

DS #:

5398

APN:

125-07-601-009, 125-07-601-010

PROJECT:

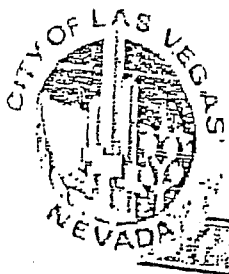
Grand Canyon Village Mass Grading

SUBMITTAL:

1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		January 20, 2021
TO: Land Development Services Department of Building & Safety		FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
Grand Canyon Village Mass Grading		VTN
Cross Streets:	Grand Canyon Dr. & Skye Canyon Park Dr.	Grand Canyon Village, LLC
File Number:	F:\Depot\DSMemos\DS5398A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-07-601-009, 125-07-601-010	NDOT
Zoning Action:		
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	12/23/2020	01/19/2020	See Comments Below	\$400.00	4124257: \$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 following are comments pertaining to the subject site specific drainage study and grading plans:

1. 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.
2. The project proposes to construct facilities and/or increase flows within Nevada Department of Transportation (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.
3. Provide printed copies of the Drainage Basin maps, Figures 6 and 7 were not provided with physical copy.
4. Provide erosion control mitigation for the steep slope that sheet flows onto Oso Blanca Dr from basin ON1b.
5. ON1a is considered to all flow to the existing 36" RCP. The northern corner of basin ON1a clearly bypasses this inlet and flows onto Oso Blanco Dr. This flow needs to be considered in the street hydraulic analysis.
6. Per Standard Form 4 the lag time for ON1 is 0.136 however the developed condition HEC-1 model uses 0.135. Update accordingly.

7. Hydraulic section ST3 for existing condition should be evaluated for combination point CP1E flows rather than basin OB flows.
8. Hydraulic Section ST3 for developed condition should be evaluated for combination point CP1D flows rather than basin OB flows.
9. Hydraulic section ST1 for developed condition on figure 7 shows it is considering $\frac{1}{2}$ of the basin GCU (1 cfs) however the report and flowmaster show that it considers all of basin GCU (4 cfs). Resolve this discrepancy.
10. Label the existing storm drain facilities with their respective CLV Drawing Numbers.

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
HDR/JKS

T/R/S: T19S/R60E/S07
AREA G-07

Technical Drainage Study for

Grand Canyon Village

Las Vegas, Nevada

W.O. # 8025

Prepared for

**Grand Canyon Village
LLC**

10655 Park Run Drive, Suite 160

Las Vegas, NV 89144

PH: (702) 220-4500

Submitted to:

**City of Las Vegas
Public Works**

333 N Rancho Drive

Las Vegas, NV 89106

PH: (702) 229-6251



HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Grand Canyon Village Date: December 21, 2020

Location of Development: a) Descriptive (Cross Streets) North/South: Grand Canyon Drive

East/West: Skye Canyon Park Drive

b) Section: 7 Township: 19S Range: 60E

c) APN : 125-07-601-009, 125-07-601-010

Name of Owner: Grand Canyon Village LLC

Telephone No.: (702)-220-4500 Fax No.: _____ E-Mail Address: _____

Address: 10655 Park Run Drive, Suite 160, Las Vegas, NV 89144

Contact Person-Name: Aaron Yup Telephone No.: 702-873-7550

* E-Mail Address: ayup@vtnnv.com Fax No.: 702-362-2597

Firm: VTN Nevada

Address: 2727 S. Rainbow Blvd Las Vegas, NV 89146

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		Mass grade & minor street improvement

1. Total Owned Land Area: At Site: ±24.11 Acres Being Developed/Disturbed: ±12.01 Acres

2. Is a portion or all of the subject property located in a designated 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.): Grading, future commercial

5. Approximate upstream land area which drains to the subject site: ±0 Acres

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Grand Canyon Parcel Map Study (DS5175)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Eastern boundary in regional facility & frontage road west of US95.

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



Engineer's Seal 12/22/2020

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.

***New Required Field**

****Review and concurrence of the Clark County Regional Flood Control District is required.**

	Revision	Date
_____	Local Entity File No.	

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Grand Canyon Village

Map ID:

Firm Name: VTN Nevada

Engineer: Brian Ruiz

Address: 2727 S. Rainbow Blvd

City: Las Vegas

State: NV

Zip: 89146

Phone Number: 702-873-7550

Fax Number: 702-362-2597

Property Owner: Grand Canyon Village LLC

Address: 10655 Park Run Drive, Suite 160

City: Las Vegas

State: NV

Zip: 89144

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.

II. MAPS AND EXHIBITS

Yes No

X _____ A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.

X _____ A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes No

- X Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
- X 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.
- X Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes No

- X Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
- X Minimum scale: 1" = 60'.
- X Project name.
- X Vicinity Map with local and major cross streets.
- X Revision box.
- X North arrow and bar scale.
- X Engineer's/consultant's address and phone number.
- X Elevation datum and benchmark.
- X Legend for symbols and abbreviations.
- X Cut/fill scarps, where applicable.
- X Street names, grades, widths.
- 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.
- X Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
- N/A Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
- X Proposed typical street sections.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes No

- N/A _____ Streets with off-set crowns.
- X _____ Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
- X _____ Property lines.
- X _____ Right-of-way lines and widths, existing and proposed.
- X _____ Existing improvements and their elevations.
- X _____ Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
- X _____ Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
- X _____ Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
- 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" x 48". Wrought iron gate is required for flows > 10 cfs.
- N/A _____ Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
- N/A _____ Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
- N/A _____ Building and/or lot numbers.
- X _____ Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
- X _____ Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes No

- N/A For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
- 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.
- N/A Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes No

- X Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
- X Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
- X Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
- X Use of correct precipitation values in and around the McCarran Airport rainfall area.
- X A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
- X A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
- X Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
- X On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
- N/A Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes No

- N/A Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
- 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. $Q_{100} \text{ d x v} \leq 8$. $Q_{10} \text{ d x v} \leq 6$ 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.
- N/A Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
- N/A A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones.
- Field survey data.
 - Input and output information.
 - Plotted cross-sections based on survey with proper encroachments.
 - A map showing the location of the cross-sections.
 - Analysis of both sub and super-critical flow segments.
 - A summary table and a discussion of the results in the text of the report.
- N/A Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
- N/A Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
- N/A The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
- N/A Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2



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 (CCRFCDD) 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 CCRFCDD Hydrologic Criteria and Drainage Design Manual (Design Manual).

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

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

I. GENERAL REQUIREMENT		
Yes	No	
N/A		A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
N/A		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
X		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. _____ 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	
N/A		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
N/A		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
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.
N/A		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
N/A		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

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



December 21, 2020

Albert Sung, P.E., C.F.M.
Flood Control Division
Department of Public Works
City of Las Vegas
333 N. Rancho Blvd, 7th Floor
Las Vegas, NV 89106

Subject: Technical Drainage Study for Grand Canyon Village

Mr. Sung:

This letter certifies that all items on the **Technical Drainage Study for Grand Canyon Village** electronic submittal matches the paper version bound into the study.

Respectfully submitted,

Brian Ruiz, P.E.

TECHNICAL DRAINAGE STUDY

FOR

GRAND CANYON VILLAGE

CITY OF LAS VEGAS, NEVADA

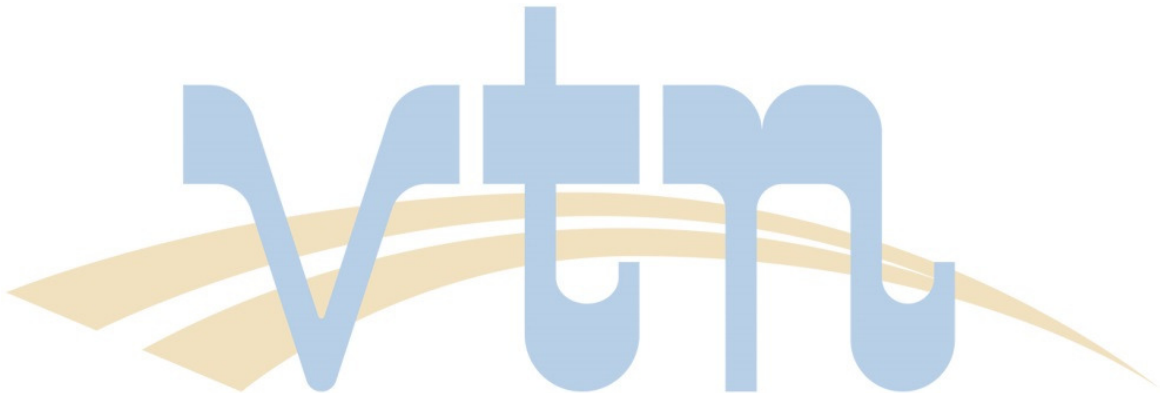
W.O. # 8025

Prepared for:

GRAND CANYON VILLAGE LLC
10655 PARK RUN DRIVE, STE 160
LAS VEGAS, NV 89144

Submitted to:

CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS
333 N RANCHO DRIVE
LAS VEGAS, NV 89106





December 21, 2020
W.O. #8025

City of Las Vegas
Land Development Services
Department of Building Safety

Attention: Albert Sung, P.E., CFM
Flood Control Project Engineer

SUBJECT: TECHNICAL DRAINAGE STUDY FOR GRAND CANYON VILLAGE

Mr. Sung,

Transmitted herewith for your review is one (1) copy of the *Technical Drainage Study for Grand Canyon Village*. The site is an $\pm$ 12.07-acre development located within a portion of Section 7, Township 19 South, Range 60 East, M.D.M., Clark County, Nevada.

If there are any questions concerning this study or if additional information is needed, please do not hesitate to contact this office.

Respectfully Submitted,

VTN Nevada

Aaron Yup, E.I.

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I. INTRODUCTION**A. STUDY OVERVIEW AND PURPOSE**

This study will provide technical drainage and flood control information for *Grand Canyon Village*, a commercial site on a ± 12.07 -acre lot. The objective of this study is to provide hydrologic and hydraulic analysis for the proposed project and allow for the mass grading of the project site. No commercial development is proposed onsite with this study. The study provides analysis for the existing and developed (mass grading) condition. A Technical Drainage Study will be submitted for the final developed condition improvements in the future for the project site.

B. LOCATION

Grand Canyon Village is located within a portion of Section 7, Township 19 South, Range 60 East, M.D.M, Clark County, Nevada APN's 125-07-601-009, 125-07-601-010. Specifically, the site is located west of Oso Blanca Road and the US 95, north of Skye Canyon Park Drive, south of Drake Drive, and east of Grand Canyon Drive. (Refer to *Figure 1: Vicinity Map*).

C. DESCRIPTION

The proposed development presently consists of arid rangeland with desert shrub vegetative cover (poor hydrologic condition). The project site generally slopes to the east at approximately $\pm 2.5\%$. The project site is bounded by a developing apartment complex to the north, a shopping center and Grand Canyon Drive to the west, US95 to the east, and Skye Canyon Park Drive to the south. (Refer to *Figure 2: Site Description Map* included in *Appendix A*).

D. FLOODPLAIN INFORMATION

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Community Panel Number 32003C1735E Clark County, Nevada, and Incorporated Areas, the project site is located within a Zone "X". A Zone "X" is described as an area determined to be outside the 0.2% annual chance (500-year) floodplain (refer to *Figure 3, Flood Insurance Rate Map* in *Appendix A*).

E. REGIONAL FLOOD CONTROL MASTER PLAN INFORMATION

Grand Canyon Village is delineated on the referenced Figures F-11 and W-2B from the 2018 Clark County Regional Flood Control District (CCRFCDD) Las Vegas Valley Flood Control Master Plan Update (MPU) (Refer to *Figures 4A and 4B, MPU Facilities Map and MPU Hydrologic Map*). The proposed project is adjacent to CCRFCDD Facilities CN95 0313, 0318, and 0333. Facility CN95 0313 is designated as a 10'x6' RCB, 0318 a transition structure, and 0333 a 5'x5' RCB along the US95.

F. PREVIOUS HYDROLOGY STUDIES

The following is a list of drainage studies being utilized as reference to the proposed project.

- *Technical Drainage Study for Skye Canyon – Phase 3A Infrastructure* (referred to as the Infrastructure Study), originally submitted to CLV by Slater Hanifan Group on November 6, 2017 (DS4931), and conditionally approved on August 16th, 2018,

This study provides subsurface drainage patterns and the existing and ultimate magnitude of flows conveyed by the existing storm drain systems located in Grand Canyon Drive.

- *Technical Drainage Study for Skye Canyon Village* (referred to as the Skye Canyon Village Study), originally submitted to CLV by Anderson, Wahlen and Associates on July 6th, 2016 (DS4812), and approved on November 4th, 2016,

This study was used to reference existing and ultimate offsite flows approaching the project site.

- *Construction Drawings for Horse Drive/US 95 Interchange* submitted to CCRFCD by VTN on July 16th, 2009 (LAS23C08).

The drawing set was used to determine locations and geometries of existing facilities to the east of the project site in Oso Blanca and south of the project site in Skye Canyon Park (previously Horse Drive).

- *Parcel Map Study for Grand Canyon Apartments* (referred to as the Parcel Map Study) submitted to CLV by VTN on August 7th, 2019 (DS5175), and approved August 26th, 2019.

The parcel map study established existing condition drainage patterns and referenced hydrology impacting the project site.

- *Technical Drainage Study for Grand Canyon Apartments* (referred to as the Grand Canyon Apartments Study) and addendums initially submitted to CLV by VTN on May 5th, 2020 and September 16th, 2020 (DS5276), currently under review.

This study was used to reference drainage patterns from the adjacent apartment site to the north of the project site.

The referenced studies have been reviewed and the hydrologic and hydraulic calculations contained within have been determined to be acceptable.

II. HYDROLOGIC CRITERIA

A. METHOD OF ANALYSIS

The hydrologic modeling for this study was prepared using the SCS Unit Hydrograph Methodology in conjunction with the HEC-1 computer program from the U.S. Army Corps of Engineers (USACOE) as outlined in the Clark County Regional Flood Control District *Hydrologic Criteria and Drainage Design Manual* (hereinafter referred to as the Manual). The computation and analyses have been included in *Appendix B.1* through *B.5* of this study.

B. RAINFALL CRITERIA

(*Figures 503, 506, 513, and Table 501* were referenced from the Manual and have been included in *Appendix B.1*)

The site is not located within the McCarran Airport Rainfall Area as determined from *Figures 513*. The onsite basin precipitation values derived by this study of 1.28 inches for a 10-year, 6-hour rainfall depth-duration-frequency and 2.03 inches for a 100-year, 6-hour rainfall depth-duration-frequency were taken from *Figures 503 and 506* respectively. The precipitation values were adjusted utilizing *Precipitation Adjustment Ratios* of 1.24 and 1.43 for the 10-year and 100-year storms respectively, from *Table 501*. Consequently, the onsite 10-year and 100-year, 6-hour rainfall depth-duration-frequency as derived by this study are 1.59 inches and 2.90 inches, respectively.

C. RUNOFF COMPUTATION

Grand Canyon Village consists of soil type 400. Soil 400 is characterized as Tencee very gravelly fine sandy loam, 2 to 8 percent slopes, and is in hydrologic soil group D. The site and soil boundaries are illustrated on *Figure 5: Soils Map* included in *Appendix A*.

The SCS Soil Survey of Las Vegas, Nevada, was used to identify soil types and their corresponding hydrologic soil groups. The land uses or land covers for onsite and offsite basins include Desert Shrub in Poor Condition, Commercial, and Residential (Apartment/Condos). For the given soil type and land use, CN values were determined from using the appropriate columns of Table 602 of the Manual. Soil information and CN calculations for existing condition basins have been included in *Appendix B*.

The lag times quantify how long before basins are contributing to flow at the outlet and is a representative scale of an individual basin that were determined using Standard Form 4. Velocities used in Standard Form 4 have been calculated using the equation $V = CS^{1/2}$ from the *Manual*. The coefficient $C = 14.8$ represents wide channel flow with $D = 0.25$ and $n = 0.04$ for undeveloped conditions. The coefficient $C = 29.4$ represents wide channel flow with $D = 0.7$ and $n = 0.04$ for undeveloped conditions. The coefficient $C = 20.2$ represents street flow with $n = 0.016$ and a depth in the gutter of 0.3 feet for developed conditions. The coefficient $C = 30.6$ represents curb height street flow for developed conditions.

Travel Time velocities have been calculated based on the equation $V = CS^{1/2}$ from section 602.1 of the *Manual*. For basins analyzed in this study, the first 500 feet of the Travel Time Length uses the V_1 set of C coefficients from the *Manual* and the remaining Travel Time Length uses the larger V_2 set of coefficients. The Standard Form 4 computes the Travel Time separately for the V_1 and V_2 portions of the basin and adds them together to give the total Travel Time for the basin. Based on the hydrologic properties and land usages of the basins within this study, we feel that the 500-foot break point provides a conservative but representative assumption to where enough flow can be generated within the basin to warrant the use of the higher velocity coefficients. In summary,

Existing Conditions	Developed Conditions
$V_1 = 14.8*(S/100)^{1/2}$	$V_1 = 20.2*(S/100)^{1/2}$
$V_2 = 29.4*(S/100)^{1/2}$	$V_2 = 30.6*(S/100)^{1/2}$

D. PEAK FLOWS

The following tables summarize the peak design flows generated by each offsite and onsite basin. For an illustration of basins and flows, please refer to *Figures 6, 7, and 8* in *Appendix A*. A discussion of each drainage condition may be found in the following section of this report.

EXISTING CONDITION HEC-1 SUMMARY TABLE			
Basin ID	Area (ac)	Q10 (cfs)	Q100 (cfs)
EX1	5.82	5	13
GCE	1.21	2	4
EX2	6.45	5	14
OB	1.86	3	5
CP1E	-	8	19
SKYE	1.61	3	5

DEVELOPED CONDITION HEC-1 SUMMARY TABLE			
Basin ID	Area (ac)	Q10 (cfs)	Q100 (cfs)
ON1	12.23	16	34
GCU	1.25	2	4
OB	1.25	3	6
SKYE	1.61	3	5
CP1D (ON1B + OB)	-	9	19

This study analyzes the subject site in the existing and developed conditions. The existing condition evaluates existing offsite flows that impact the site perimeter in its undeveloped state. The developed condition assumes that the site is developed and continues to be impacted by offsite flows established in the existing condition. As all the surrounding offsite basins impacting the site are fully developed, the developed condition and ultimate condition are assumed to be the same for the purposes of this study. Note that flows for concentration points and drainage basins are shown as (##/##-cfs), representing the 10/100-year storm event flows.

A. EXISTING CONDITION ANALYSIS

(Refer to reference *Figure 6: Existing Condition Basin Map* provided in *Appendix A*)

The *Existing Condition* analyzes the site in its existing state and analyzes existing basins tributary to the site boundary. A 36" RCP lateral stub along Oso Blanca intercepts existing flows at the eastern boundary of the project site and drains into regional facility CN95 0313. Refer to the *Horse Drive/US95 Grading Detail Sheet* provided in *Appendix D.3*. The facility was designed to convey a total of 33-cfs in the 100-year storm event. An existing storm drain system in Grand Canyon Drive conveys subsurface flow to the north as shown in the Skye Canyon Village study. An existing storm drain system in Skye Canyon Park Drive consists of multiple existing drop inlets intercepting flow which is then conveyed to the east as shown by the Horse Canyon improvements. Refer to the *Overall Utility Map* for the *Skye Canyon Village* study in *Appendix D.2* and the storm drain improvement plan sheets for the *Horse Canyon Drawings* in *Appendix D.3*. The apartment site to the north of the project site is assumed to be developed and does not discharge any flows towards the project site. Refer to the *Ultimate Condition Basin Map* from the *Grand Canyon Apartments* study provided in *Appendix D.5*.

1. OFFSITE DRAINAGE BASIN DESCRIPTION

No offsite flow enters the project site. Existing surface street flow in Grand Canyon Drive has been modelled by basin GCE (2/4-cfs). Street flow in Grand Canyon Drive is conveyed north within the street away from the project site. Basin SKYE (3/5-cfs) represents Skye Canyon Park Drive in its existing condition. Surface flow in Skye Canyon Park is conveyed east and west towards a low point and is intercepted by a series of existing inlets at the southern boundary of the project site. Basin OBE (3/5-cfs) represents the existing half-street of Oso Blanca Road and undeveloped tributary offsite area adjacent to the project site. Flow in Oso Blanca is conveyed south away from the project site in Oso Blanca.

2. ONSITE DRAINAGE BASIN DESCRIPTION

The area of the project site has been delineated into two basins based on existing drainage patterns referenced from the Parcel Map Study (refer to *Appendix D.4*). Basin EX1 (5/13-cfs) is conveyed eastward in existing washes before being intercepted by an existing 36" RCP. Flows from onsite basin EX2 (5/14-cfs) are conveyed eastward before flowing into Oso Blanca at the

southeastern boundary of the project site. Concentration point CP1E (8/19-cfs) represents the total flow in Oso Blanca conveyed to the south in the existing condition.

B. DEVELOPED (MASS GRADING) CONDITION ANALYSIS

(Refer to *Figure 7: Developed (Mass Grading) Condition Basin Map* provided in *Appendix A*)

The *Developed Condition* analyzes the site in the developed state with existing offsite remaining the same as those described in the existing condition. As all the surrounding offsite basins impacting the site are fully developed and a commercial curve number was assumed in the developed condition, the developed condition and ultimate condition are assumed to be the same for the purposes of this study. Onsite development includes a mass grading of the site with an interim drainage berm facility and minor street improvements in Grand Canyon Drive.

1. OFFSITE DRAINAGE BASIN DESCRIPTION

Offsite flows impacting the project site are the same as described in the existing condition with offsite flow conveyed within drainage facilities. A bus turnout has been constructed adjacent to the project site in Grand Canyon Drive. The revised basin is represented by basin GCU (2/4-cfs), resulting in no measurable flow increase from the existing condition. Oso Blanca and Skye Canyon Park Drive remain the same as discussed in the existing condition.

2. ONSITE DRAINAGE BASIN DESCRIPTION

The onsite area represented by basin ON1 (17/35-cfs) represents the onsite mass-grading and has been delineated into two subbasins based on onsite drainage patterns. A future fully developed commercial curve number of 95 has been assumed for the area of the project site to be conservative and facilitate future development. Basin ON1A (10/21-cfs) represents the portion of the graded area that is conveyed towards the existing 36" RCP facility. Based on reference material from the *Horse Canyon Drawings* provided in *Appendix C.3*, the 36" stub was designed to convey approximately 33-cfs in the 25-year storm event and should have adequate capacity for the proposed 21-cfs from the 100-year storm event. Basin ON1B (7/14-cfs) represents the flow conveyed to the east to discharge into Oso Blanca as in the existing condition. CP1D (10/19-cfs) was calculated by manually adding the flow from subbasin ON1B with the flow from basin OB. As shown, flow conveyed to Oso Blanca in the 100-year storm event remained unchanged at 19-cfs.

C. ULTIMATE CONDITION ANALYSIS

As all the surrounding offsite basins impacting the site are fully developed and a commercial curve number was assumed in the developed condition, the developed condition and ultimate condition are assumed to be the same for the purposes of this study.

III. FACILITY DESIGN CALCULATIONS

A. STREET FLOW

In order to determine the extent of flood protection needed, the depth of flow within the streets adjacent to and within the site needs to be determined. The program *FlowMaster*, by *Haestad Methods*, has been utilized to determine the normal depth and velocity of the anticipated storm flows within the streets. *Table 4 & 5* shows the results of these street flow analyses. The product $V \times D$ shown in *Table 4* has been calculated to show that the flow within the streets meets the *Manual* requirement to be less than 6 in the 10-year storm event and less than 8 in the 100-year storm event. Normal depth calculations have been provided in *Appendix C.1*.

The locations of the hydraulic sections are as follows:

- ST1 is located in Grand Canyon Drive at the northwest corner of the project site.
- ST2 is located in Skye Canyon Park at the southeast corner of the project site.
- ST3 is located in Oso Blanca at the eastern boundary of the project site.
- BERM is located onsite at the onsite interim 2' berm facility.

TABLE 4 - NORMAL DEPTH PERIMETER STREET SUMMARY (100-YEAR EXISTING CONDITION)						
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Tributary Basin
ST1	4	0.50%	1.60	0.35	0.56	GCE
ST2	5	2.25%	3.30	0.35	1.16	SKYE
ST3	5	1.93%	3.31	0.37	1.22	OB

TABLE 5 - NORMAL DEPTH PERIMETER STREET SUMMARY (100-YEAR DEVELOPED CONDITION)						
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Tributary Basin
ST1	4	0.50%	1.60	0.35	0.56	GCU
ST2	5	2.25%	3.30	0.35	1.16	SKYE
ST3	5	1.93%	3.31	0.37	1.22	OB
BERM	21	1.59%	2.90	0.48	1.39	ON1A

TABLE 6 - 10 - YEAR DEVELOPED DRY LANE ANALYSIS SUMMARY									
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Max Dry Lane Depth	Req. Dry Lane	Meets Dry Lane, Dry Lane Available	Tributary Basin
ST1	1	0.50%	1.22	0.24	0.29	0.55	12.00	YES, 22.5-ft	1/2(GCU)
ST2	3	2.25%	2.95	0.31	0.91	0.55	12.00	YES, 19-ft	SKYE
ST3	3	1.93%	2.96	0.33	0.98	0.55	12.00	YES, 23-ft	OB

In the 100-year storm event, a flow of 2-cfs is conveyed north in the east half-street of Grand Canyon Drive per basin GCU. As analyzed by hydraulic section ST1, this flow has a normal depth of 0.35-ft. The high point flowline within Grand Canyon Drive at the site's northwestern entrance was set to 2759.34'. The site's entrance has been humped to an elevation of 2760.84' to meet the minimum criteria of being 6-inches above the water surface elevation of 2760.20'. As analyzed by hydraulic section ST2, a flow of 5-cfs is conveyed in Skye Canyon Park Drive with a normal depth of 0.35-ft. The high point flowline within Drake Drive at the site's northwestern entrance was set to 2746.13'. The site's entrance has been humped to an elevation of 2747.01' to meet the minimum criteria of being 6-inches above the water surface elevation of 2746.98'.

