.: 21724 _____ DATE _____



DATE	BY	APP	DATE

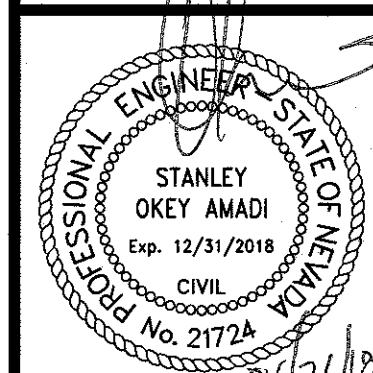
DESCRIPTION	NO.

CITY OF LAS VEGAS, NV

NINETY-FIVE MANAGEMENT, LLC
SKYE CANYON II PARCEL 2.14
PLAN AND PROFILE - X

DATE: 4/25/18
DRAWN: DNP
DESIGNER: DNP
CHECKED: STS
PROJECT NO.

OLY1719-000



PP-10
SHEET 20 OF 20