Grand Canyon Drive, Skye Canyon Park and Oso Blanca Drive are classified as streets with greater than or equal to 80' ROW and must provide adequate dry lane during a 10-year storm event per *the Manual*. To meet dry lane criteria, Grand Canyon Drive, Skye Canyon Park Drive, and Oso Blanca Drive must not exceed a flow depth of 0.55-ft. As analyzed by sections ST1, ST2, and ST3 shown in Table 6, dry lane criteria is adequately met.

B. FLOOD CONTROL FACILITIES

A 2' interim berm is proposed onsite in order to convey flow towards the existing 36" RCP stub at the eastern boundary of the project site. A normal depth section and free board calculations have been provided for the berm to verify that velocity and freeboard criteria are met. The calculations can be found in *Appendix C*.

IV. CONCLUSIONS

A. COMPLIANCE WITH AGENCY REQUIREMENTS

This Technical Drainage Study for *Grand Canyon Village* has been developed in accordance with Criteria established in the *Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual*, and the local entity. The proposed development should not adversely impact any proposed or existing *Clark County Regional Flood Control District Master Plan Update* facilities.

B. OVERALL FACILITY EFFECTIVENESS

Grand Canyon Village shall be designed to control storm water runoff for the 6-hour, 10-year and 100-year floods as calculated in this study. There are no adverse effects on upstream or downstream properties due to there being no proposed drainage system or infrastructure improvements. Developed condition flow rates do not create an adverse impact on downstream properties.

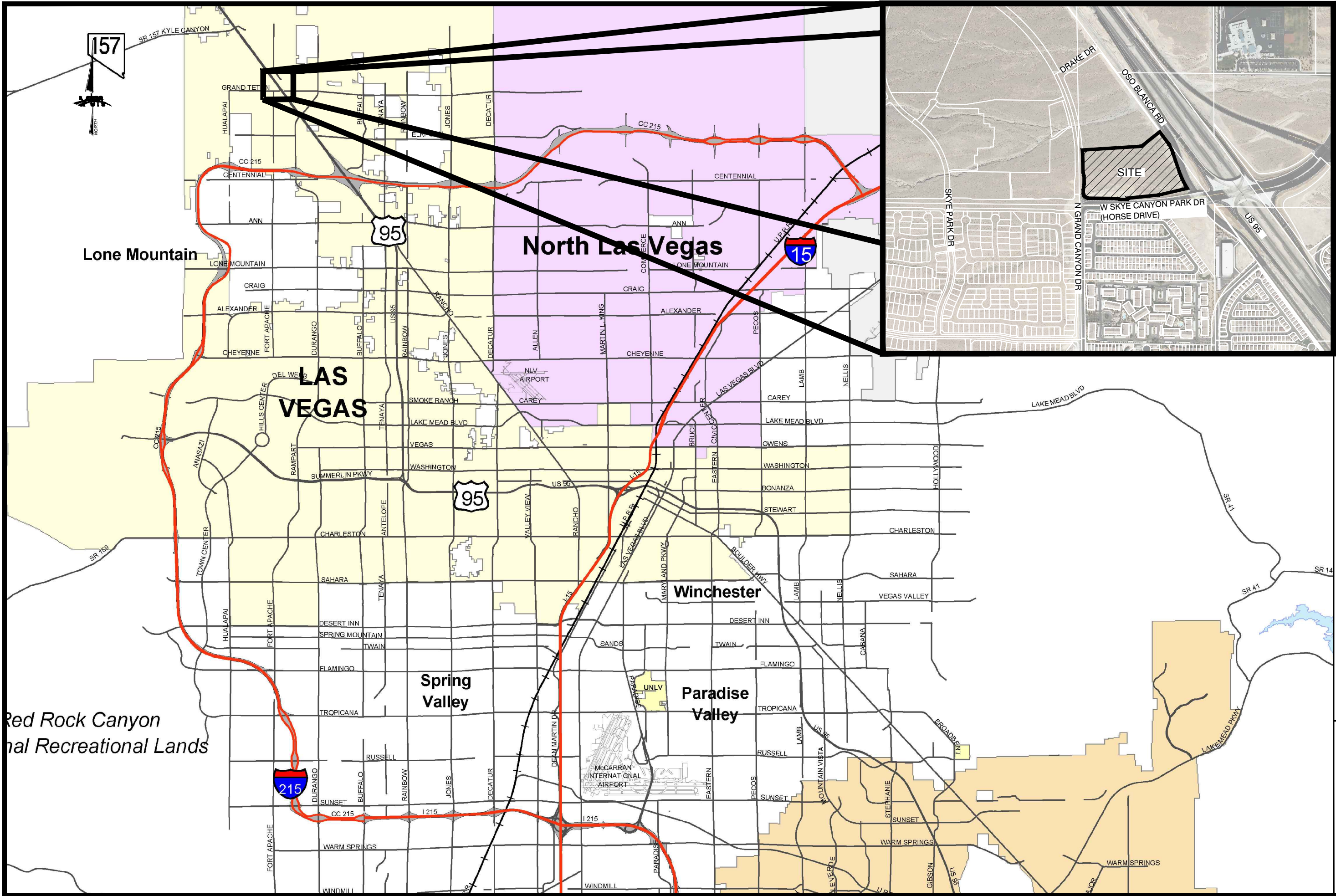
- Flow depths, velocities, and associated depth times velocity all meet CCRFCD criteria.
- Developed condition flow rates do not create an adverse impact on downstream properties.
- The project site is adjacent to a CCRFCD MPU facility and therefore CCRFCD concurrence is required.
- Dry lane criteria has been met.

REFERENCES

1. *Hydrologic Criteria and Drainage Design Manual*, Clark County Regional Flood Control District, 1999.
2. *CCRFCDD Las Vegas Valley Flood Control Master Plan Update*, by Atkins and Louis Berger, dated 2018.
3. *Flood Insurance Rate Map (FIRM)*, Community Panel Numbers *32003C2925D, Clark County, Nevada, and Incorporated Areas, revised to reflect LOMR dated November 16, 2011, are a digital duplication of the FIRM Map derived from FEMA Map Service Center.
4. *Soil Survey of Las Vegas, Nevada, Part of Clark County*, by the United States Department of Agriculture, Soil Conservation Service.
5. *Technical Drainage Study for Skye Canyon – Phase 3A Infrastructure, August 16th, 2018* by SHG, (DS4931),
6. *Technical Drainage Study for Skye Canyon Village, November 4th, 2016*, by Anderson, Wahlen and Associates, (DS4812).
7. *Construction Drawings for Horse Drive/US 95 Interchange, 2009*, by VTN, (LAS23C08).
8. *Parcel Map Study for Grand Canyon Apartments, August 7th, 2019*, by VTN, (DS5175).
9. *Technical Drainage Study for Grand Canyon Apartments, May 5th, 2020*, by VTN, (DS5276).

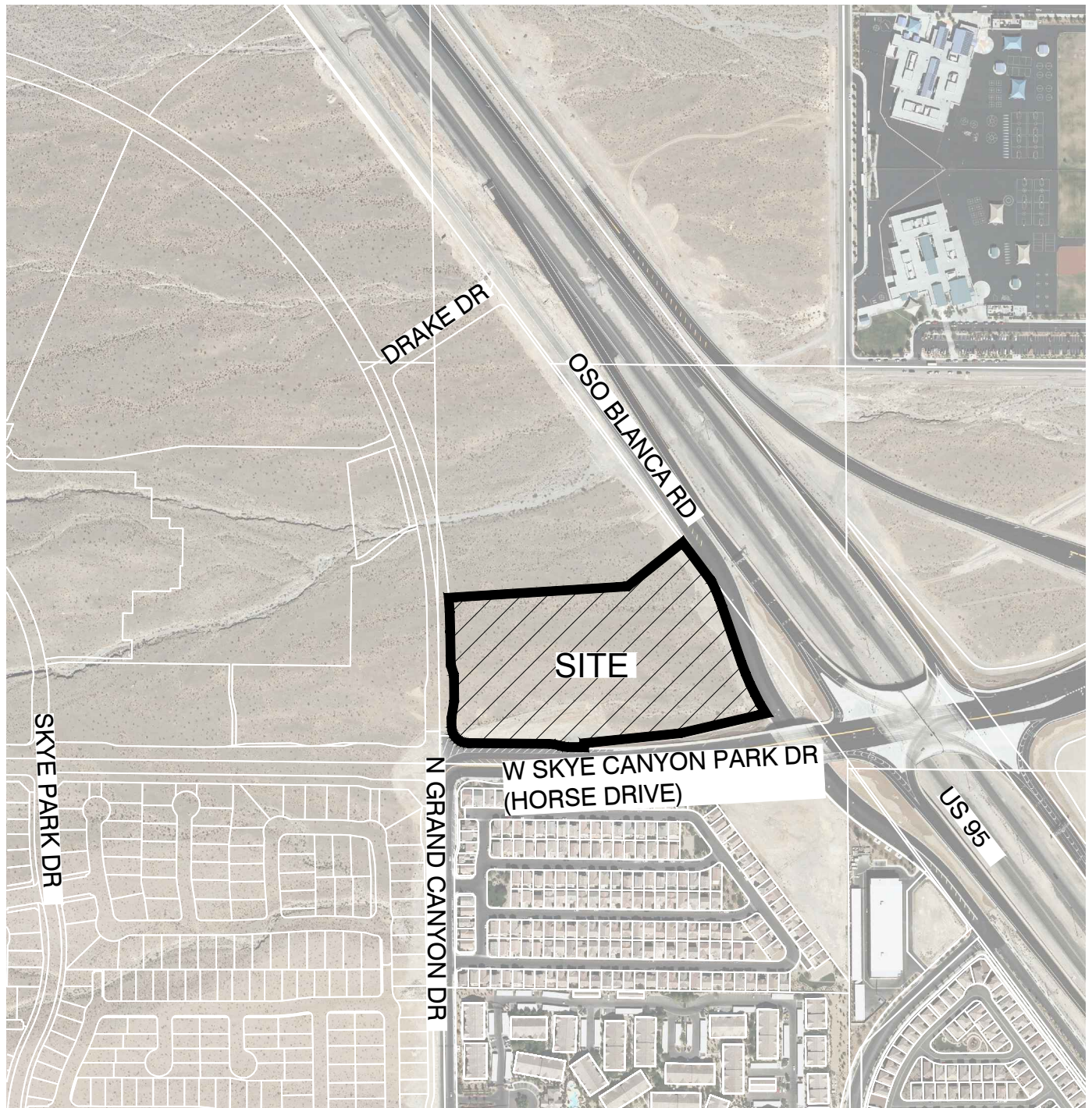
APPENDIX A

FIGURES & EXHIBITS



W.O.#:	8025
DATE:	OCTOBER 2020
BY:	ACY
SCALE:	N.T.S
SHEET	1 OF 1

FIGURE 1
VICINITY MAP
GRAND CANYON VILLAGE



GRAPHIC SCALE



1" = 500'



vtm
 2727 SOUTH RAINBOW BOULEVARD
 LAS VEGAS, NV 89146-5148

GRAND CANYON VILLAGE

SITE DESCRIPTION MAP FIGURE 2

SCALE	HORZ.	1"=500'
	VERT.	N/A
W.O. NO.		8025
DRAWN BY:		ACY
DATE:		OCTOBER 2020
SHEET		1 OF 1

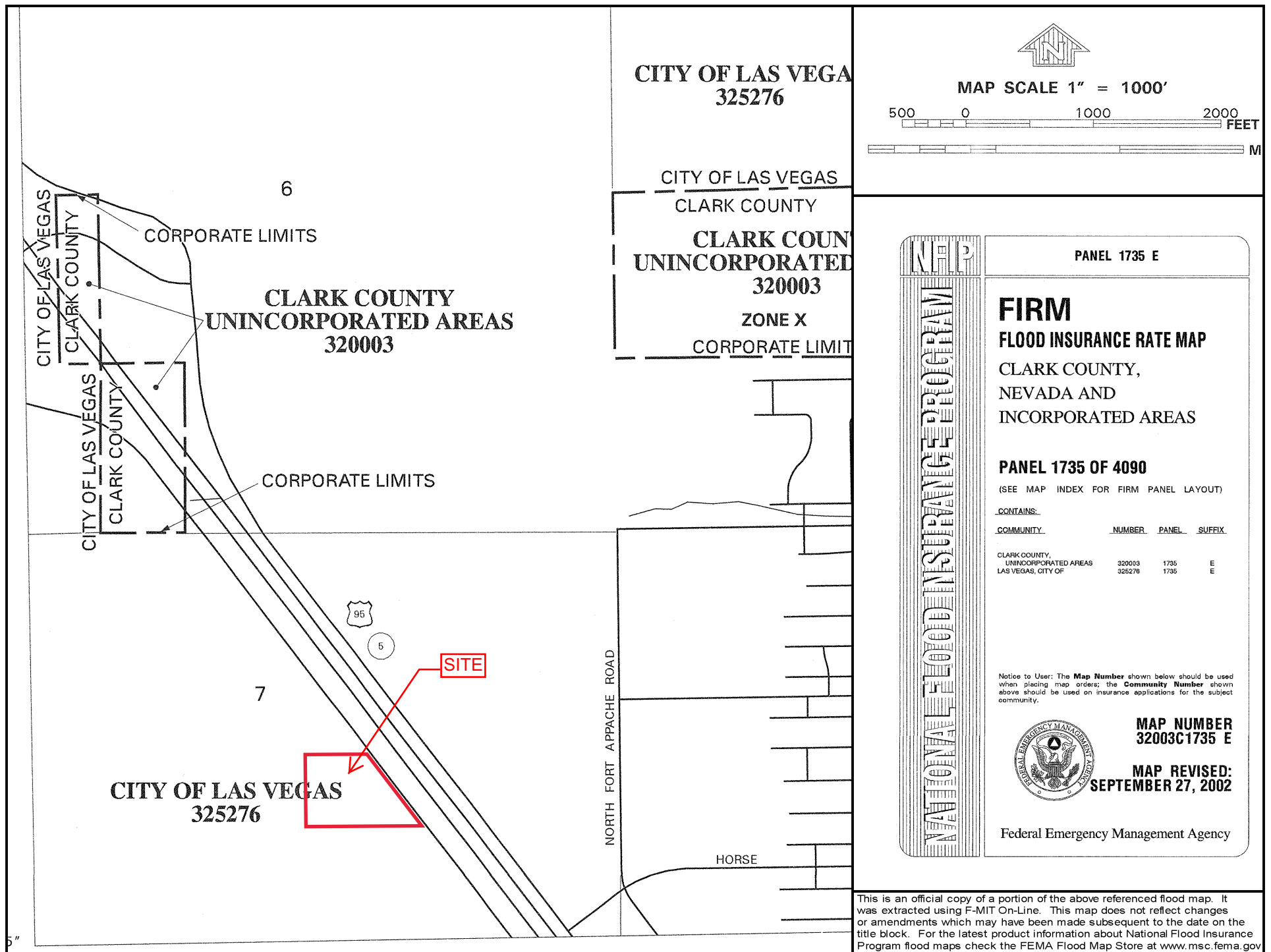


Figure 3

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BCHU		BELTWAY CHANNEL - HUALAPAI						
0000	E	12' X 5' RCAP	853	206	DBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1216	218	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	60	57	DNW26-C	WEST3	0.51	1.04
0042	E	60" RCP	615	57	DNW26-C	WEST3	0.51	1.42
0054	E	54" RCP	615	57	DNW26-C	WEST3	0.51	1.23
BRDB		BRENT DRAINAGE SYSTEM						
0000	E	36" RCP WITH 18" ORIFICE PLATE	2170	36	BRDB	WEST3	2.37	0.40
0031	E	45,080 CFS PMF SPILLWAY		45080	CBRDB	WEST3	2.37	
0032	E	450 AC-FT SOUTH ENVIRONMENTAL ENHANCEMENT AREA		1685	CBRDB	WEST3	2.37	
0033	E	ENERGY DISSIPATOR	100	1052	CNW147W	WEST3	1.75	
0043	E	20' X 7' RCBC	135	1052	CNW147W	WEST3	1.75	0.50
0045	E	CONC CHNL 12W 7D 2:1 SS	983	1052	CNW147W	WEST3	1.75	2.00
0058	E	12' X 6' RCB	1688	951	CNW113-C	WEST3	1.47	1.81
0107	P	8' X 6' RCB	2560	951	CNW113-C	WEST3	1.47	2.40
0157	P	12' X 7' RCB	2580	621	CNW96-C	WEST3	0.84	0.25
CN95		CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH						
0000	E	20' X 7' RCB	3335	2778	CNWBB3-C	WEST3	3.35	2.00
0068	E	20' X 7' RCB	2300	2725	CNW103-C	WEST3	3.04	2.10
0102	E	CONC CHNL 20W 9D 0:1 SS	375	2548	2CNW89-C	WEST3	2.65	1.77
0104	E	2: 12' X 10' RCB	300	2548	2CNW89-C	WEST3	2.65	1.10
0167	E	16' X 8' RCB	3521	2548	2CNW89-C	WEST3	2.65	1.58
0199	E	15' X 9' RCB	407	1467	2CNW72-C	WEST3	1.13	0.41
0218	E	15' X 9' RCB	1227	1467	2CNW72-C	WEST3	1.13	0.82
0257	E	TRANSITION STRUCTURE	59	1467	2CNW72-C	WEST3	1.13	0.77
0259	E	15' X 9' RCB	284	599	CNW74-C	WEST3	0.40	0.77
0313	E	10' X 6' RCB	2680	599	CNW74-C	WEST3	0.40	2.50
0318	E	TRANSITION STRUCTURE	60	599	CNW74-C	WEST3	0.40	1.50
0333	E	5' X 5' RCB	670	259	NW62-S	WEST3	0.16	1.50
CNFR		CENTENNIAL PKWY CHANNEL WEST / FARM ROAD						
0000	P	8' X 6' RCB	8350	776	CNW89-C	WEST3	1.05	2.00
CNGT		CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH						
0000	E	10' X 5' RCB	2376	543	CNW71-E	WEST3	0.47	2.58
0020	E	10' X 5' RCB	1570	543	CNW71-E	WEST3	0.47	3.50
0043	E	8' X 6' RCB	2470	543	CNW71-E	WEST3	0.47	3.60
0118	E	6' X 5' RCAP	5472	349	KYLEDET	KYLEDB	58.61	3.72
CNKC		CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH						
0000	E	12' X 4' RCB	377	954	CNW72-C	WEST3	0.74	4.58
0007	E	10' X 5' RCB	874	954	CNW72-C	WEST3	0.74	3.28
0024	E	8' X 5' RCB	1385	954	CNW72-C	WEST3	0.74	2.40
0050	E	72" RCP	2757	437	NW45-S	WEST3	0.31	3.60
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0195	E	CONC CHNL 36W 9D 0:1 SS	1130	3771	CNW3B3-C	WEST3	5.64	0.60
0200	E	CONC CHNL 36W 9D 0:1 SS	1340	3523	CNW2D4-C	WEST3	5.14	1.00
0226	E	2: 18' X 8.5' RCBC @ RIO VISTA	100	3523	CNW2D4-C	WEST3	5.14	0.51
0241	E	CONC CHNL 36W 9.5D 0:1 SS	405	3523	CNW2D4-C	WEST3	5.14	0.51
0251	E	CONC CHNL 36W 9D 0:1 SS	575	3234	CNW2D3-C	WEST3	4.64	0.51
0271	E	CONC CHNL 32W 10D 0:1 SS	229	3234	CNW2D3-C	WEST3	4.64	0.51
0274	E	32' X 10' RCBC @ TENAYA	142	3234	CNW2D3-C	WEST3	4.64	0.51
0277	E	CONC CHNL 32W 9D 0:1 SS	579	3234	CNW2D3-C	WEST3	4.64	0.64
0287	E	CONC CHNL 32W 8D 0:1 SS	865	2992	CNW2B2-C	WEST3	3.83	1.59
0301	E	2: 15' X 7' RCB	1738	2992	CNW2B2-C	WEST3	3.83	1.30
0304	E	22' X 7' RCB	3410	2992	CNW2B2-C	WEST3	3.83	1.85
0314	E	22' X 7' RCB	703	2822	CNWBD2-N	WEST3	3.45	1.94
EKBU		ELKHORN SPRINGS AND BUFFALO						
0000	E	60" RCP	1046	255	NW134-C	WEST3	0.46	0.89
EKDB		ELKHORN SPRINGS DETENTION BASIN						
0000	E	GRASS CHNL 15W 5.8D 3.5:1 SS	2575	221	CNW150-C	WEST3	1.41	0.39
0025	E	4' X 3' RCB	160	106	ELKBASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	106	ELKBASIN	WEST3	0.84	1.23
0049	E	60" RCP	1095	106	ELKBASIN	WEST3	0.84	0.13
0070	E	48 AC-FT ELKHORN SPRINGS DETENTION BASIN		456	CNW133-C	WEST3	0.84	
EKHU		ELKHORN AND HUALAPAI						
0003	E	6' X 4' RCAP	980	393	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	393	CNW26-C	WEST3	0.51	3.61
0023	E	8' X 5' RCAP	1200	393	CNW26-C	WEST3	0.51	0.90
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0176	P	78" RCP	1320	190	CCPFR-C	GOW3A	0.46	1.15
GONO		GOWAN NORTH SYSTEM						
0511	P	6' X 5' RCB	1320	326	CCPHW-C	GOW3A	0.60	1.14
LVMD		LAS VEGAS WASH - MIDDLE						
2507	E	2: 13' X 9' RCB	2831	1808	CNW168-C	CWEST3	4.43	0.36
2525	E	24' X 8' RCB	1140	1598	CNW159-C	CWEST3	3.92	0.40
2550	E	24' X 8' RCB	1445	1312	CD161-C	CWEST3	3.42	0.40
2574	E	24' X 8' RCB	1430	1312	CD161-C	CWEST3	3.42	0.41
2599	E	CONC CHNL 24W 7D 2:1 SS	1577	1268	CNW162-C	CWEST3	3.10	0.51
2632	E	18' X 5' RCB	1443	695	CNW138-C	WEST3	1.16	0.47
2661	E	18' X 5' RCB	3003	695	CNW138-C	WEST3	1.16	0.78
2711	E	10' X 5' RCB	2440	560	CNW139-C	WEST3	0.93	2.00
2737	E	8' X 5' RCB	265	560	CNW139-C	WEST3	0.93	2.25
2763	E	6' X 5' RCB	1565	560	CNW139-C	WEST3	0.93	2.41
2789	E	6' X 5' RCB	910	560	CNW139-C	WEST3	0.93	2.00
MOHU		MOCCASIN-HUALAPAI BRANCH						
0000	P0	13' X 6' RCB	1476	924	2CNW33-C	LOWER3	2.08	1.80
0026	P0	11' X 6' RCB	1654	560	CNW45-N	LOWER3	1.25	0.50
0061	P0	9' X 6' RCB	779	560	CNW45-N	LOWER3	1.25	0.50
0076	P0	60" RCP	1000	263	CNW45-C	LOWER3	1.03	3.00
0095	P0	NATURAL WASH	865	263	CNW45-C	LOWER3	1.03	3.00
0111	P0	6' X 5' RCBC @ EGAN CREB DR	164	263	CNW45-C	LOWER3	1.03	6.10
0116	P0	NATURAL WASH	1900	263	CNW45-C	LOWER3	1.03	3.00
0151	P0	54" RCPC @ SHAUMBER	438	72	MODB1	LOWER3	0.86	2.00
MOIR		MOCCASIN - IRON MOUNTAIN BRANCH						
0000	P0	60" RCP	1060	410	CNW33-C	LOWER3	0.83	4.50
0020	P0	54" RCP	1161	71	MODB2	LOWER3	0.56	3.20
0041	P0	42" RCP	1236	71	MODB2	LOWER3	0.56	5.00
0065	P0	60" RCP	1099	71	MODB2	LOWER3	0.56	0.40
MOKC		MOCCASIN AND KYLE CANYON						
0000	P0	9' X 6' RCB	6140	1072	CNW35-C	LOWER3	2.69	3.40
MOLC		MOCCASIN - LOG CABIN BRANCH						
0000	P0	20' X 10' RCB	2206	2265	2CNW64	LOWER3	6.06	0.65
0072	P0	12' X 8' RCB	4493	2265	2CNW64	LOWER3	6.06	2.66
0149	E	13' X 8' RCB	520	1817	CNW62-N	LOWER3	4.88	2.00
0157	P	13' X 8' RCB	288	1817	CNW62-N	LOWER3	4.88	1.40
0162	P0	13' X 6' RCB	435	1817	CNW62-N	LOWER3	4.88	1.80
MSNV		MOUNTAIN SPA/VISTA RANCH						
0000	E	6: 12' X 5' RCBC @ GRAND TETON	273	639	CNW163-C	CWEST3	1.69	0.40
0005	E	GRASS CHNL 100W 4.5D 10:1 SS	6325	259	CNW155-C	WEST3	4.46	0.40
0125	E	GRASS CHNL 100W 4.5D 10:1 SS	1300	66	CNW147E	WEST3	1.55	0.40
RACO		RACEL STREET COLLECTOR						
0000	E	14' X 7' RCB BAFFLED ENERGY DISSIPATOR	87	424	CNW111S	WEST3	0.55	0.29
0001	E	78" RCP	3245	424	CNW111S	WEST3	0.55	2.46
0064	E	78" RCP	2650	347	DNW111S	WEST3	0.44	2.09
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0000	E	6' X 5' RCB	1062	173	FADB	WEST3	1.54	1.04
0002	E	54" RCP OUTLET WITH 41" ORIFICE	503	173	FADB	WEST3	1.54	2.38
0003	E	2,341 CFS PMF SPILLWAY		2341	FADBIN	WEST3	1.54	
0004	E	76 AC-FT FORT APACHE DETENTION BASIN		658	FADBIN	WEST3	1.54	
0007	E	ENERGY DISSIPATOR	100	658	FADBIN	WEST3	1.54	
0009	E	12' X 6' RCBC @ FORT APACHE DETENTION BASIN	133	658	FADBIN	WEST3	1.54	1.79
0012	E	CONC CHNL 12W 6:7D 0:1 SS	1937	658	FADBIN	WEST3	1.54	3.15
0048	E	12' X 6' RCBC @ GRAND CANYON	140	559	CMNA1	WEST3	1.27	3.15
0051	E	CONC CHNL 12W 6:8D 0:1 SS	2660	559	CMNA1	WEST3	1.27	3.44
0096	E	1: 10' X 6' AND 1: 6' X 6' RCBC @ HUALAPAI WAY	190	559	CMNA1	WEST3	1.27	1.93
0100	E	CONC CHNL 12W 5.5D 0:1 SS	2085	475	CDMNA1	WEST3	0.43	2.88
ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0140	E	CONC CHNL 10W 5D 0:1 SS	2155	475	CDMNA1	WEST3	0.43	1.65
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0053	E	2: 12' X 8' RCBC @ SOUTH RAMP CONNECTOR	85	1465	CDW1C1-C	WEST3	3.55	1.40
0054	E	CONC CHNL 21W 8D 0:1 SS	432	1465	CDW1C1-C	WEST3	3.55	1.51
0062	E	TRANSITION STRUCTURE	130	1465	CDW1C1-C	WEST3	3.55	1.51
0065	E	24' X 7' RCB	480	1465	CDW1C1-C	WEST3	3.55	0.30
0074	E	24' X 6' RCB	50	1414	CNWB6-C	WEST3	3.41	0.30
0075	E	20' X 6' RCBC @ BELTWAY	428	1414	CNWB6-C	WEST3	3.41	2.81
0083	P	20' X 4' RCB	950	1414	CNWB6-C	WEST3	3.41	2.49
0101	P	CONC CHNL 20W 5D 0:1 SS	980	1414	CNWB6-C	WEST3	3.41	2.38
0120	E	20' X 6' RCBC @ GRAND MONTECITO	120	1414	CNWB6-C	WEST3	3.41	1.00
0122	P	CONC CHNL 16'-20W 6D 0:1 SS	350	1414	CNWB6-C	WEST3	3.41	1.84
0130	P	CONC CHNL 16W 5.5D 0:1 SS	1012	1414	CNWB6-C	WEST3	3.41	2.67
0149	P	CONC CHNL 16W 5-5.5D 0:1 SS	87	1115	CNWB3-C	WEST3	2.99	2.27
0151	P	CONC CHNL 16W 5D 0:1 SS	1255	1115	CNWB3-C	WEST3	2.99	2.65
0171	E	16' X 6' RCBC @ EL CAPITAN WAY	234	1115	CNWB3-C	WEST3	2.99	1.75
0175	E	CONC CHNL 14W 7D 0:1 SS	1220	1115	CNWB3-C	WEST3	2.99	2.93
0198	E	CONC CHNL 14W 7D 0:1 SS	225	788	CNWB6-C	WEST3	1.88	2.93
0227	E	12' X 6' RCB	995	788	CNWB6-C	WEST3	1.88	1.73
0250	E	12' X 6' RCB	4020	788	CNWB6-C	WEST3	1.88	1.12
0275	E	7' X 6' RCB	2650	535	CNW6-C	WEST3	1.04	3.30
0295	P	7' X 6' RCB	2980	431	CNW53-C	WEST3	0.80	3.60
TSDB		TULE SPRINGS DRAINAGE SYSTEM						
0000	E	2: 10' X 4' RCBC @ ECHO GRANDE	100	25	TULEDB	WEST3	1.37	1.04
0002	E	36" RCP WITH 22" ORIFICE PLATE	320	25	TULEDB	WEST3	1.37	0.33
0010	E	14,013 CFS PMF SPILLWAY		14013	CTULEDB	WEST3	1.37	
0011	E	117 AC-FT NORTH ENVIRONMENTAL ENHANCEMENT AREA		551	CTULEDB	WEST3	1.37	
0012	E	ENERGY DISSIPATOR	260	333	CNW148-C	WEST3</		



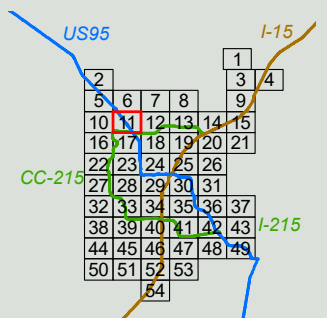
2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

**FIGURE F-11
FLOOD CONTROL FACILITIES**

- LEGEND**
- Ultimate Development Boundary
 - Existing Facilities
 - Category A Proposed Facilities
 - Category B Proposed Facilities
 - Local Existing Facilities
 - Detention Basin
 - Culvert or Bridge Crossing
 - Stormdrain
 - Lined Channel
 - Unlined Channel
 - Levee/Dike
 - Natural Wash/Floodway
 - ID-Mile Separator
- Remove & Replace/Parallel Facilities**
- | Category A | Category B |
|------------|------------|
| Channel | Channel |
| Stormdrain | Stormdrain |
| Crossing | Crossing |



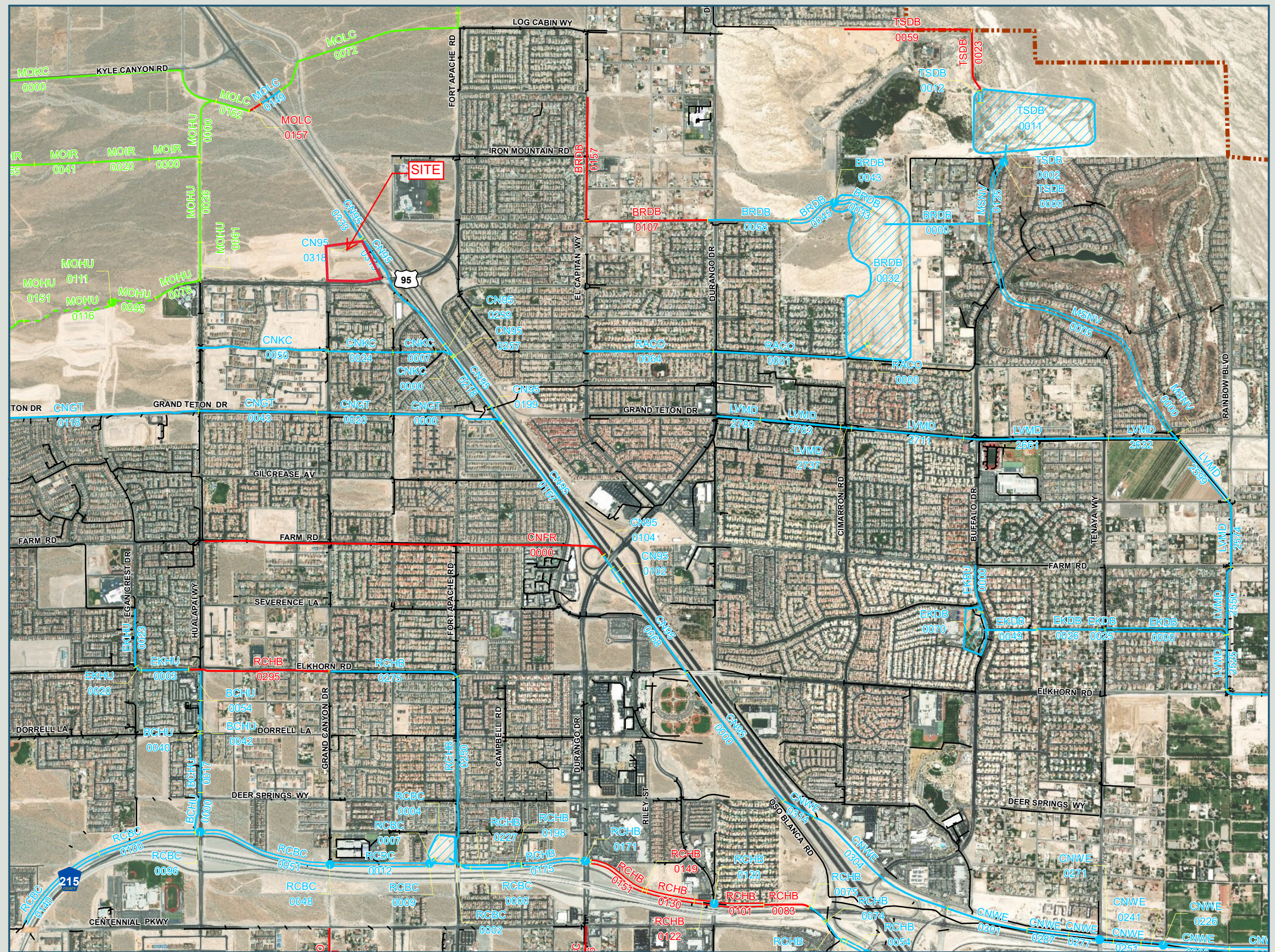
AAerialSource:Esri World Imagery 2017



ATKINS
Member of the SNC-Lavalin Group

Louis Berger

Figure 4B



NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data delineated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE (FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0

100

200

400

600

800

MAP LEGEND

—

PARCEL BOUNDARY

—

SUB BOUNDARY

—

PM/LD BOUNDARY

—

ROAD EASEMENT

—

MATCH / LEADER LINE

—

HISTORIC LOT LINE

—

HISTORIC SUB BOUNDARY

—

HISTORIC PM/LD BOUNDARY

—

SECTION LINE

□

CONDOMINIUM UNIT

□

AIR SPACE PCL

□

RIGHT OF WAY PCL

□

SUB-SURFACE PCL

001

ROAD PARCEL NUMBER

001

PARCEL NUMBER

1.00

ACREAGE

202

PARCEL SUB/SEQ NUMBER

PB 24-45

PLAT RECORDING NUMBER

5

BLOCK NUMBER

5

LOT NUMBER

GL5

GOV. LOT NUMBER

BOOK

T19S R60E

SEC.

7

MAP

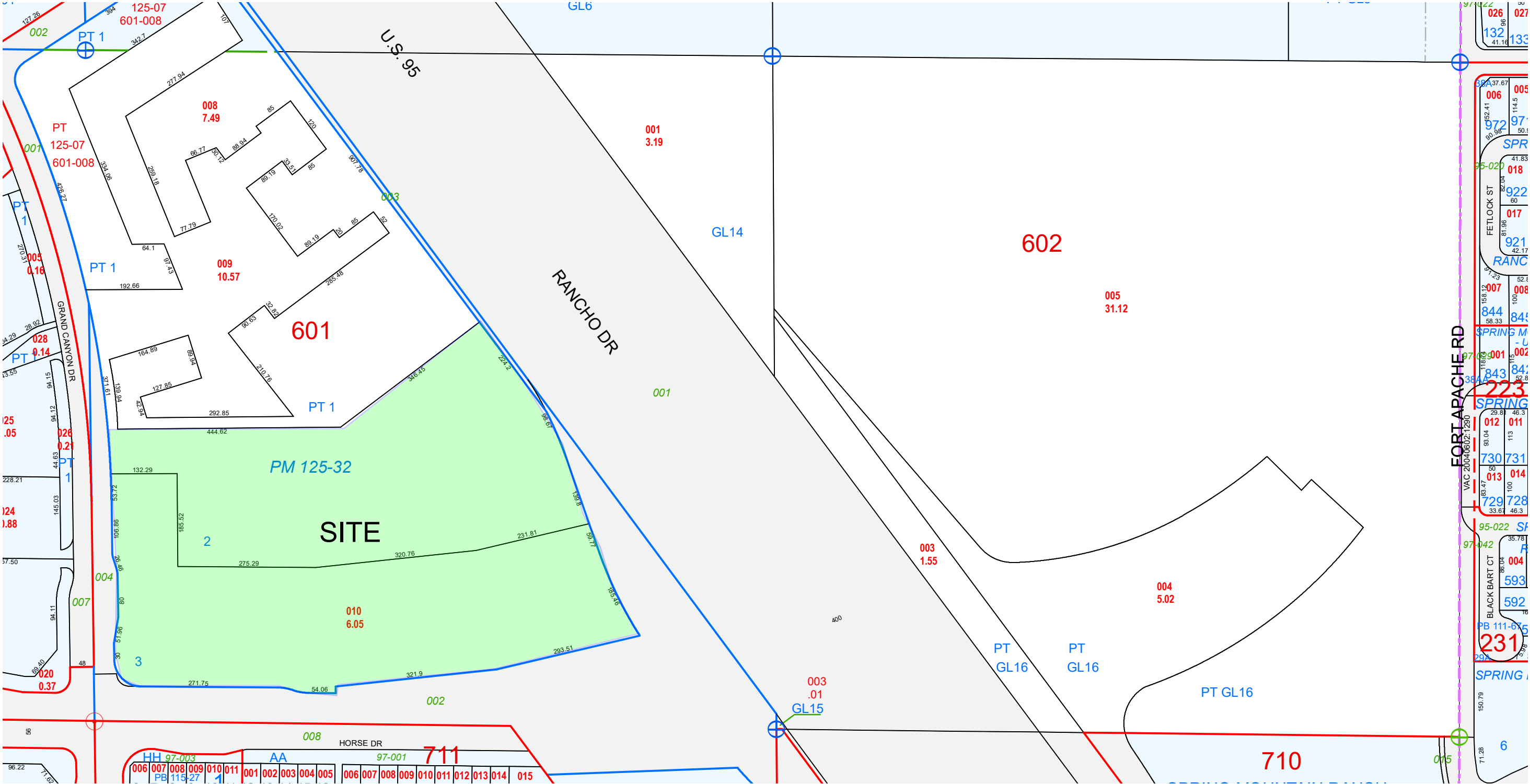
S 2 NE 4

125-07-6

Scale: 1" = 200'

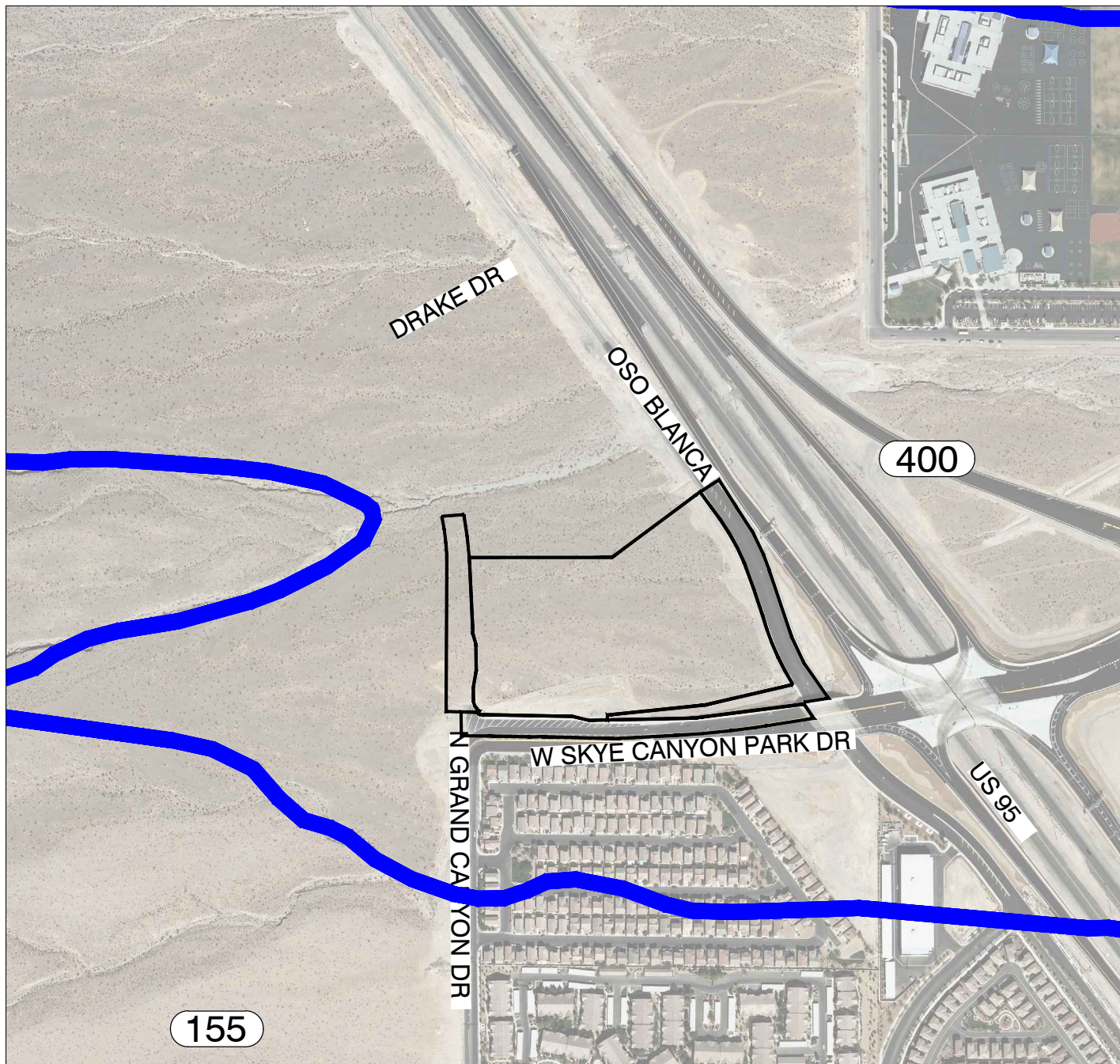
Rev: 2/10/2020

CLARK COUNTY
NEVADA



TAX DIST 200

FIGURE 4C



LEGEND

- SITE BOUNDARY
- 300** SOIL NUMBER
- SOIL BOUNDARY

NOTE:

1. This data was taken from the following website:
<http://soildatamart.nrcs.usda.gov>
2. This data is in state plane coordinates



GRAPHIC SCALE



1" = 500'

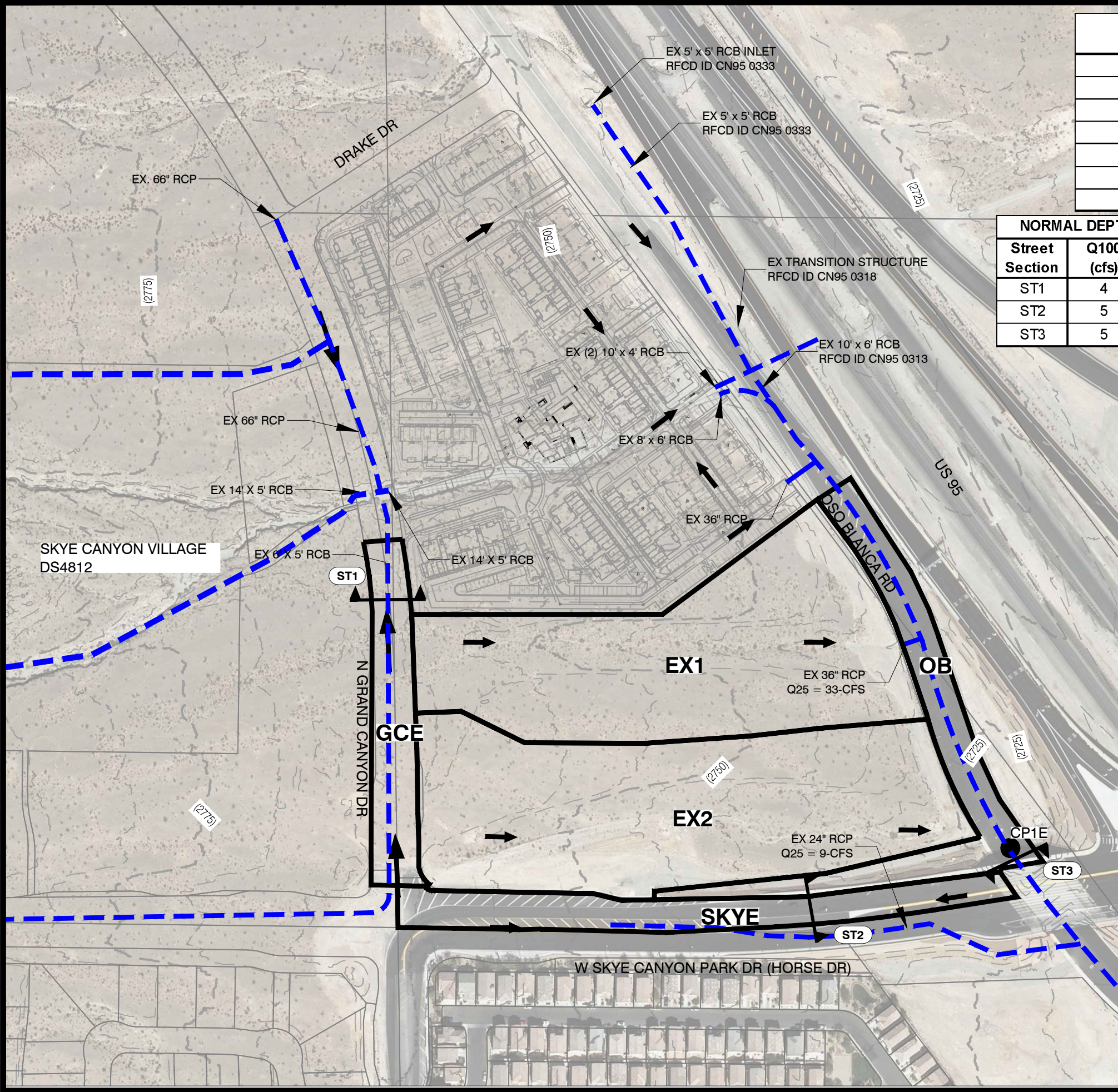
H:\8025\Drainage\A Figures and Exhibits\Figure 5 -Soils Map.dwg

vtm
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NV 89146-5148

FIGURE 5 SOILS MAP

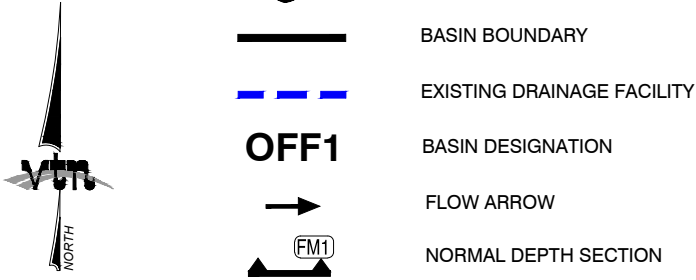
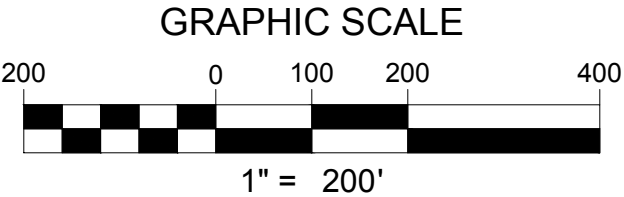
GRAND CANYON VILLAGE

SCALE	HORZ.	1"=500'
	VERT.	n/a
W.O. NO.	7934	
DRAWN BY:	ACY	
DATE:	DECEMBER 2020	
SHEET	1	OF 1



EXISTING CONDITION HEC-1 SUMMARY TABLE			
Basin ID	Area (ac)	Q10 (cfs)	Q100 (cfs)
EX1	5.82	5	13
GCE	1.21	2	4
EX2	6.45	5	14
OB	1.86	3	5
CP1E	-	8	19
SKYE	1.61	3	5

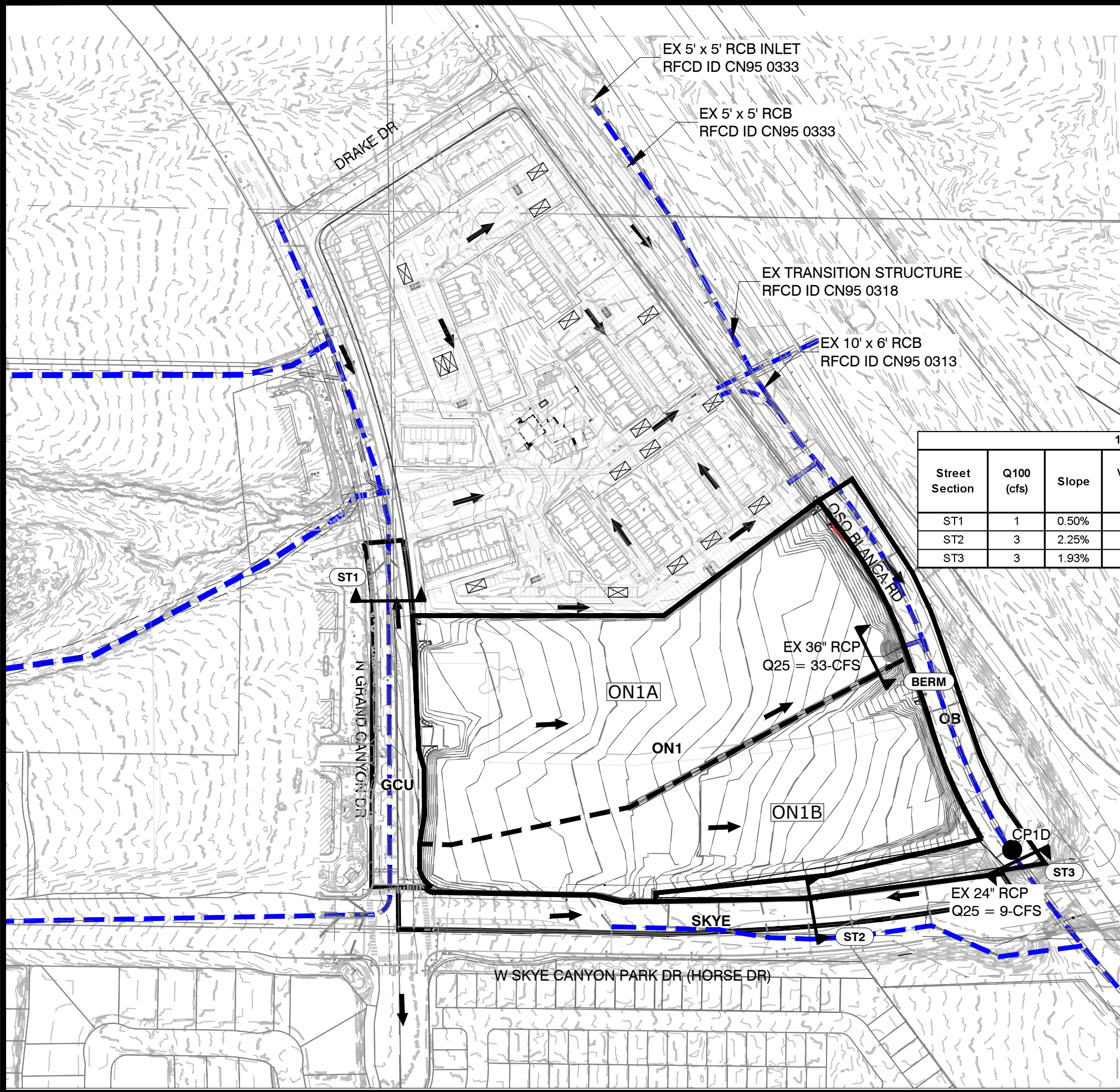
NORMAL DEPTH PERIMETER STREET SUMMARY (100-YEAR EXISTING CONDITION)						
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Tributary Basin
ST1	4	0.50%	1.60	0.35	0.56	GCE
ST2	5	2.25%	3.30	0.35	1.16	SKYE
ST3	5	1.93%	3.31	0.37	1.22	OB



W.O.#:	7934
DATE:	DECEMBER 2020
BY:	ACY
SCALE:	1"=200'
SHEET	1 OF 1

GRAND CANYON VILLAGE
FIGURE 6- EXISTING CONDITION BASIN MAP

H:\8025\Drainage\A Figures and Exhibits\Figure 6 - Existing Condition Basin Map Rev.dwg\ayup: Dec 21, 2020 - 5:07pm

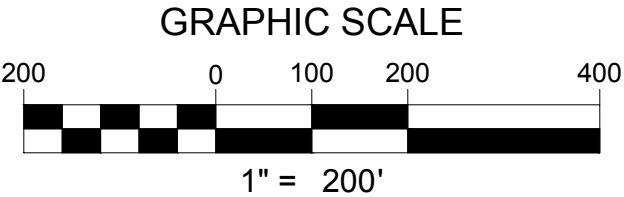


DEVELOPED CONDITION HEC-1 SUMMARY TABLE			
Basin ID	Area (ac)	Q10 (cfs)	Q100 (cfs)
ON1	12.23	17	35
GCU	1.25	2	4
OB	1.25	3	5
SKYE	1.61	3	5
CP1D (ON1B + OB)	-	9	19

PRORATED SUBBASIN SUMMARY INTERIM/ULTIMATE CONDITION				
BASIN	BASIN AREA		Q10	Q100
ON1	12.23		17	35
SUBBASIN	SUB AREA	SUB AREA	Q499	Q100
ON1A	7.28	59.5%	10	21
ON1B	4.95	40.5%	7	14
TOTAL	12.23	100.0%	17	35

NORMAL DEPTH PERIMETER STREET SUMMARY (100-YEAR DEVELOPED CONDITION)						
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Tributary Basin
ST1	4	0.50%	1.60	0.35	0.56	GCU
ST2	5	2.25%	3.30	0.35	1.16	SKYE
ST3	5	1.93%	3.31	0.37	1.22	OB
BERM	21	1.59%	2.90	0.48	1.39	ON1A

10 - YEAR DEVELOPED DRY LANE ANALYSIS SUMMARY									
Street Section	Q100 (cfs)	Slope	Velocity (ft/s)	Depth (ft)	V x D	Max Dry Lane Depth	Req. Dry Lane	Meets Dry Lane, Dry Lane Available	Tributary Basin
ST1	1	0.50%	1.22	0.24	0.29	0.55	12.00	YES, 22.5-ft	1/2(GCU)
ST2	3	2.25%	2.95	0.31	0.91	0.55	12.00	YES, 19-ft	SKYE
ST3	3	1.93%	2.96	0.33	0.98	0.55	12.00	YES, 23-ft	OB



LEGEND

- CONCENTRATION POINT
- BASIN BOUNDARY
- SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITY
- PROPOSED DRAINAGE FACILITY
- BASIN DESIGNATION
- SUBBASIN DESIGNATION
- FLOW ARROW
- NORMAL DEPTH SECTION

GRAND CANYON APARTMENTS
FIGURE 7 - DEVELOPED (MASS GRADING)
CONDITION BASIN MAP

W.O.#:	7934
DATE:	DECEMBER 2020
BY:	ACY
SCALE:	1"=200'
SHEET	1 OF 1

APPENDIX B

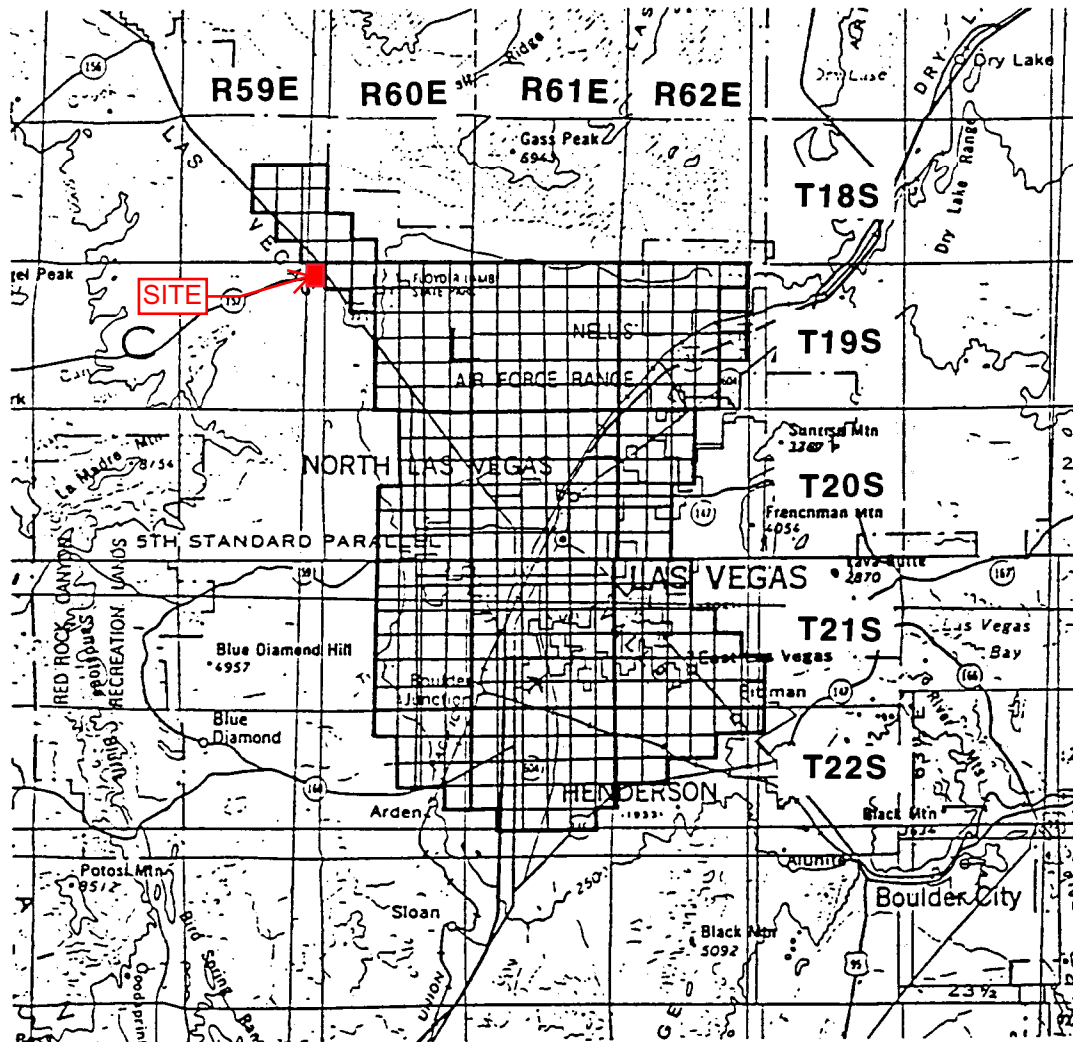
HYDROLOGY

B.1

RAINFALL CALCULATIONS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP RANGE SECTIONS

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

TOWNSHIP RANGE SECTIONS

20 South 62 East 4-9,16-20,29-32
 21 South 60 East 1-4,9-16,21-28,33-36
 21 South 61 East ALL SECTIONS
 21 South 62 East 4-9,15-23, 25-36
 22 South 60 East 1-4,10-15,24
 22 South 61 East 1-24,26-29
 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

WRC
ENGINEERING

REFERENCE:

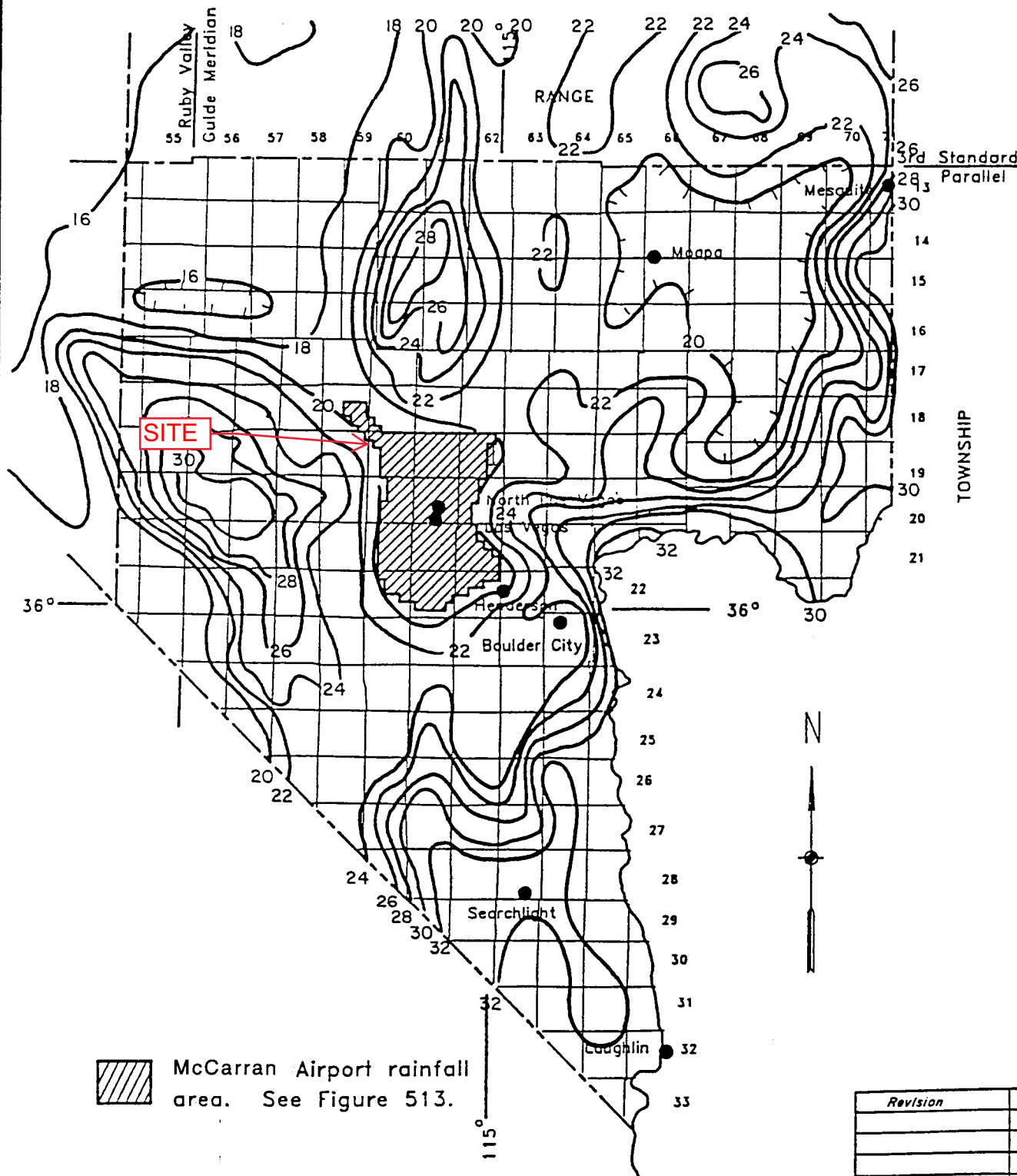
USACE, Los Angeles District, 1988

FIGURE 513

SITE T-R-S:
19-60-7



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



Revision	Date

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>

RAINFALL CALCULATIONS

CONDITION: Existing/Developed Condition

WO#: 8025

The project site is not included in the McCarran Airport Rainfall Area as shown by Figure 513 in the Hydrologic Criteria and Drainage Design Manual. Precipitation values are taken from the NOAA ATLAS 2, then adjusted per Table 501 in the Hydrologic Criteria and Drainage Design Manual.

STREET INTERSECTION	TOWNSHIP	RANGE	SECTION
	<i>T19 South</i>	<i>R60 East</i>	<i>7</i>

STORM EVENT	RAINFALL DEPTH (IN)	RATIO TO NOAA ATLAS 2 ADJUSTMENT RATIO	DESIGN DEPTH (IN)
10-YEAR	1.28	1.24	1.59
100-YEAR	2.03	1.43	2.90

10-YEAR/100-YEAR DESIGN RAINFALL DEPTH RATIO:

0.55

B.2

SOIL AND CURVE NUMBER CALCULATIONS



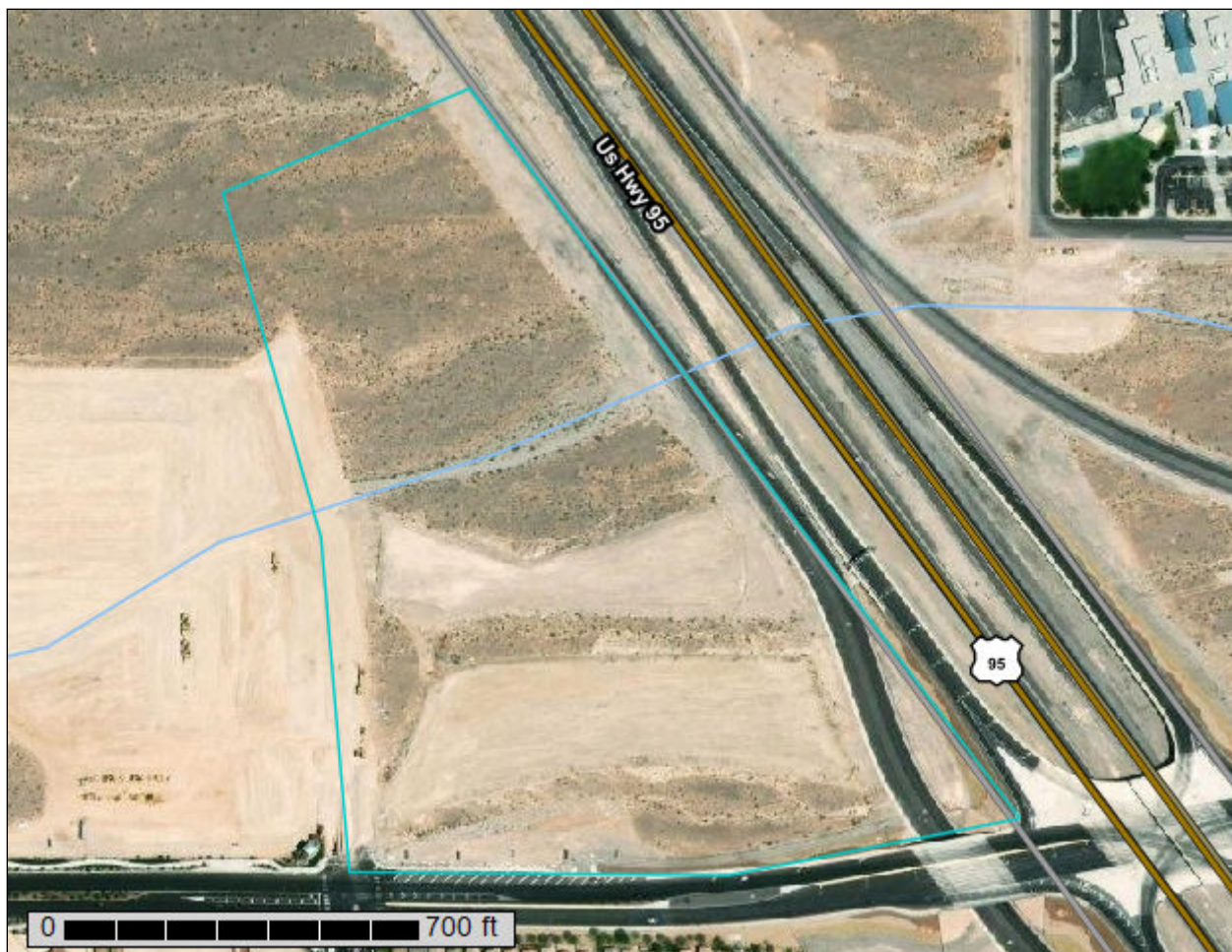
United States
Department of
Agriculture

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



July 3, 2019

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 (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

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

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

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

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

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Soil Map	5
Soil Map.....	6
Legend.....	7
Map Unit Legend.....	9
Map Unit Descriptions.....	9
Las Vegas Valley Area, Nevada, Part of Clark County.....	11
400—Tencee very gravelly fine sandy loam, 2 to 8 percent slopes.....	11
Soil Information for All Uses	12
Soil Reports.....	12
Water Features.....	12
Hydrologic Soil Group and Surface Runoff.....	12
References	14

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



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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 13, Sep 14, 2018

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

Date(s) aerial images were photographed: Jul 3, 2016—Oct 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
400	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	31.2	100.0%
Totals for Area of Interest		31.2	100.0%

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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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

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

Custom Soil Resource Report

soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

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

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

Report—Hydrologic Soil Group and Surface Runoff

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

Hydrologic Soil Group and Surface Runoff—Las Vegas Valley Area, Nevada, Part of Clark County			
Map symbol and soil name	Pct. of map unit	Surface Runoff	Hydrologic Soil Group
400—Tencée very gravelly fine sandy loam, 2 to 8 percent slopes			
Tencée	100	Very high	D

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- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

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United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

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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 (SEMIARID RANGELANDS¹)

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

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

²Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: >70% ground cover.

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

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

CURVE NUMBERS FOR SOILS

Soil # 400 Tencee very gravelly fine sandy loam, 20 to 8 percent slopes

Soil	Percent	Group	Desert Shrub ₁ (Poor Condition)	Residential ₂ (apartments/ condos)	Commercial ₃	Impervious ₄
Tencee and similar soils	100%	D	88	93	95	98
Total	100%		88	93	95	98

Notes:

- 1- Referenced from Table 602 (4 of 4), Desert Shrub, Poor Condition
- 2- Referenced from Table 602A, apartments/ condos
- 3- Referenced from Table 602 (1 of 4) Commercial
- 4- Referenced from Table 602 (1 of 4), Impervious Paved Streets and Roads

Curve Number Calculations for Basins

Basin	Type	Soil	Desert Shrub ₁ (Poor Condition)	Residential ₂ (apartments/ condos)	Commercial ₃	Impervious ₄	CN Value
EXISTING CONDITION BASINS							
EX1	400	100%	100%				88.0
EX2	400	100%	100%				88.0
GCE	400	100%	20%			80%	96.0
SKYE	400	100%				100%	98.0
OB	400	100%	32%			68%	94.8
DEVELOPED CONDITION BASINS							
ON1	400	100%			100%		95.0
GCU	400	100%				100%	98.0

B.3

TRAVEL TIME CALCULATIONS

TRAVEL TIME CALCULATIONS

DEVELOPMENT: **Grand Canyon/Skye Canyon Park Apartments**

W.O. # **7934**

CALCULATED BY: **ACY**

$$Velocity = CS^{1/2}$$

C1 applies to the first 500 feet of travel distance			
C2 applies to the remaining travel distance			
Non-urban		Urbanized	
C1=14.8	C2=29.4	C1=20.2	C2=30.6

					First 500 feet		Remaining Travel Distance	
Basin	Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (ft/ft)	C1	V1 (fps)	C2	V2 (fps)
EXISTING CONDITION BASINS								
EX1	744	2760	2736	0.032	14.8	2.7	29.4	5.3
EX2	748	2759	2736	0.031	14.8	2.6	29.4	5.2
GC1E	491	2768	2759	0.018	20.2	2.7	30.6	4.1
GC2E	775	2762	2759	0.004	20.2	1.3	30.6	1.9
DRKE	442	2766	2750	0.036	14.8	2.8	29.4	5.6
OBE	1000	2751	2736	0.015	15.8	1.9	30.4	3.7
INTERIM CONDITION BASINS								
ON1	1041	2762	2747	0.014	20.2	2.4	30.6	3.7
ON2	1183	2757	2744	0.011	20.2	2.1	30.6	3.2
GC1I	506	2766	2757	0.018	20.2	2.7	30.6	4.1
GC2I	788	2760	2757	0.004	20.2	1.2	30.6	1.9
DRKI	445	2762	2749	0.029	20.2	3.5	30.6	5.2
OB	1000	2751	2736	0.015	21.2	2.6	31.6	3.9
ULTIMATE CONDITION BASINS								
GC1U	506	2766	2757	0.018	20.2	2.7	30.6	4.1
GC2U	788	2760	2757	0.004	20.2	1.2	30.6	1.9
DRKU	445	2762	2749	0.029	20.2	3.5	30.6	5.2

B.4

STANDARD FORM 4 LAG TIME CALCULATIONS

STANDARD FORM 4

DEVELOPMENT: Grand Canyon Village

CONDITION: Existing/Developed Condition

W.O. # 8025 CALCULATED BY: ACY

V1 applies to the first 500 feet of travel distance V2 applies to the remaining travel distance	
Non-Urban:	Urban
$V1 = 148 * S^{1/2}$ $V2 = 294 * S^{1/2}$	$V1 = 202 * S^{1/2}$ $V2 = 306 * S^{1/2}$

$$T_i = \frac{1.8(1.1 - k)L^{1/2}}{S^{1/3}} \quad T_t = \frac{L}{60V}$$

$$k = 0.0132C_n - 0.39 \quad T_c = T_i + T_t$$

SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK (URBANIZED BASINS)		FINAL Tc	LAG TIME	REMARKS
DESIG.	Cn	K	AREA Ac.	AREA Mi^2	LENGTH Ft	SLOPE %	Ti Min.	LENGTH Ft	SLOPE %	V1 fps (9a)	V2 fps (9b)	Tt Min.	TOTAL LENGTH (11)	Tc Min. (12)	Min.	TLAG Hr.	
(1)	(2)	(3)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)			
EXISTING CONDITION BASINS																	
EX1	88.0	0.772	5.82	0.0091	100	3%	19.02	887	3.6	2.8	5.6	4.12	987	15.48	15.48	0.155	
EX2	88.0	0.772	6.45	0.0101	243	2%	33.95	994	4.0	3.0	5.9	4.20	1237	16.87	16.87	0.169	
GCE	96.0	0.877	1.21	0.0019	40	2%	9.34	643	0.2	0.8	1.2	12.44	683	13.79	13.79	0.138	
SKYE	98.0	0.904	1.61	0.0025	60	2%	10.09	775	2.1	2.9	4.4	3.91	835	14.64	14.00	0.140	
OB	94.8	0.861	1.86	0.0029	50	2%	11.19	795	1.8	2.7	4.1	4.32	845	14.69	14.69	0.147	
DEVELOPED CONDITION BASINS																	
ON1	95.0	0.864	12.23	0.0191	35	2%	9.26	1083	2.8	3.4	5.1	4.39	1118	16.21	13.65	0.136	
GCU	98.0	0.904	1.25	0.0020	50	2%	9.21	643	0.2	0.8	1.2	12.44	693	13.85	13.85	0.139	
															Tc Min (URB)= 5 min		
															Tc Min (NON-URB)= 10 min		

B.5

HEC-1 MODELS

B.5.1

**HEC-1 MODEL
EXISTING CONDITION
“EX-GCA.OUT”**

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 21DEC20 TIME 13:46:05 *
*
*****

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

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      X  X  XXXXXX  XXXX      X
      X  X  X      X  X      XX
      X  X  X      X      X
      XXXXXX XXXX  X      XXXX  X
      X  X  X      X      X
      X  X  X      X  X      X
      X  X  XXXXXX  XXXX      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

*DIAGRAM

*** FREE ***

```

1 ID EXISTING CONDITION HYDROLOGIC MODEL
2 ID INPUT FILE DATE = OCTOBER 2020
3 ID DESIGN STORM = 100-YEAR 6-HR STORM
4 ID STORM DISTRIBUTION = SDN #3
5 ID MODELED BY VTN (ACY)
6 ID
7 ID *****
8 ID * GRAND CANYON VILLAGE *
9 ID *****
10 ID
11 ID
12 ID AREA DARF DARF
13 ID SQ. MI. 100-Year 10-Year
14 ID 0-0.5 1.00 0.55
15 ID
16 ID
17 ID 100-YEAR, 6-HOUR STORM, SDN3
18 ID
19 IT 5 0 0 300
20 IN 5 0 0
21 IO 5 0 0
22 JR PREC .55 1.000

```

```

23 KK EX1
24 KM ONSITE UNDEVELOPED BASIN
25 BA 0.0091
26 PB 2.90
27 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
28 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
29 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
30 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
31 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
32 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
33 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
34 PC .998 .999 1.00
35 LS 0 88.0
36 UD 0.155

```

```

37 KK GCE
38 KM PARTIALLY DEVELOPED GRAND CANYON AVENUE STREET BASIN
39 BA 0.0019
40 LS 0 96.0
41 UD 0.138

```

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42 KK EX2
43 KM ONSITE UNDEVELOPED BASIN
44 BA 0.0101
45 LS 0 88.0

```

46 UD 0.169
*
1 HEC-1 INPUT PAGE 2

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

47 KK OB
48 KM DEVELOPED OSO BLANCA ROAD BASIN
49 BA 0.0029
50 LS 0 94.80
51 UD 0.147
*
52 KK CP1E
53 KM TOTAL FLOW IN OSO BLANCA ADJACENT TO SITE
54 HC 2
*
55 KK SKYE
56 KM DEVELOPED SKYE CANYON AVENUE BASIN
57 BA 0.0025
58 LS 0 98.0
59 UD 0.140
60 ZZ

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

23 EX1
.
.
37 . GCE
.
.
42 . EX2
.
.
47 . OB
.
.
52 . CP1E.....
.
.
55 . SKYE

(**) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 21DEC20 TIME 13:46:05 *
*

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

EXISTING CONDITION HYDROLOGIC MODEL
INPUT FILE DATE = OCTOBER 2020
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3
MODELED BY VTN (ACY)

* GRAND CANYON VILLAGE *

AREA	DARF	DARF
SQ. MI.	100-Year	10-Year
0-0.5	1.00	0.55

100-YEAR, 6-HOUR STORM, SDN3

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

IT HYDROGRAPH TIME DATA
NMIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE

ITIME 0000 STARTING TIME
 NQ 300 NUMBER OF HYDROGRAPH ORDINATES
 NDDATE 2 0 ENDING DATE
 NDTIME 0055 ENDING TIME
 ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
 TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 .55 1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				.55	1.00
HYDROGRAPH AT					
+	EX1	.01	1 FLOW	5.	13.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	GCE	.00	1 FLOW	2.	4.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	EX2	.01	1 FLOW	5.	14.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	OB	.00	1 FLOW	3.	5.
			TIME	3.58	3.58
2 COMBINED AT					
+	CP1E	.01	1 FLOW	8.	19.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	SKYE	.00	1 FLOW	3.	5.
			TIME	3.58	3.58

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

B.5.2

**HEC-1 MODEL
DEVELOPED CONDITION
“DEV-GCA.OUT”**

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 21DEC20 TIME 16:27:25
*
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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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X X XXXXXX XXXX X
X X X X X XX
X X X X X
XXXXXX XXXX X XXXX X
X X X X X
X X X X X
X X XXXXXX XXXX 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

*DIAGRAM

*** FREE ***

```

1 ID DEVELOPED CONDITION HYDROLOGIC MODEL
2 ID INPUT FILE DATE = OCTOBER 2020
3 ID DESIGN STORM = 100-YEAR 6-HR STORM
4 ID STORM DISTRIBUTION = SDN #3
5 ID MODELED BY VTN (ACY)
6 ID
7 ID *****
8 ID * GRAND CANYON VILLAGE *
9 ID *****
10 ID
11 ID
12 ID AREA DARF DARF
13 ID SQ. MI. 100-Year 10-Year
14 ID 0-0.5 0.99 0.55
15 ID
16 ID
17 ID 100-YEAR, 6-HOUR STORM, SDN3
18 ID
19 IT 5 0 0 300
20 IN 5 0 0
21 IO 5 0 0
22 JR PREC .55 1.000
23 *
24 KK ON1
25 KM ONSITE DEVELOPED BASIN
26 BA 0.0191
27 PB 2.90
28 PC 0 0.02 0.057 0.07 0.087 0.108 0.124 0.13 0.13 0.130
29 PC 0.13 0.13 0.13 0.133 0.14 0.142 0.148 0.158 0.172 0.181
30 PC 0.19 0.197 0.199 0.2 0.201 0.204 0.214 0.229 0.241 0.249
31 PC 0.251 0.256 0.27 0.278 0.281 0.283 0.295 0.322 0.352 0.409
32 PC 0.499 0.59 0.71 0.744 0.781 0.812 0.819 0.835 0.851 0.856
33 PC 0.86 0.868 0.876 0.888 0.91 0.926 0.937 0.95 0.97 0.976
34 PC 0.982 0.985 0.987 0.989 0.99 0.993 0.993 0.994 0.995 0.998
35 LS 0 95.0
36 UD 0.135
37 *
38 KK GCU
39 KM DEVELOPED STREET BASIN
40 BA 0.0020
41 LS 0 98.0
42 UD 0.139
43 *
44 KK OB
45 KM DEVELOPED HALF STREET BASIN
46 BA 0.0029
47 LS 0 94.8

```

46 UD 0.147
*
1 HEC-1 INPUT PAGE 2

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

47 KK SKYE
48 KM DEVELOPED SKYE CANYON AVENUE BASIN
49 BA 0.0025
50 LS 0 98.0
51 UD 0.140
52 ZZ

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
23 ON1
.
.
37 GCU
.
.
42 OB
.
.
47 SKYE
.
.

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
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*

*
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* 609 SECOND STREET *
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DEVELOPED CONDITION HYDROLOGIC MODEL
INPUT FILE DATE = OCTOBER 2020
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STORM DISTRIBUTION = SDN #3
MODELED BY VTN (ACY)

* GRAND CANYON VILLAGE *

AREA	DARF	DARF
SQ. MI.	100-Year	10-Year
0-0.5	0.99	0.55

100-YEAR, 6-HOUR STORM, SDN3

21 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE
IT HYDROGRAPH TIME DATA
NMIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 300 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NDTIME 0055 ENDING TIME
ICENT 19 CENTURY MARK
COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS
ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 .55 1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1 .55	RATIO 2 1.00
HYDROGRAPH AT +	ON1	.02	1 FLOW TIME	17. 3.58	35. 3.58
HYDROGRAPH AT +	GCU	.00	1 FLOW TIME	2. 3.58	4. 3.58
HYDROGRAPH AT +	OB	.00	1 FLOW TIME	3. 3.58	5. 3.58
HYDROGRAPH AT +	SKYE	.00	1 FLOW TIME	3. 3.58	5. 3.58

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

APPENDIX C

HYDRAULICS

C.1

PERIMETER STREET NORMAL DEPTH CALCULATIONS

C.1.1

EXISTING CONDITION PERIMETER STREET NORMAL DEPTH CALCULATIONS

Project Description

Input Data

Station (ft)	Elevation (ft)
--------------	----------------

Start Station	Ending Station	Roughness Coefficient
1	2	0.015
2	3	0.015
3	4	0.015
4	5	0.015
5	6	0.015
6	7	0.015
7	8	0.015
8	9	0.015
9	10	0.015
10	11	0.015
11	12	0.015
12	13	0.015
13	14	0.015
14	15	0.015
15	16	0.015
16	17	0.015
17	18	0.015
18	19	0.015
19	20	0.015
20	21	0.015
21	22	0.015
22	23	0.015
23	24	0.015
24	25	0.015
25	26	0.015
26	27	0.015
27	28	0.015
28	29	0.015
29	30	0.015
30	31	0.015
31	32	0.015
32	33	0.015
33	34	0.015
34	35	0.015
35	36	0.015
36	37	0.015
37	38	0.015
38	39	0.015
39	40	0.015
40	41	0.015
41	42	0.015
42	43	0.015
43	44	0.015
44	45	0.015
45	46	0.015
46	47	0.015
47	48	0.015
48	49	0.015
49	50	0.015
50	51	0.015
51	52	0.015
52	53	0.015
53	54	0.015
54	55	0.015
55	56	0.015
56	57	0.015
57	58	0.015
58	59	0.015
59	60	0.015
60	61	0.015
61	62	0.015
62	63	0.015
63	64	0.015
64	65	0.015
65	66	0.015
66	67	0.015
67	68	0.015
68	69	0.015
69	70	0.015
70	71	0.015
71	72	0.015
72	73	0.015
73	74	0.015
74	75	0.015
75	76	0.015
76	77	0.015
77	78	0.015
78	79	0.015
79	80	0.015
80	81	0.015
81	82	0.015
82	83	0.015
83	84	0.015
84	85	0.015
85	86	0.015
86	87	0.015
87	88	0.015
88	89	0.015
89	90	0.015
90	91	0.015
91	92	0.015
92	93	0.015
93	94	0.015
94	95	0.015
95	96	0.015
96	97	0.015
97	98	0.015
98	99	0.015
99	100	0.015

12/21/2020 4:38:58 PM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for ST1 (100-YR Existing)

Options

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

Results

Normal Depth		0.35	ft
Elevation Range	0.00 to 0.93 ft		
Flow Area		2.51	ft ²
Wetted Perimeter		21.95	ft
Hydraulic Radius		0.11	ft
Top Width		21.15	ft
Normal Depth		0.35	ft
Critical Depth		0.33	ft
Critical Slope		0.00772	ft/ft
Velocity		1.60	ft/s
Velocity Head		0.04	ft
Specific Energy		0.39	ft
Froude Number		0.82	
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	0.35	ft
Critical Depth	0.33	ft
Channel Slope	0.50000	%
Critical Slope	0.00772	ft/ft

Cross Section for ST1 (100-YR Existing)

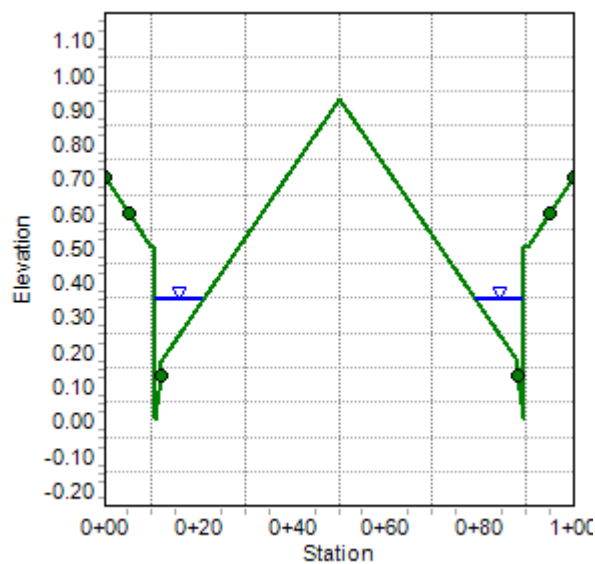
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.35	ft
Discharge	4.00	ft ³ /s

Cross Section Image



Worksheet for ST2 (100-YR Existing)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.25000 %
Discharge 5.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+55.00	0.93

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+55.00, 0.93)	0.016

Options

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

Results

Normal Depth 0.35 ft
Elevation Range 0.00 to 0.93 ft
Flow Area 1.51 ft²
Wetted Perimeter 13.58 ft

Worksheet for ST2 (100-YR Existing)

Results

Hydraulic Radius	0.11	ft
Top Width	13.18	ft
Normal Depth	0.35	ft
Critical Depth	0.41	ft
Critical Slope	0.00709	ft/ft
Velocity	3.30	ft/s
Velocity Head	0.17	ft
Specific Energy	0.52	ft
Froude Number	1.72	
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	0.35	ft
Critical Depth	0.41	ft
Channel Slope	2.25000	%
Critical Slope	0.00709	ft/ft

Cross Section for ST2 (100-YR Existing)

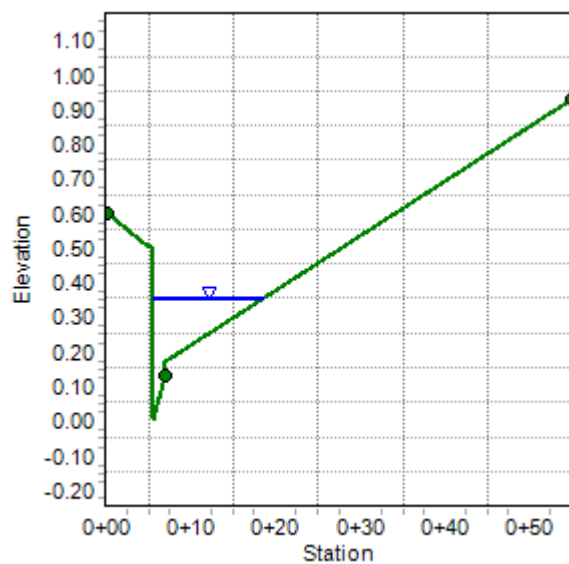
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.25000	%
Normal Depth	0.35	ft
Discharge	5.00	ft ³ /s

Cross Section Image



Worksheet for ST3 (100-YR Existing)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.93000 %
Discharge 5.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.93
0+38.00	0.17
0+38.00	0.13
0+39.50	0.00
0+39.50	0.50
0+40.00	0.50
0+45.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.93)	(0+38.00, 0.13)	0.016
(0+38.00, 0.13)	(0+45.00, 0.60)	0.013

Options

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

Results

Normal Depth 0.37 ft
Elevation Range 0.00 to 0.93 ft
Flow Area 1.51 ft²
Wetted Perimeter 12.15 ft
Hydraulic Radius 0.12 ft

Worksheet for ST3 (100-YR Existing)

Results

Top Width	11.73	ft
Normal Depth	0.37	ft
Critical Depth	0.43	ft
Critical Slope	0.00688	ft/ft
Velocity	3.31	ft/s
Velocity Head	0.17	ft
Specific Energy	0.54	ft
Froude Number	1.63	
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	0.37	ft
Critical Depth	0.43	ft
Channel Slope	1.93000	%
Critical Slope	0.00688	ft/ft

Cross Section for ST3 (100-YR Existing)

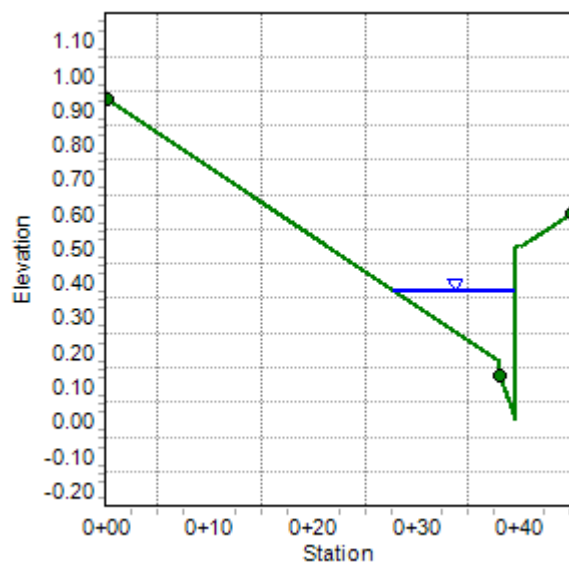
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.93000	%
Normal Depth	0.37	ft
Discharge	5.00	ft ³ /s

Cross Section Image



C.1.2

DEVELOPED CONDITION PERIMETER STREET NORMAL DEPTH CALCULATIONS

Worksheet for ST1 (100-YR Developed)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	4.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.70
0+05.00	0.60
0+10.00	0.50
0+10.50	0.50
0+10.50	0.00
0+12.00	0.13
0+12.00	0.17
0+50.00	0.93
0+88.00	0.17
0+88.00	0.13
0+89.50	0.00
0+89.50	0.50
0+90.00	0.50
0+95.00	0.60
1+00.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.70)	(0+05.00, 0.60)	0.025
(0+05.00, 0.60)	(0+12.00, 0.13)	0.013
(0+12.00, 0.13)	(0+88.00, 0.13)	0.016
(0+88.00, 0.13)	(0+95.00, 0.60)	0.013
(0+95.00, 0.60)	(1+00.00, 0.70)	0.025

Worksheet for ST1 (100-YR Developed)

Options

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

Results

Normal Depth		0.35	ft
Elevation Range	0.00 to 0.93 ft		
Flow Area		2.51	ft²
Wetted Perimeter		21.95	ft
Hydraulic Radius		0.11	ft
Top Width		21.15	ft
Normal Depth		0.35	ft
Critical Depth		0.33	ft
Critical Slope		0.00772	ft/ft
Velocity		1.60	ft/s
Velocity Head		0.04	ft
Specific Energy		0.39	ft
Froude Number		0.82	
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	0.35	ft
Critical Depth	0.33	ft
Channel Slope	0.50000	%
Critical Slope	0.00772	ft/ft

Cross Section for ST1 (100-YR Developed)

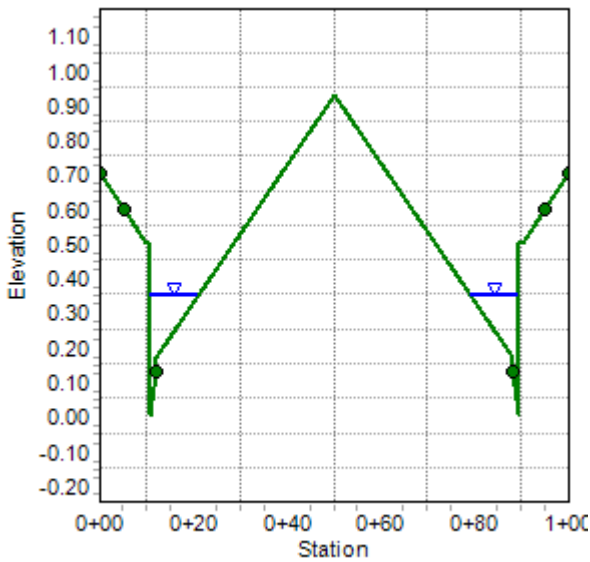
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.35	ft
Discharge	4.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)	Elevation (ft)
--------------	----------------

Roughness Segment Definitions

Options

Results

Bentley Systems, Inc. Haestad Methods Solution Center, MicroStation V8i (SELECTseries 1) [08.11.01.03]

Worksheet for ST2 (100-YR Developed)

Results

Hydraulic Radius	0.11	ft
Top Width	13.18	ft
Normal Depth	0.35	ft
Critical Depth	0.41	ft
Critical Slope	0.00709	ft/ft
Velocity	3.30	ft/s
Velocity Head	0.17	ft
Specific Energy	0.52	ft
Froude Number	1.72	
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	0.35	ft
Critical Depth	0.41	ft
Channel Slope	2.25000	%
Critical Slope	0.00709	ft/ft

Cross Section for ST2 (100-YR Developed)

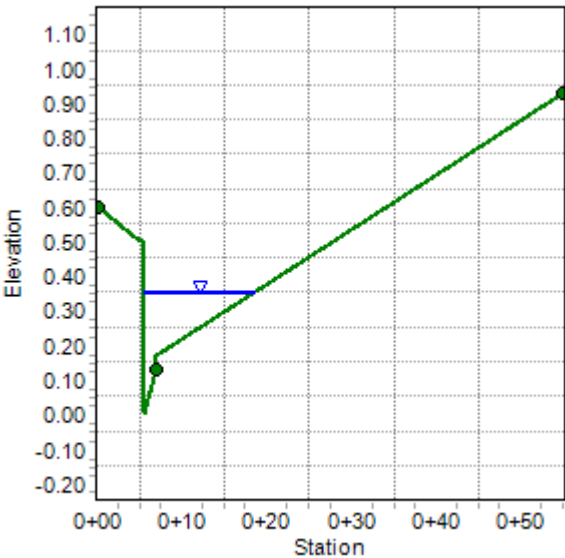
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.25000	%
Normal Depth	0.35	ft
Discharge	5.00	ft³/s

Cross Section Image



Worksheet for ST3 (100-YR Developed)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.93000	%
Discharge	5.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	0.93
0+38.00	0.17
0+38.00	0.13
0+39.50	0.00
0+39.50	0.50
0+40.00	0.50
0+45.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.93)	(0+38.00, 0.13)	0.016
(0+38.00, 0.13)	(0+45.00, 0.60)	0.013

Options

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

Results

Normal Depth	0.37	ft
Elevation Range	0.00 to 0.93 ft	
Flow Area	1.51	ft ²
Wetted Perimeter	12.15	ft
Hydraulic Radius	0.12	ft

Worksheet for ST3 (100-YR Developed)

Results

Top Width	11.73	ft
Normal Depth	0.37	ft
Critical Depth	0.43	ft
Critical Slope	0.00688	ft/ft
Velocity	3.31	ft/s
Velocity Head	0.17	ft
Specific Energy	0.54	ft
Froude Number	1.63	
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	0.37	ft
Critical Depth	0.43	ft
Channel Slope	1.93000	%
Critical Slope	0.00688	ft/ft

Cross Section for ST3 (100-YR Developed)

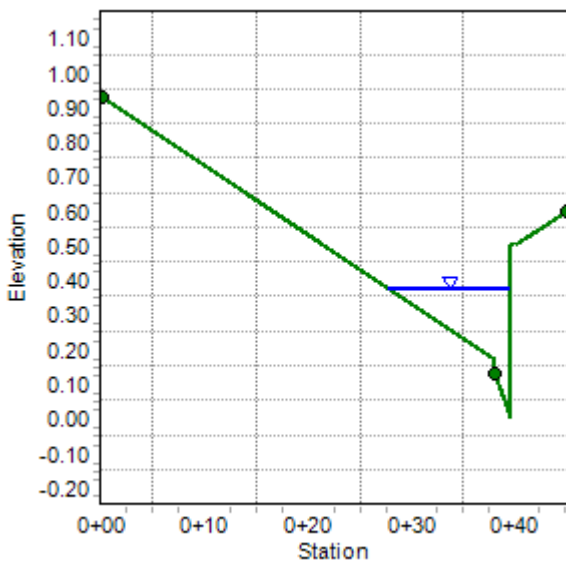
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.93000	%
Normal Depth	0.37	ft
Discharge	5.00	ft ³ /s

Cross Section Image



C.1.3

10-YEAR DEVELOPED DRY LANE CALCULATIONS

Worksheet for ST1 Dry Lane (10-YR Developed)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.86000	%
Discharge	1.00	ft ³ /s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.70
0+05.00	0.60
0+10.00	0.50
0+10.50	0.50
0+10.50	0.00
0+12.00	0.13
0+12.00	0.17
0+50.00	0.93
0+88.00	0.17
0+88.00	0.13
0+89.50	0.00
0+89.50	0.50
0+90.00	0.50
0+95.00	0.60
1+00.00	0.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.70)	(0+05.00, 0.60)	0.025
(0+05.00, 0.60)	(0+12.00, 0.13)	0.013
(0+12.00, 0.13)	(0+88.00, 0.13)	0.016
(0+88.00, 0.13)	(0+95.00, 0.60)	0.013
(0+95.00, 0.60)	(1+00.00, 0.70)	0.025

Worksheet for ST1 Dry Lane (10-YR Developed)

Options

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

Results

Normal Depth		0.23	ft
Elevation Range	0.00 to 0.93 ft		
Flow Area		0.64	ft²
Wetted Perimeter		9.12	ft
Hydraulic Radius		0.07	ft
Top Width		8.58	ft
Normal Depth		0.23	ft
Critical Depth		0.23	ft
Critical Slope		0.00837	ft/ft
Velocity		1.57	ft/s
Velocity Head		0.04	ft
Specific Energy		0.26	ft
Froude Number		1.01	
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	0.23	ft
Critical Depth	0.23	ft
Channel Slope	0.86000	%
Critical Slope	0.00837	ft/ft

Cross Section for ST1 Dry Lane (10-YR Developed)

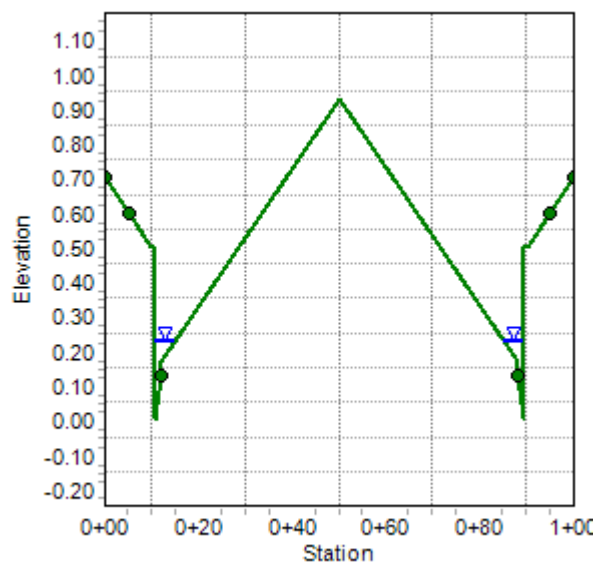
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.86000	%
Normal Depth	0.23	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for ST2 Dry Lane (10-YR Developed)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.25000 %
Discharge 3.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+55.00	0.93

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+55.00, 0.93)	0.016

Options

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

Results

Normal Depth 0.31 ft
Elevation Range 0.00 to 0.93 ft
Flow Area 1.02 ft²
Wetted Perimeter 10.88 ft

Worksheet for ST2 Dry Lane (10-YR Developed)

Results

Hydraulic Radius	0.09	ft
Top Width	10.52	ft
Normal Depth	0.31	ft
Critical Depth	0.36	ft
Critical Slope	0.00750	ft/ft
Velocity	2.95	ft/s
Velocity Head	0.14	ft
Specific Energy	0.45	ft
Froude Number	1.67	
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	0.31	ft
Critical Depth	0.36	ft
Channel Slope	2.25000	%
Critical Slope	0.00750	ft/ft

Cross Section for ST2 Dry Lane (10-YR Developed)

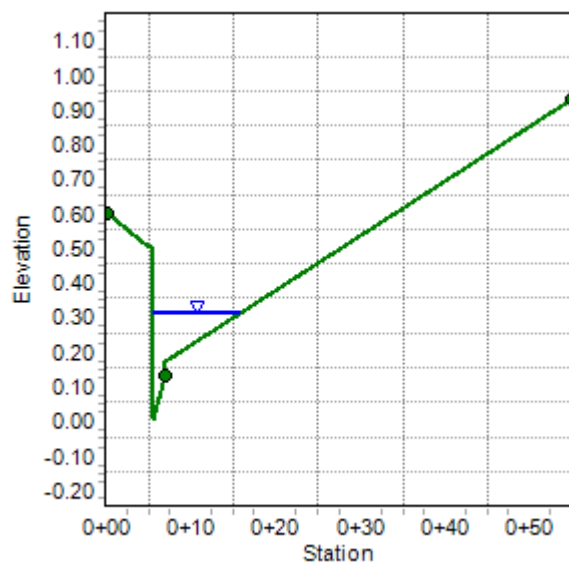
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.25000	%
Normal Depth	0.31	ft
Discharge	3.00	ft ³ /s

Cross Section Image



Worksheet for ST3 Dry Lane (10-YR Developed)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.93000 %
Discharge 3.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.93
0+38.00	0.17
0+38.00	0.13
0+39.50	0.00
0+39.50	0.50
0+40.00	0.50
0+45.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.93)	(0+38.00, 0.13)	0.016
(0+38.00, 0.13)	(0+45.00, 0.60)	0.013

Options

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

Results

Normal Depth 0.33 ft
Elevation Range 0.00 to 0.93 ft
Flow Area 1.01 ft²
Wetted Perimeter 9.75 ft
Hydraulic Radius 0.10 ft

Worksheet for ST3 Dry Lane (10-YR Developed)

Results

Top Width	9.38	ft
Normal Depth	0.33	ft
Critical Depth	0.37	ft
Critical Slope	0.00727	ft/ft
Velocity	2.96	ft/s
Velocity Head	0.14	ft
Specific Energy	0.46	ft
Froude Number	1.58	
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	0.33	ft
Critical Depth	0.37	ft
Channel Slope	1.93000	%
Critical Slope	0.00727	ft/ft

Cross Section for ST3 Dry Lane (10-YR Developed)

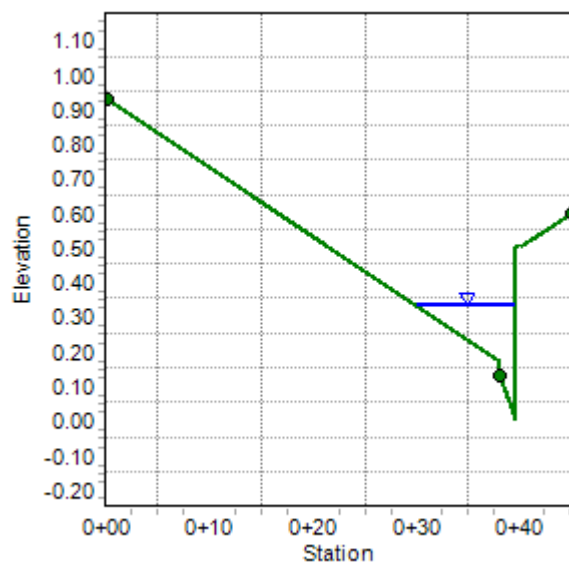
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.93000	%
Normal Depth	0.33	ft
Discharge	3.00	ft ³ /s

Cross Section Image



C.2

ONSITE STREET NORMAL DEPTH CALCULATIONS

Worksheet for BERM 100-YR DEVELOPED

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.59000 %
Discharge 21.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	40.71
1+00.00	38.97
1+09.00	40.97
1+15.00	40.97

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 40.71)	(1+15.00, 40.97)	0.025

Options

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

Results

Normal Depth 0.48 ft
Elevation Range 38.97 to 40.97 ft
Flow Area 7.23 ft²
Wetted Perimeter 30.00 ft
Hydraulic Radius 0.24 ft
Top Width 29.94 ft
Normal Depth 0.48 ft
Critical Depth 0.49 ft
Critical Slope 0.01458 ft/ft

Worksheet for BERM 100-YR DEVELOPED

Results

Velocity	2.90	ft/s
Velocity Head	0.13	ft
Specific Energy	0.61	ft
Froude Number	1.04	
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	0.48	ft
Critical Depth	0.49	ft
Channel Slope	1.59000	%
Critical Slope	0.01458	ft/ft

Cross Section for BERM 100-YR DEVELOPED

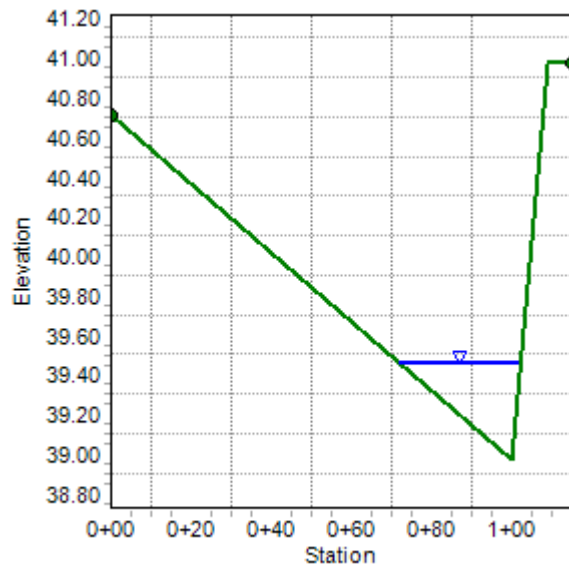
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.59000	%
Normal Depth	0.48	ft
Discharge	21.00	ft ³ /s

Cross Section Image



C.3

FREEBOARD CALCULATIONS

FREEBOARD CALCULATIONS

DEVELOPMENT Grand Canyon Village

W.O. # 8025

CALCULATED BY ACY

EQUATIONS*

$$Fb_{sup} = 1 + 0.025 * V * D^{\frac{1}{3}}$$

$$Fb_{sub} = \frac{1}{2} + \frac{V^2}{2g}$$

Where :Fb=Freeboard, sup=Super-critical, sub=Sub-critical, V = Velocity, D = Depth and g = 32.2

NOTES: Equations are referenced from pages 769 and 773 of the CCRFCD HC&DDM

Minimum Freeboard is 1 ft.

Section / Description	Super/Sub critical flow	Channel Velocity (fps)	Flow Depth (ft)	Freeboard Required (ft)	Channel Depth (ft)
Berm	SUPER	2.79	0.46	1.05	1.51

APPENDIX D

REFERENCE MATERIAL

D.1

**SKYE CANYON INFRASTRUCTURE PHASE 3A
DS4931**

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: August 16, 2018	
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:		COPIES TO: Slater Hanifan Group
		Skye Canyon – Phase 3A Infrastructure		
Cross Streets:	Skye Village Road & Grand Canyon Drive		M F Land LLC / Ninety-Five Management LLC	
File Number:	F:\Depot\DSMemos\DS4931C.doc		Bart Anderson, P.E., DevCo	
Parcel Number:	125-07-201-007 & Portion of 125-07-101-009		CCRFGD	
Zoning Action:				
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	11/6/2017	1/22/2018	Not Approved	\$400.00	491017: \$400
2 nd Submittal	4/18/2018	5/24/2018	Not Approved	\$400.00	495171: \$400
3 rd Submittal	8/2/2018	8/16/2018	See Comments Below	\$400.00	497829: \$400
			TOTAL FEES (LDDRS):	\$1,200.00	----

REMARKS: The complex nature of these storm drain infrastructure improvement plans needs to include a complete set of plans with the next submittal.

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

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

- This drainage study is acceptable in concept;** however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District (CCRFGD)* has issued a letter of concurrence. The engineer should contact the CCRFGD to confirm that they have begun their review.
- The subject *Skye Canyon Phase 3A Infrastructure Drainage Study* will not be approved prior to the final approval of the *Skye Canyon Detention Basin 2 Technical Drainage Study*.
- Skye Canyon Phase 3A* onsite developments are to be flood protected by *Detention Basin 2*. No occupancy permits within onsite *Phase 3A* will be issued prior to the substantial completion of *Detention Basin 2*.
- The future MPU facility within Skye Village Road north of the Skye Village/Grand Canyon/Iron Mountain intersection to the proposed MPU facility at the Kyle Canyon interchange area shall be substantially complete before occupancy of residential Units beyond Phase 3A, 3B and 3C. This includes residential development within Phases 4 & 6 and the development of Phase 5 as shown on the Development Phasing Exhibit dated 12/4/2017.

5. **Exhibit I** shows the future abandonment of Phase 3A storm drain improvements (P15 & P33A) once the Ultimate MPU facilities are in place. The City requires that facilities be removed from the roadway if they are no longer needed. These facilities will need included in the Maintenance Bond.
6. Update **Exhibit I**, Facility P31 to show the 7' x 5' RCB .
7. Phase 3A includes interim drainage facilities located outside of roadways that shall require Public Drainage Easements to be Privately Maintained by the Master Developer. The Plans have preliminarily identified these easements. Provide an exhibit that shows the easements limits along with legal descriptions for Flood Control to verify easement limits. Once Flood Control has concurred with the easement limits, the plans shall be revised to reflect the final easement locations. Public drainage easements 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.
8. Revise the easement location along *Grand Canyon Drive* to reflect the HEC-RAS analysis for the earthen channel.
9. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.
10. Flood Control understands that the new *Skye Canyon Master Plan Amendment* (MPA) is being included as a part of the 2018 MPU process. Any changes not incorporated in the 2018 MPU must be approved by *City of Las Vegas* and *Clark County Regional Flood Control District* (CCRFCD) and shall be adopted by the *City of Las Vegas City Council* prior to the final approval of the subject improvement plans.
11. The *Design Report for Moccasin Road CCRFCD Flood Control Facility (US95 / Kyle Canyon Road Interchange to CCRFCD Facility LVUP 1076/1077)* must be conditionally approved (90% submittal) prior to the final approval of the subject improvement plans. The connection to these MPU facilities has been shown on the Grand Canyon Improvement plans.
12. The subject *Phase 3A Infrastructure Drainage Study* addresses the included street improvements of *Skye Village Road, Skye Park Drive, Street "E", Grand Canyon Drive*, culvert crossings and storm drain systems with the streets. Technical drainage studies will be required for the future onsite parcels as they develop.
13. Since the streets network and the associated storm drain facilities will eventually be accepted by the **City of Las Vegas**, the engineer/developer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final approval of the improvement plans.
14. Structural plans for the storm drain improvements must be submitted for review by Flood Control and the Building Department. 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 improvement plans. The structural approval is also required to be submitted to CCRFCD prior to concurrence.
15. The submitted RCA plans generally show the required 5-foot minimum stem wall height before the arch section. Revise the RCA plans to show the 5-foot stem wall on all details and sections.
16. The interim channels adjacent to the infrastructure roadways are the Maintenance responsibility of the Master Developer.

17. The project proposed to build temporary drainage facilities including drainage berms/swales over the *Phase 3A* site and along the west side of *Skye Village Road*. Prior to the final plans 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 facilities 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.

18. **Sheet D-22:** Revise the pipe material of the storm drain lateral between SDMH #16 and the RCA to RCP instead of C900 PVC.

19. Revise the cross section details to show the Drainage Easements.

20. **Sheet S1.14** Revise the detail to reflect a 3-wire Cable Fence.

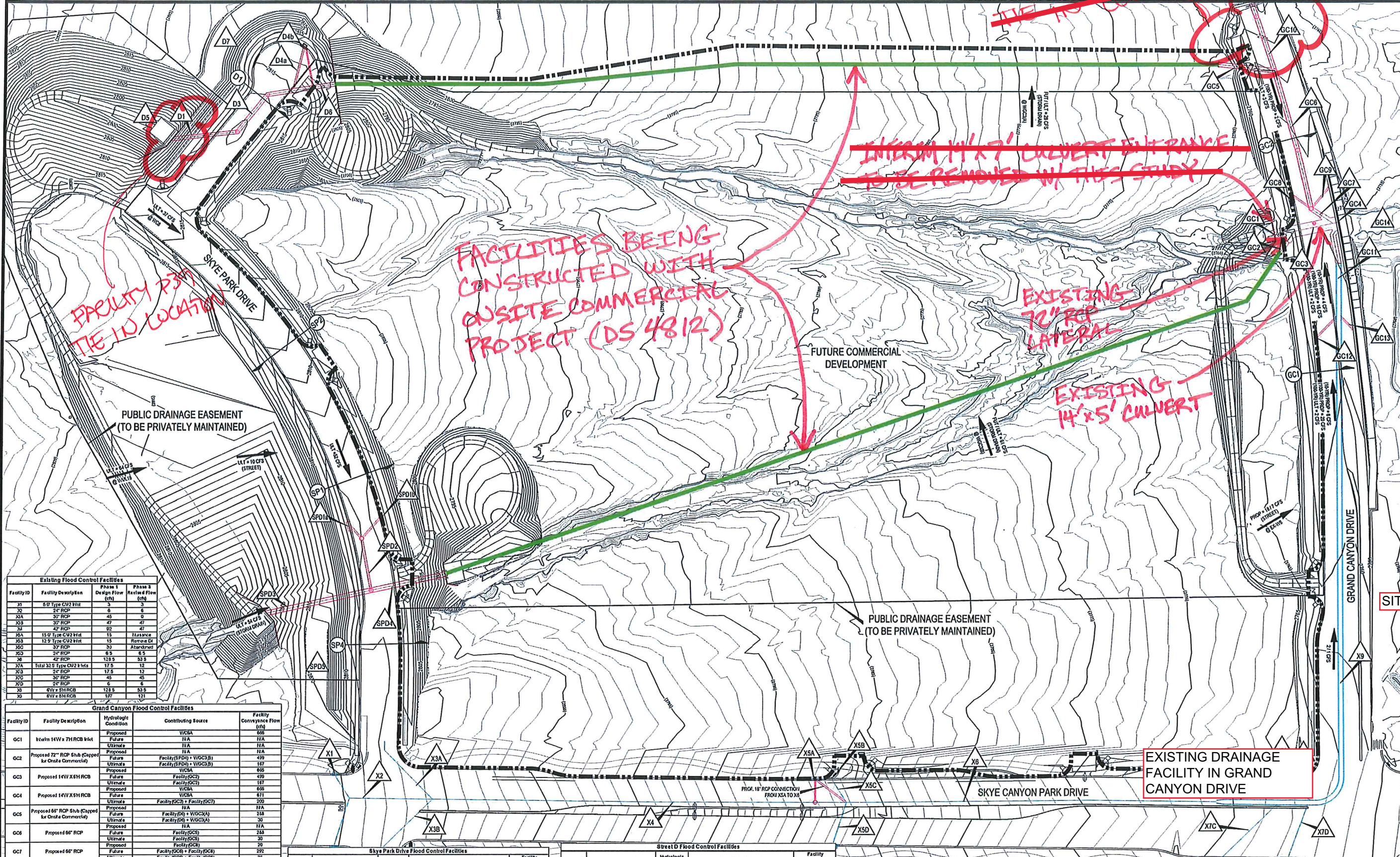
21. Structural details shall be revised to show the invert slab construction joint to be a minimum of 3-inches above the slab invert at the wall locations.

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

T/R/S: T19S/R60E/07
AREA G-07



Existing Flood Control Facilities			
Facility ID	Facility Description	Phase 1 Design Flow (cfs)	Phase 2 Design Flow (cfs)
X1	60" Type C22 Vitr	6	6
X2	24" RCP	6	6
X3A	30" RCP	45	45
X3B	30" RCP	47	47
X4	42" RCP	92	47
X5A	150" Type C22 Vitr	15	15
X5B	120" Type C22 Vitr	15	15
X6	30" RCP	30	30
X7	24" RCP	6.5	6.5
X8	42" RCP	133.5	50.5
X9	Total 24" Type C22 Vitr	17.5	12
X10	24" RCP	17.5	12
X11	30" RCP	45	45
X12	24" RCP	6	6
X13	60" x 50" RCB	123.5	50.5
X14	60" x 50" RCB	127	121

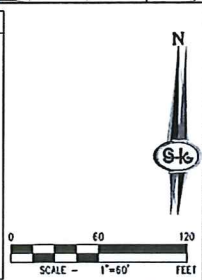
Grand Canyon Flood Control Facilities				
Facility ID	Facility Description	Hydrologic Condition	Contributing Source	Facility Conveyance Flow (cfs)
GC1	Interim 14W x 7H RCB Inlet	Proposed	WCSA	11A
		Future	IIA	11A
		Ultimate	IIA	11A
GC2	Proposed 72" RCP Sub (Capped for Onsite Commercial)	Proposed	Facility (SPD1 + WGC3B)	149
		Future	Facility (SPD1 + WGC3B)	149
		Ultimate	Facility (SPD1 + WGC3B)	149
GC3	Proposed 14W x 5H RCB	Proposed	WCSA	605
		Future	Facility (GC2)	499
		Ultimate	Facility (GC2)	656
GC4	Proposed 14W x 5H RCB	Proposed	WCSA	671
		Future	Facility (GC3) + Facility (GC2)	200
		Ultimate	Facility (GC3) + Facility (GC2)	200
GC5	Proposed 60" RCP Sub (Capped for Onsite Commercial)	Proposed	IIA	11A
		Future	Facility (GC3) + WGC3A	11A
		Ultimate	Facility (GC3) + WGC3A	30
GC6	Proposed 60" RCP	Proposed	IIA	11A
		Future	Facility (GC5)	11A
		Ultimate	Facility (GC5)	30
GC7	Proposed 60" RCP	Proposed	Facility (GC6) + Facility (GC5)	292
		Future	Facility (GC6) + Facility (GC5)	292
		Ultimate	Facility (GC6) + Facility (GC5)	13
GC8	Proposed 10" Type C22 SDC & 24" RCP SDC Lateral	Proposed	WGC3A	4
		Future	WGC3A	4
		Ultimate	WGC3A	4
GC9	Proposed 24" RCP Sub (Capped for Onsite)	Proposed	IIA	11A
		Future	IIA	11A
		Ultimate	WGC3A	4
GC10	Proposed 60" RCP Sub (Capped for Onsite)	Proposed	IIA	11A
		Future	IIA	11A
		Ultimate	IIA	11A
GC11	60" x 50" RCB	Proposed	Facility (GC12) + Facility (GC9)	125
		Future	Facility (GC9)	121
		Ultimate	Facility (GC9)	121
GC12	Proposed 72" Type C22 SDC & 24" RCP SDC Lateral	Proposed	IIA	11A
		Future	IIA	11A
		Ultimate	IIA	11A
GC13	Proposed 24" RCP Sub	Proposed	IIA	11A
		Future	IIA	11A
		Ultimate	IIA	11A
GC14	Existing Wash	Proposed	WCSA	694
		Future	WCSA	694
		Ultimate	WCSA	317

Skye Park Drive Flood Control Facilities				
Facility ID	Facility Description	Hydrologic Condition	Contributing Source	Facility Conveyance Flow (cfs)
SPD1a	Proposed 12" Type C22 Vitr & 24" RCP Lateral	Proposed	DS 5WSPD3	23
		Future	DS 5WSPD3	23
		Ultimate	(DS 5WSPD3) + (DS 5WSPD2) + (DS 5WSPD1)	25
SPD1b	Proposed 12" Type C22 Vitr & 24" RCP Lateral	Proposed	DS 5WSPD3	23
		Future	DS 5WSPD3	23
		Ultimate	(DS 5WSPD3) + (DS 5WSPD2) + (DS 5WSPD1)	25
SPD2	Proposed 30" RCP	Proposed	WSPD3	5
		Future	WSPD3	5
		Ultimate	SPD1a + SPD1b	52
SPD3	Proposed 12" RCP	Proposed	SPS	433
		Future	SPS	433
		Ultimate	IIA	433
SPD4	Proposed 12" RCP	Proposed	SPD3 + SPD3	433
		Future	SPD3 + SPD3	433
		Ultimate	SPD3 + SPD3	105
SPD5	Emergency Overflow 20' Wide Channel w/ 3' High Bank	Proposed	SPS	433
		Future	SPS	433
		Ultimate	SPD3	105

Street D Flood Control Facilities				
Facility ID	Facility Description	Hydrologic Condition	Contributing Source	Facility Conveyance Flow (cfs)
D1	Proposed 54" RCP	Proposed	DBH	253
		Future	DBH	253
		Ultimate	IIA	253
D3	Proposed 60" RCP	Proposed	DBH	253
		Future	DBH	253
		Ultimate	IIA	253
D4a	Proposed 18" RCP	Proposed	VSPD0	2
		Future	VSPD0	2
		Ultimate	VSPD0	2
D4b	Proposed 8" Type C22 Vitr	Proposed	VSPD0	2
		Future	VSPD0	2
		Ultimate	VSPD0	2
D5	Score-8 Detention Basin with a 54" Outlet (Facility D1)	Proposed	CPH	301
		Future	CPH	301
		Ultimate	IIA	301
D6	Proposed 60" RCP	Proposed	DBH + VSPD0	200
		Future	DBH + VSPD0	200
		Ultimate	VSPD0	2
D7	Emergency Overflow 20' Wide Channel w/ 3' High Bank	Proposed	CPH	301
		Future	CPH	301
		Ultimate	IIA	301

Hydraulic Analyses Flow Summary						
Cross Section	Section Type	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DuV
D1	Full Street	2	3.50	0.23	3.0	0.7
SP1	Full Street	52	1.50	0.59	4.9	2.0
Q = SP2 + WSPD3 + BASIN W/ 10' CFS						
SP2	Full Street	37	1.50	0.54	4.4	2.4
Q = WSPD3						
SP4	Full Street	25	0.60	0.30	1.8	0.8
Q = 0.5 WSPD3						
GC1 (10-Year)	Half Street	4	0.50	0.41	2.1	0.8
Q = 0.5 WSPD3 + WSPD3 (10-Year)						
GC1 (100-Year)	Half Street	16	0.50	0.62	2.7	1.7
Q = 0.5 WSPD3 + WSPD3 (100-Year)						
GC2 (10-Year)	Half Street	2	2.35	0.28	3.0	0.8
Q = 0.5 WSPD3 + DS-1						
GC2 (100-Year)	Half Street	4	2.35	0.34	3.4	1.2
Q = 0.5 WSPD3 + DS-1						

LEGEND	
-----	FUTURE COMMERCIAL SITE BOUNDARY
-----	EXISTING DRAINAGE FACILITY
-----	PROPOSED DRAINAGE FACILITY
-----	ESTIMATED FUTURE DRAINAGE FACILITY
-----	FLOW DIRECTION
-----	FLOWMASTER SECTION
-----	FACILITY ID



SLATER
HANIFAN
GROUP

CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5359

DATE: JULY 2016
DRAFTER: CWB
DESIGNER: CWB
CHECKED: SMJ
PROJECT NO. OLY1602.000

EXHIBIT I
SHEET 1 OF 1

NINETY-FIVE MANAGEMENT, LLC

SKYE CANYON PHASE 3 INFRASTRUCTURE
DRAINAGE FACILITIES & HYDRAULIC SUMMARY MAP

D.2

**SKYE CANYON VILLAGE
DS4812**

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		November 4, 2016
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. <i>AS</i> Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
	Skye Canyon Village	Anderson, Wahlen & Associates
Cross Streets:	NWC of Grand Canyon & Skye Canyon Park	MF Land, LLC
File Number:	F:\Depot\DSMemos\DS4812B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-07-201-003	
Zoning Action:	MOD-62679; SUP-63594; SUP-63597; SDR-63598; VAR-63963 & GPA-64013	
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	7/06/2016	8/19/2016	Not Approved	\$400.00	450103: \$400
2 nd Submittal	10/24/2016	11/04/2016	See Comments Below	\$400.00	462830: \$400
TOTAL FEES (LDDRS):				\$800.00	----

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

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

1. Please note the Skye Canyon - Phase 3 Infrastructure must be approved prior to final approval of the Skye Canyon Village.
2. Please note that public drainage easements 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.
3. Please note that all drainage improvements within Public Drainage Easements must be bonded and inspected.
4. Show and label existing offsite storm drain pipes proposed by others in the grading plan and plan & profile sheets.
5. Show HGL in the 72-inch RCP. It appears that the AutoCAD layer is turned off.

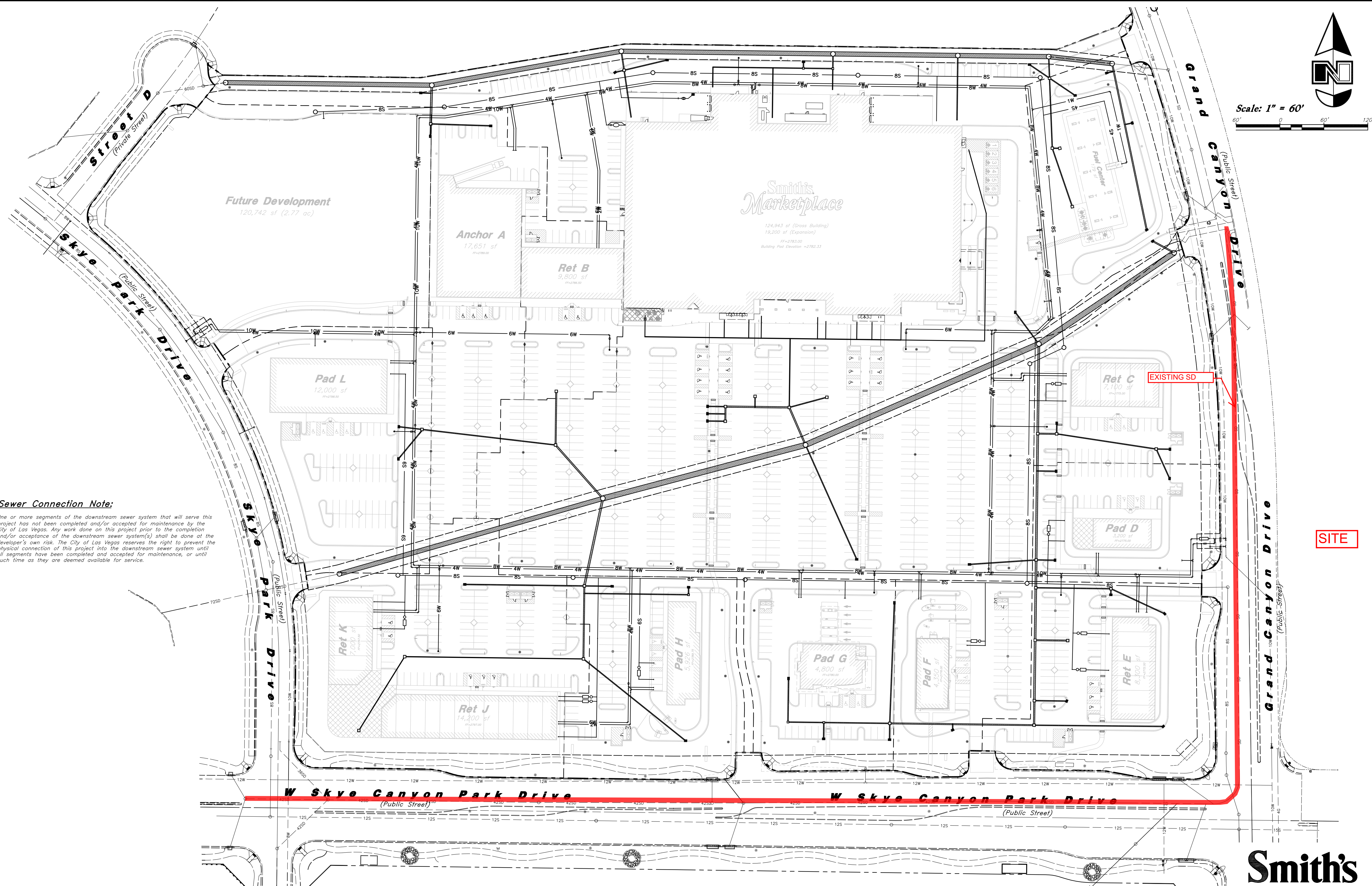
NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained 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.

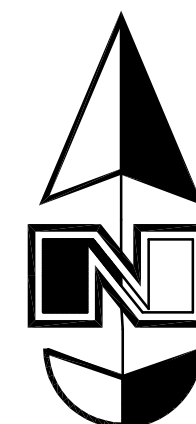
END OF REMARKS

OSK

T/R/S: T19S/R60E/07
AREA G-07

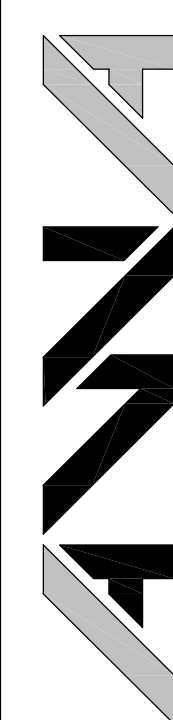


Scale: 1" = 60'



Designed by: KR
Drafted by: JC
Client Name: Smith's Food & Drug

SMC367UT

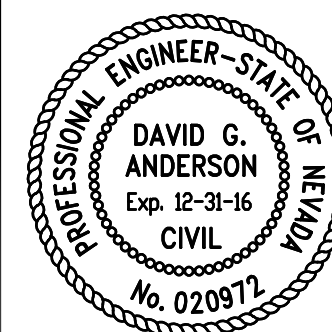


ANDERSON WAHLEN & ASSOCIATES
2010 North Redwood Road, Salt Lake City, Utah 84116
801.521-8529 - AWAengineering.net

Overall Utility Plan

Skye Canyon Village

Skye Canyon Village
West Skye Canyon Park Drive & Grand Canyon Drive
Las Vegas, Nevada



24 Oct, 2016

SHEET NO. 21 OF 3

C3.0

DWG No. HANSEN No. 6621

Smith's

FOOD & DRUG STORES

1550 South Redwood Road
Salt Lake City, Utah 84104
Telephone (801) 974-1400

#367
Las Vegas, Nevada

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"811"
or
1-800-227-2601
UNDERGROUND SERVICE ALERT (USA)

Benchmark

Monument ID: USDA (1934) 19
U.S. Department of Agriculture Brass Disc at Southwest
Corner of U.S. 95 and Kyle Canyon Road
Elevation=2817.61 Feet, 858.810 Meters
NAVD 88 DATUM
Per the City of Las Vegas Benchmark Book -
2008 Adjustment (Update 05/24/2010)

Basis of Bearings

North 89°16'30" West, Being the Bearing of the South Line of the Southeast Quarter (SE1/4) of the Northwest Quarter (NW1/4) of Section 7, Township 19 South, Range 60 East, M.D.M., City of Las Vegas, Clark County, Nevada, as Shown by Map Thereof in Book 14, Page 71 of Plats in the Clark County Recorder's Office Nevada.

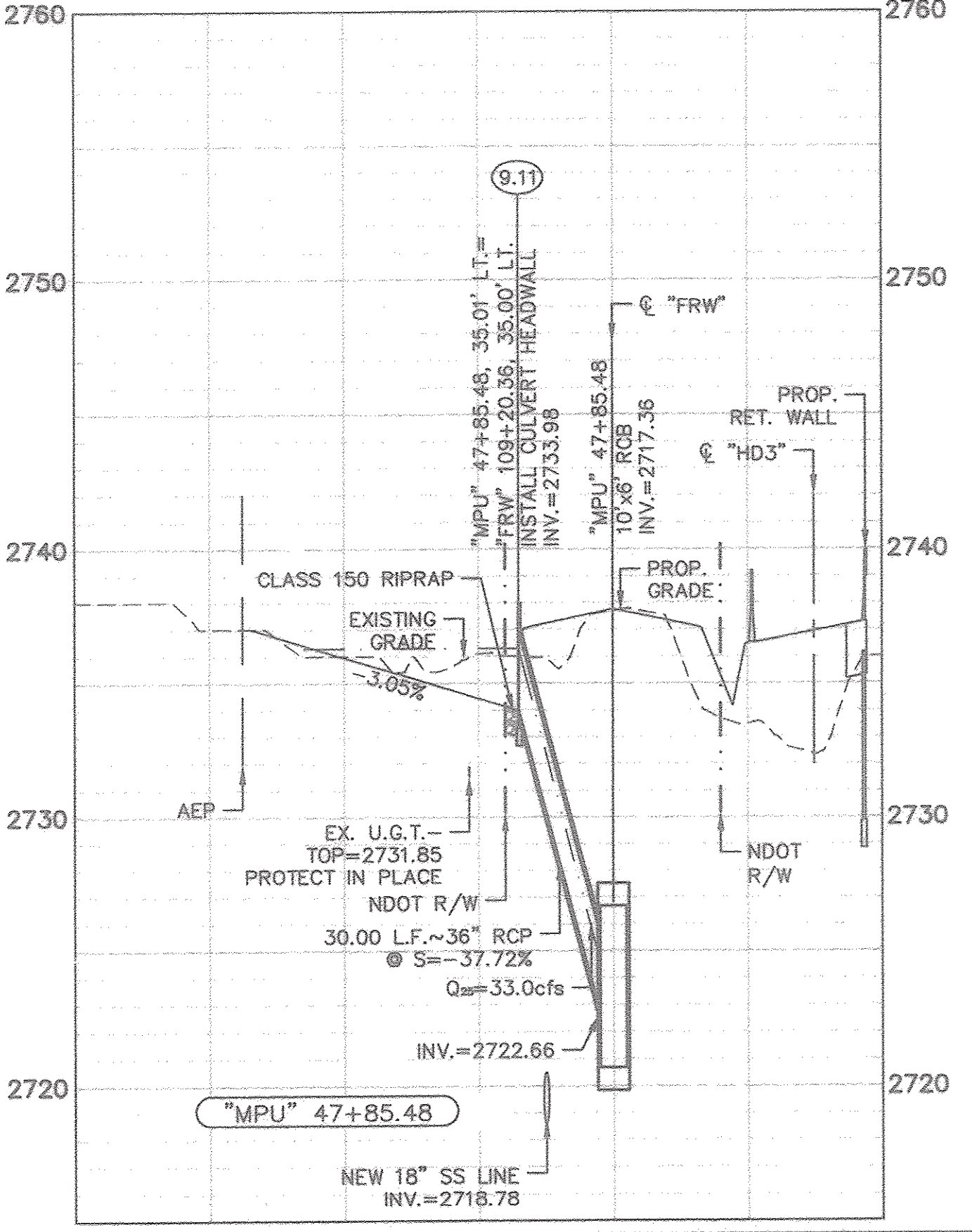
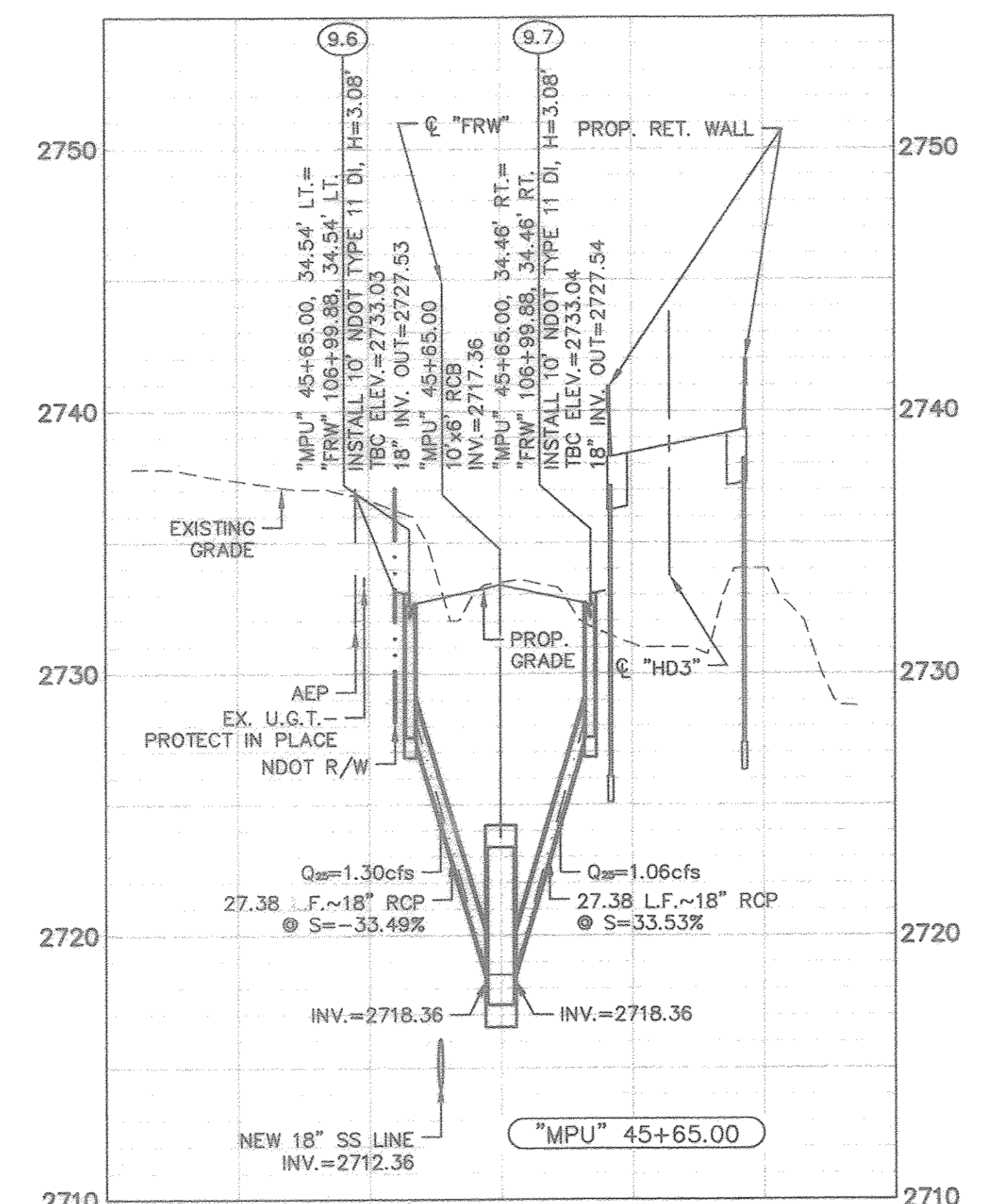
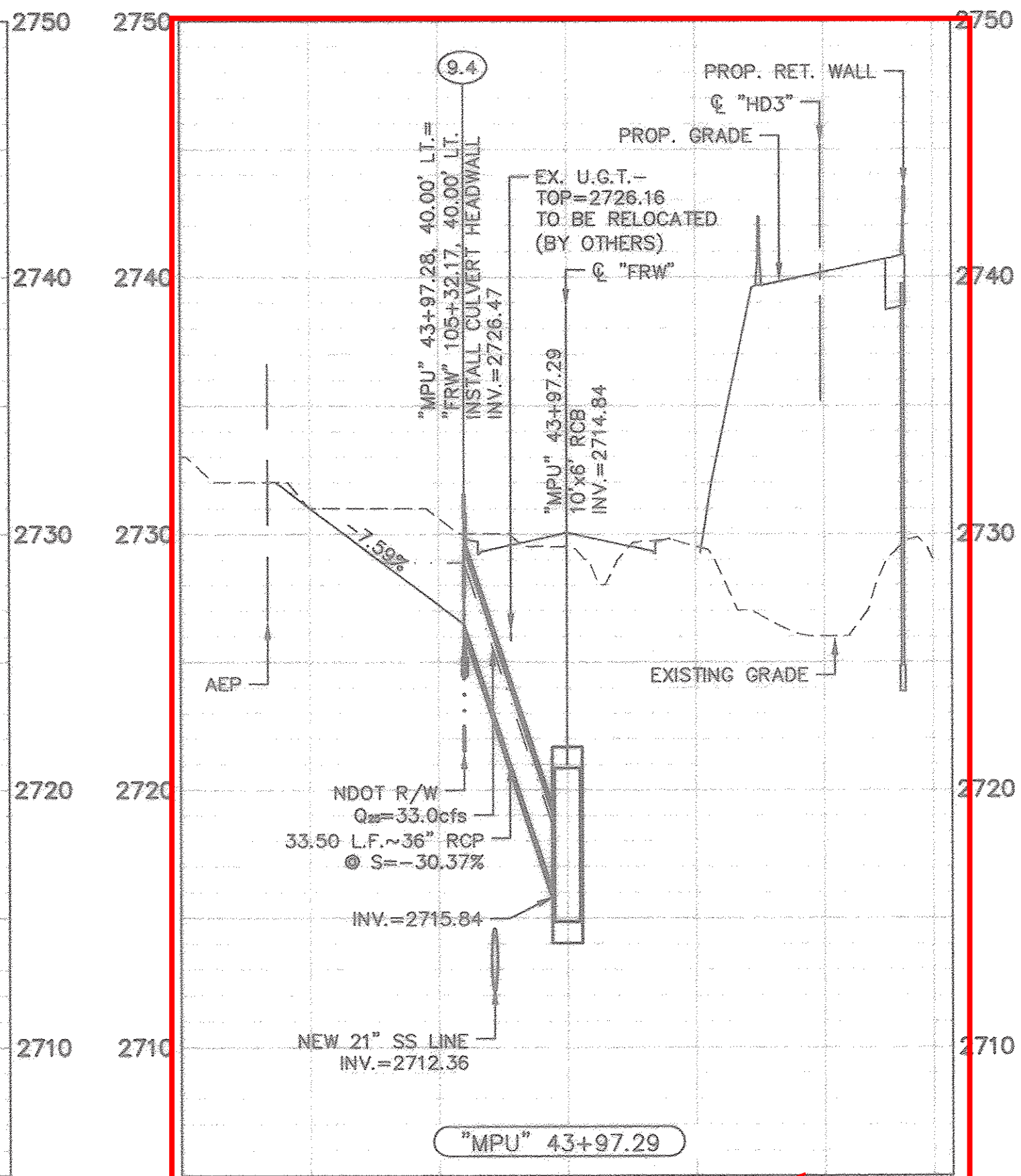
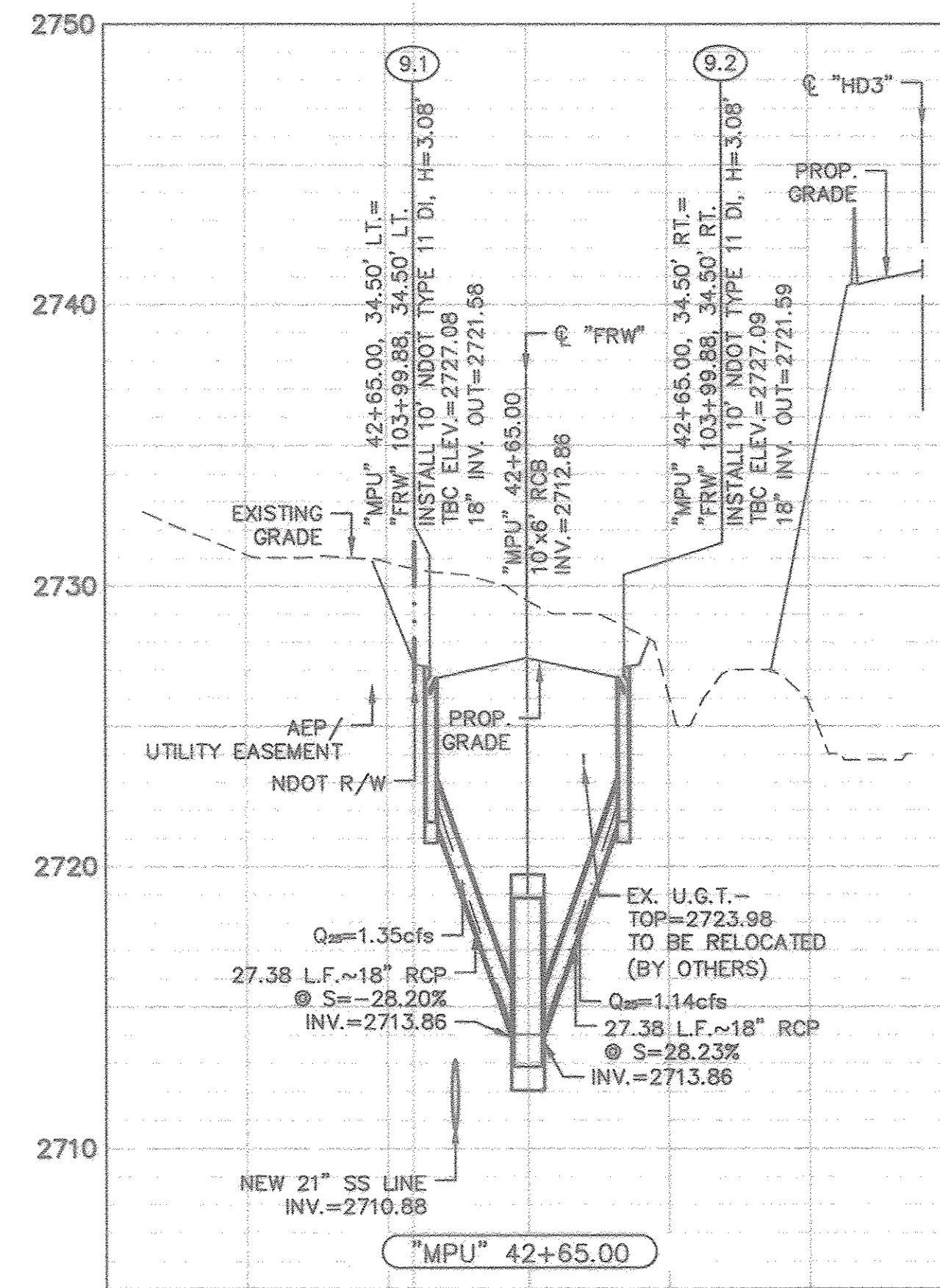
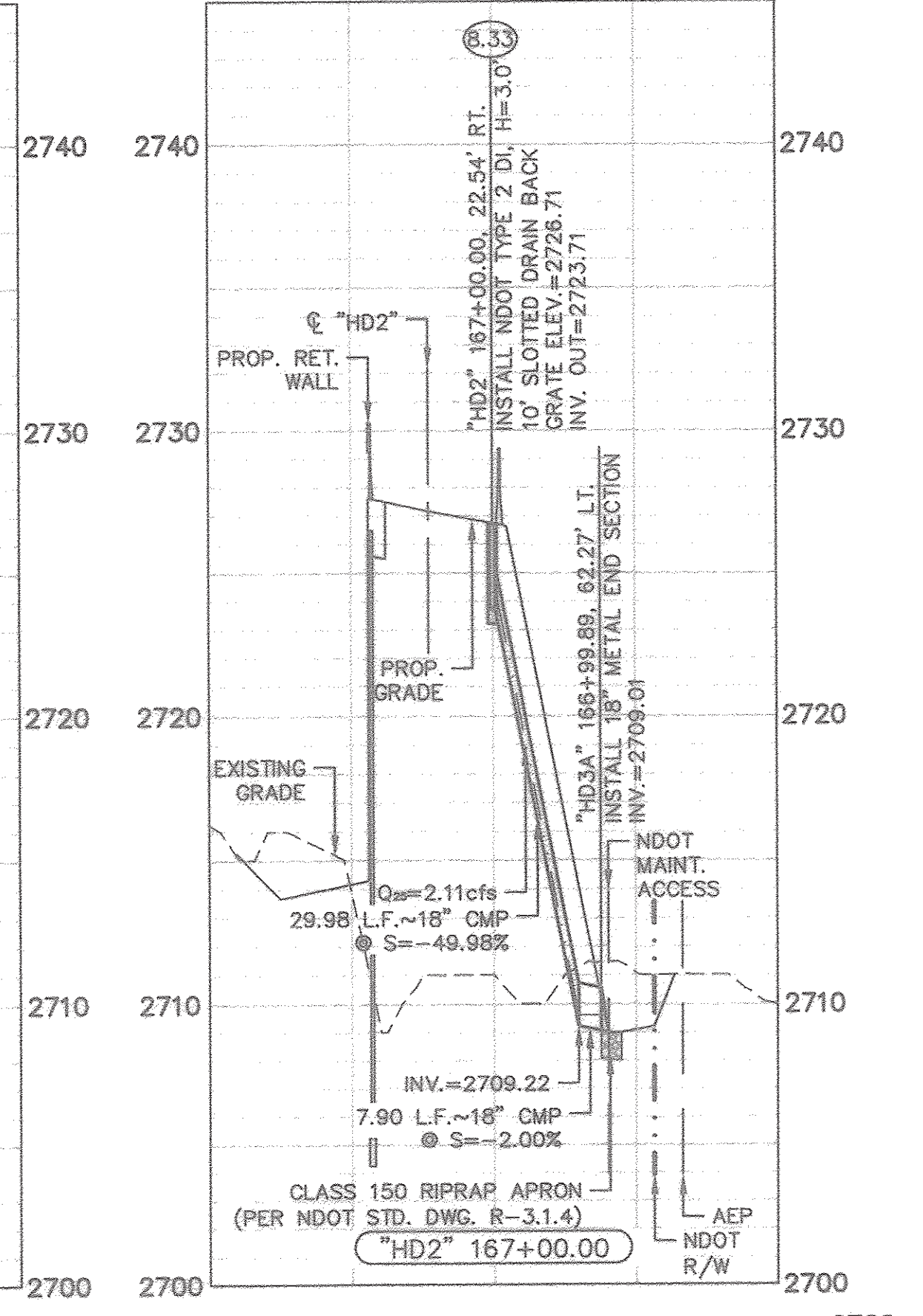
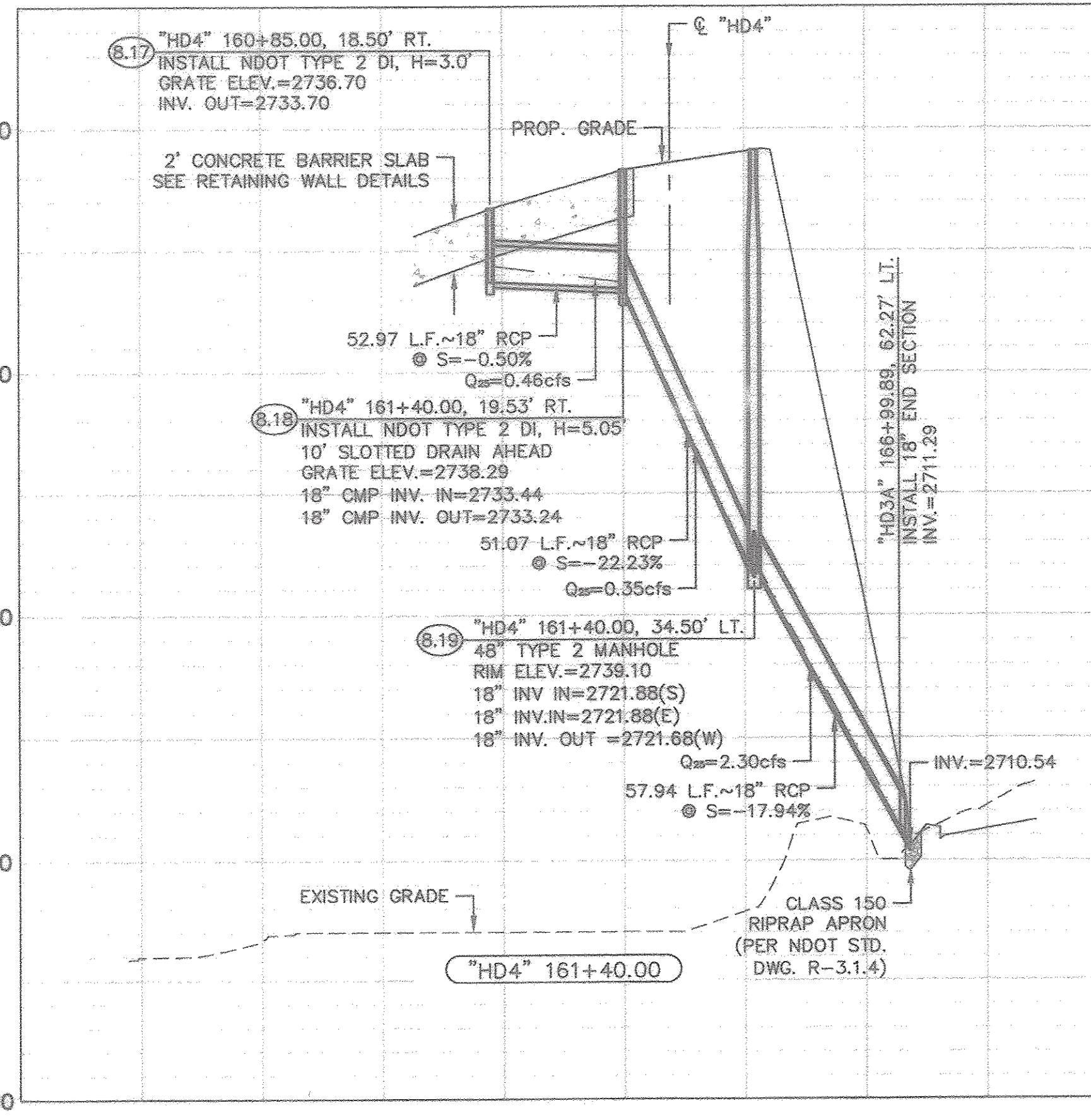
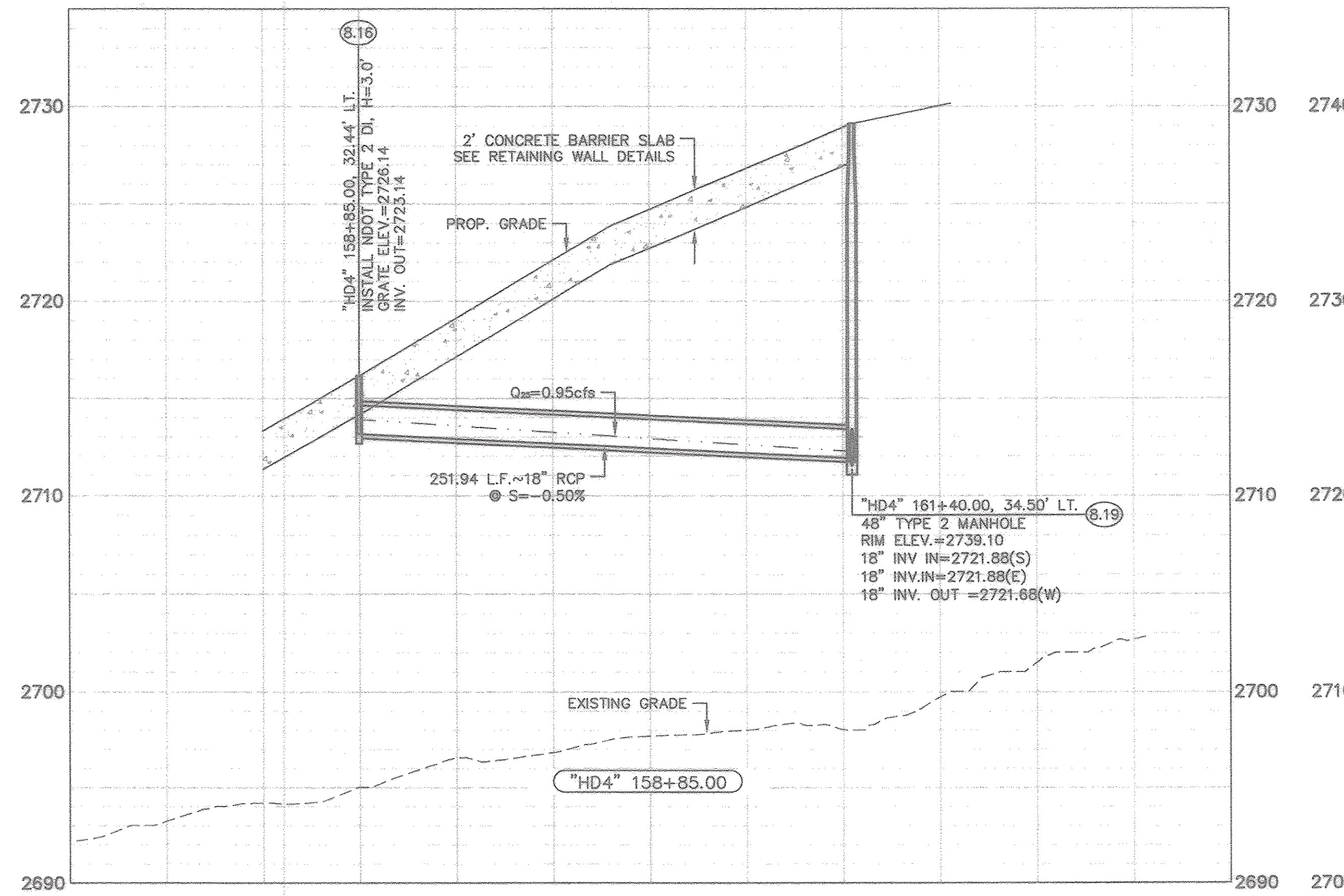
Approved for Construction

Las Vegas Valley Water District Engineering Services Manager

Date: _____ Project No.: 124997
LVVWD Approved Fire Flow _____ GPM at 20 PSI Residual

D.3

**HORSE DRIVE/US 95
INTERCHANGE CONSTRUCTION DRAWINGS
LAS23C08**



EXISTING 36" RCP
DESIGNED FOR Q25=33-CFS

- NOTES:**
1. CONTRACTOR TO VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITY CROSSINGS AND/OR CONFLICTS PRIOR TO EXCAVATION.
 2. CONTRACTOR TO PROTECT EXISTING UTILITIES IN PLACE, UNLESS NOTED OTHERWISE.
 3. SEE SHEET SD39 FOR TYPICAL EXCAVATION & TRENCH DETAILS.

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Call 811
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CLARK COUNTY TYPING OPERATIONS 1-702-455-7644

PUBLIC WORKS DEPARTMENT
CITY OF LAS VEGAS, NV
400 E. STEWART AVE.
LAS VEGAS, NV 89101
702-223-8272

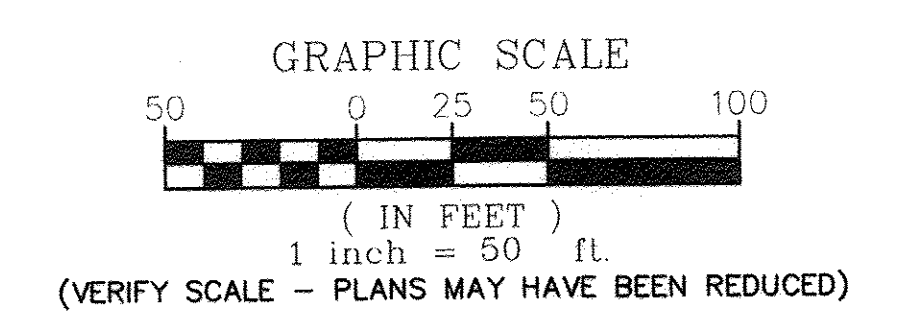
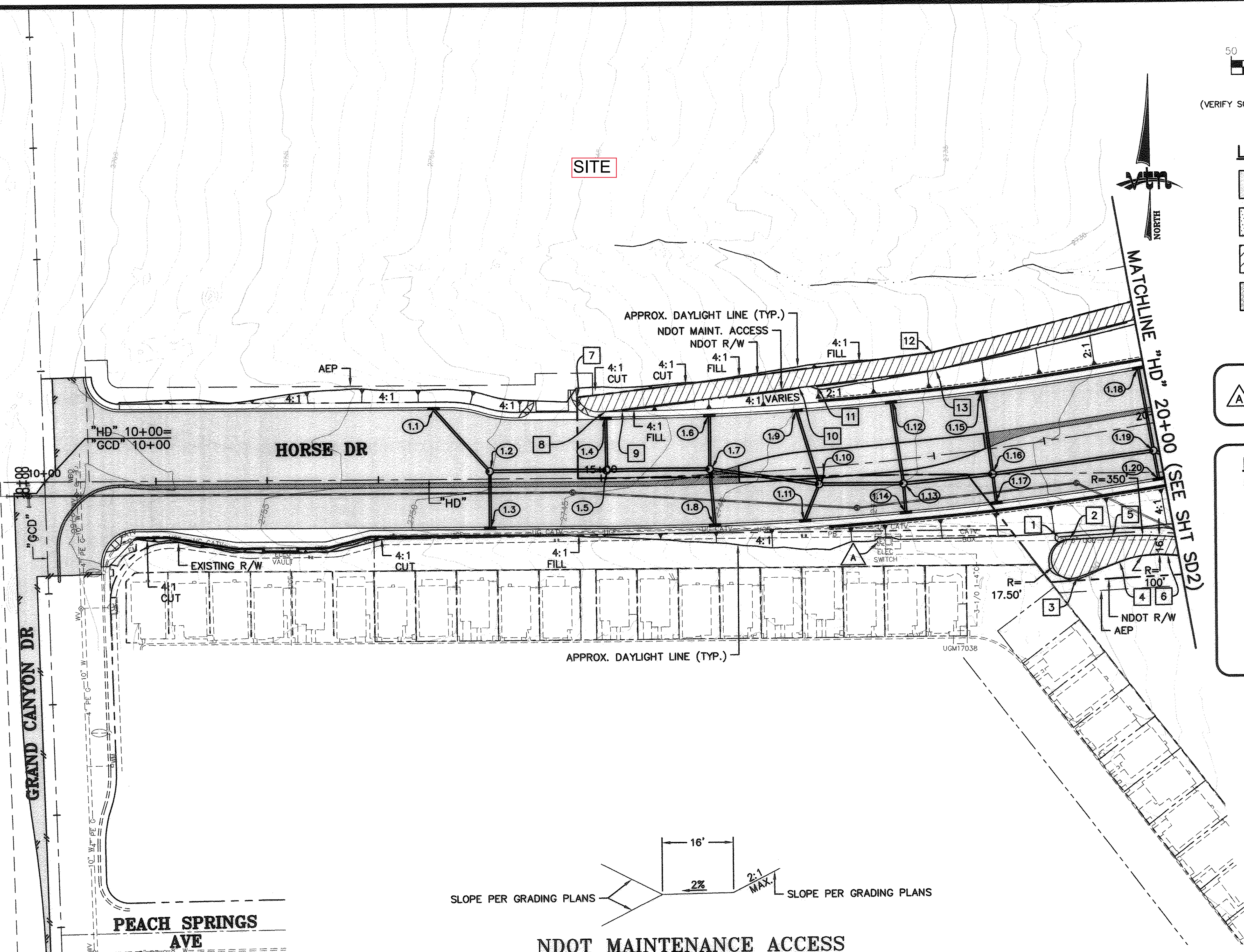
STORM DRAIN PROFILES

HORSE DRIVE / US 95 INTERCHANGE

DRAWN BY: 6/28/2007
DESIGNED BY: 6/28/2007
CHECKED BY: 6/28/2007
PROJECT NO: 107V3759
SCALE: 1"=50' HORIZ.
1"=5' VERT.

107V3759

107V3759



- LEGEND:**
- [Pattern] DENOTES PBS (PLANTMIX BITUMINOUS SURFACE)
 - [Pattern] DENOTES CONCRETE PAVEMENT
 - [Pattern] 16" WIDE NDOT MAINT. ACCESS SEE DETAIL THIS SHEET
 - [Pattern] RIPRAP
 - [Symbol] # GRADING KEYNOTE SEE SHEET SD1A

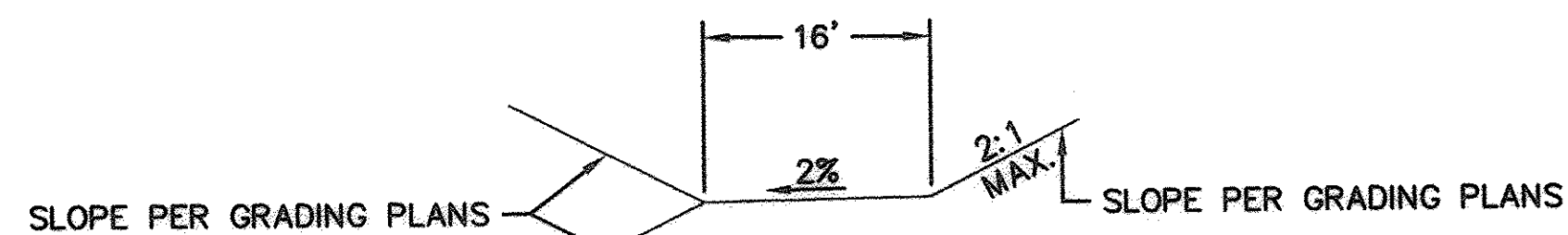
NOTE:
[Symbol] A PROTECT IN PLACE

NOTE:
FOR DRAINAGE & GRADING CONSTRUCTION NOTES SEE SHEET SD1A

FOR UTILITY ADJUSTMENT & RELOCATION SEE SHEET U1 THRU U13

FOR SANITARY SEWER INFORMATION SEE SHEET SS1 THRU SS8

FOR LANDSCAPING INFORMATION SEE LANDSCAPE PLANS



NOTE TO CONTRACTOR REGARDING FINISHED GRADES:
IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ADJUST THE CONCRETE INLET APRON AND/OR GRATE TO THE FINISHED GROUND SURFACE OR TO THE FINISHED GRADE OF THE ROADWAY SURFACE (WHICHEVER IS APPLICABLE). IF THE APRON AND/OR GRATE IS CONSTRUCTED PRIOR TO FINALIZING THE FINISHED GRADE, AND THE APRON EDGES AND CORNERS AND/OR GRATE IS BEYOND 0.02' VERTICAL TOLERANCE TO THE FINISHED GRADE, THE CONTRACTOR SHALL REMOVE AND REPLACE THE APRONS AND/OR GRATE AT HIS OWN EXPENSE TO WITH IN THIS TOLERANCE IF THIS CONDITION OCCURS.

APPROVED
LAS VEGAS VALLEY WATER DISTRICT
LVVWD PROJECT # H80315

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LAS VEGAS VALLEY WATER DISTRICT
Nevada Power Environment and Safety Services Department

PUBLIC WORKS DEPARTMENT				CITY OF LAS VEGAS, NV			
STORM DRAIN AND GRADING PLAN				HORSE DRIVE / US 95 INTERCHANGE			
"HD" 10+00 TO "HD" 20+00				HORSE DRIVE / US 95 INTERCHANGE			
DRAWN BY:	05/30/2008	DESIGNED BY:	05/30/2008	CHECKED BY:	05/30/2008	PROJECT NO:	SCALE: 1"=50'
JR		JLB		UKL		5500	N/A
LANT K. LEAVITT				SHEET SD1			
EXP. 02/10/09				109 OF 453 SHEETS			
CIVIL				DRAWING NO. 107V3759			
NO. 18287							

GRADING KEYNOTES:

KEY NOTE	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	26821816.49	738956.84	2729.10	BEGIN V-DITCH, W/2:1 SS
2	26821813.93	738966.43	2730.31	PC
3	26821779.98	738973.01	2730.81	PT
4	26821793.25	739010.75	2729.25	PC
5	26821815.65	739004.87	2728.97	PC
6	26821798.95	739053.85	2727.42	PT
7	26821951.86	738526.85	2745.84	END MAINT. ROAD
8	26821938.39	738552.06	2734.76	HORIZ. ANG. POINT
9	26821938.93	738566.95	2744.58	DITCH - GB
10	26821956.64	738727.75	2739.04	DITCH - GB
11	26821957.51	738736.10	2738.78	DITCH - GB
12	26821985.11	738846.90	2735.12	HORIZ. ANG. POINT/DITCH - GB
13	26821969.30	738849.55	2745.01	END MAINT. ROAD

DRAINAGE CONSTRUCTION NOTES:

- 1.1

"HD" 13+50.00, 64.50' LT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 70.55 L.F. 18" RCP
SEE SHEET SD23
- 1.2

"HD" 14+00.00, 7.00' LT.
INSTALL 72" NDOT TYPE 2 MANHOLE
(PER NDOT STD. DWG. R-4.3.1)
INSTALL 98.94 L.F. 24" RCP
SEE SHEET SD22 & SD23
- 1.3

"HD" 14+00.00, 44.50' RT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 45.50 L.F. 18" RCP
SEE SHEET SD23
- 1.4

"HD" 15+05.00, 54.40' LT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 41.40 L.F. 18" RCP
SEE SHEET SD23
- 1.5

"HD" 15+05.00, 7.00' LT.
INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE
(PER NDOT STD. DWG. R-4.3.1)
INSTALL 86.83 L.F. 24" RCP
SEE SHEET SD22 & SD23
- 1.6

"HD" 16+00.00, 53.86' LT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 42.91 L.F. 18" RCP
SEE SHEET SD23
- 1.7

"HD" 15+98.00, 5.00' LT.
INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE
(PER NDOT STD. DWG. R-4.3.1)
INSTALL 93.19 L.F. 24" RCP
SEE SHEET SD22 & SD23
- 1.8

"HD" 16+00.00, 46.11' RT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 45.14 L.F. 18" RCP
SEE SHEET SD23
- 1.9

"HD" 16+80.00, 53.40' LT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 64.04 L.F. 18" RCP
SEE SHEET SD23
- 1.10

"HD" 16+95.00, 15.00' RT.
INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE
(PER NDOT STD. DWG. R-4.3.1)
INSTALL 69.34 L.F. 24" RCP
SEE SHEET SD22 & SD23
- 1.11

"HD" 16+80.00, 47.17' RT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 29.69 L.F. 18" RCP
SEE SHEET SD23
- 1.12

"HD" 17+66.72, 52.91' LT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 68.83 L.F. 18" RCP
SEE SHEET SD23
- 1.13

"HD" 17+70.00, 21.85' RT.
INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE
(PER NDOT STD. DWG. R-4.3.1)
INSTALL 75.03 L.F. 24" RCP
SEE SHEET SD22 & SD23
- 1.14

"HD" 17+69.53, 48.36' RT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 20.51 L.F. 18" RCP
SEE SHEET SD23
- 1.15

"HD" 18+50.00, 52.43' LT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 69.25 L.F. 18" RCP
SEE SHEET SD23
- 1.16

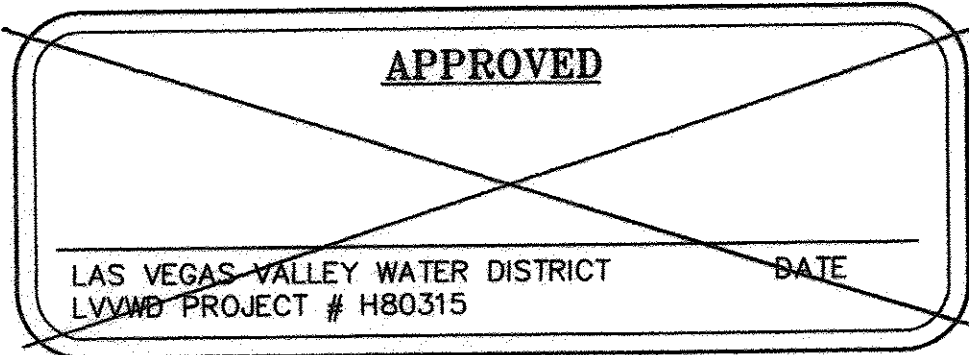
"HD" 18+50.00, 22.92' RT.
INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE
(PER NDOT STD. DWG. R-4.3.1)
INSTALL 140.16 L.F. 24" RCP
SEE SHEET SD22 & SD23
- 1.17

"HD" 18+50.00, 49.42' RT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 20.51 L.F. 18" RCP
SEE SHEET SD23
- 1.18

"HD" 19+95.00, 51.60' LT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 70.44 L.F. 18" RCP
SEE SHEET SD23
- 1.19

"HD" 19+95.00, 24.84' RT.
INSTALL 72" NDOT TYPE 2 MANHOLE
(PER NDOT STD. DWG. R-4.3.1)
INSTALL 107.74 L.F. 24" RCP
SEE SHEET SD22 & SD23
- 1.20

"HD" 19+95.00, 51.34' RT.
INSTALL NDOT TYPE 3 DROP INLET
(PER NDOT STD. DWG. R-4.2.3)
INSTALL 20.40 L.F. 18" RCP
SEE SHEET SD23



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OR
1-702-455-7844

PUBLIC WORKS DEPARTMENT

400 E. STEWART AVE.
LAS VEGAS, NV 89101
702-228-8272

STORM DRAIN AND
GRADING PLAN NOTES
"HD" 10+00 TO "HD" 20+00

HORSE DRIVE / US 95
INTERCHANGE

DRAWN BY:
JR

DESIGNED BY:
JLB

CHECKED BY:
LKL

PROJECT NO.
S550

06/30/2008

06/30/2008

06/30/2008

SCALE: 1"=50'
N/A

PROFESSIONAL ENGINEER

LANT K. LEAVITT
EXP. 12/31/08
CIVIL
No. 18287

7/1/08

SHEET
SD1A
110 OF 133 SHEETS

DRAWING NO.
107V3759

REVISION

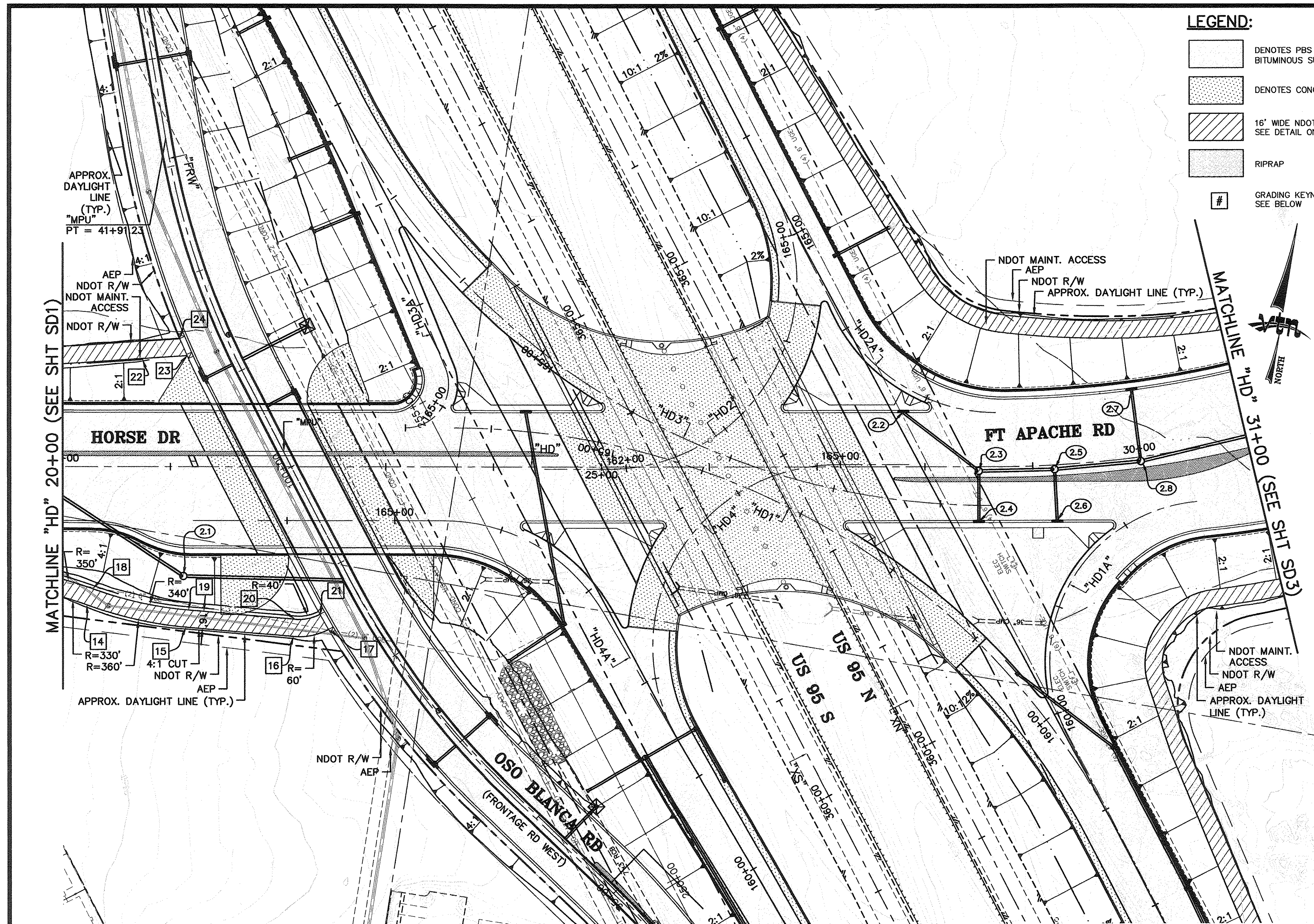
BY

DATE

REV

277 SOUTH RANCHO BOULEVARD LAS VEGAS, NEVADA 89146-5148
PH (702) 873-7500 FAX (702) 862-2597
nevada CONSULTING ENGINEERS & PLANNERS & LAND SURVEYORS

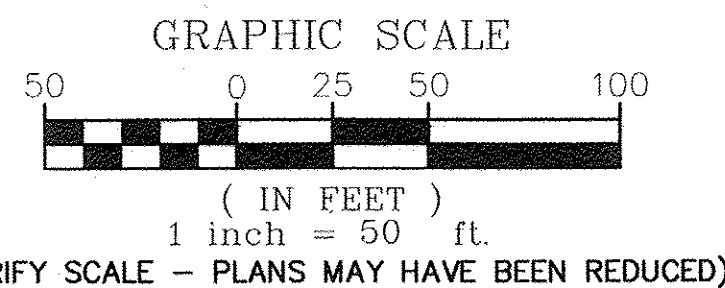
I:\6560.DWG DESIGN\6560-SD-HORSE.dwg



LEGEND:

- DENOTES PBS (PLANTMIX BITUMINOUS SURFACE)
- DENOTES CONCRETE PAVEMENT
- 16' WIDE NDOT MAINT. ACCESS SEE DETAIL ON SHEET SD1
- RIPRAP
- GRADING KEYNOTE SEE BELOW

NOTE:
PROTECT IN PLACE



DRAINAGE CONSTRUCTION NOTES:

- "HD" 20+90.00, 87.30' RT. INSTALL 72" NDOT TYPE 2 MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 160.82 L.F. 24" RCP SEE SHEET SD22
- "HD" 27+80.00, 51.50' LT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 83.88 L.F. 18" RCP SEE SHEET SD24
- "HD" 28+50.00, 4.00' RT. INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 64.20 L.F. 24" RCP SEE SHEET SD24
- "HD" 28+50.00, 51.50' RT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 41.50 L.F. 18" RCP SEE SHEET SD24
- "HD" 29+20.00, 4.00' RT. INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 74.29 L.F. 24" RCP SEE SHEET SD24
- "HD" 29+20.00, 52.90' RT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 42.90 L.F. 18" RCP SEE SHEET SD24
- "HD" 30+00.00, 63.50' LT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 61.51 L.F. 18" RCP SEE SHEET SD25
- "HD" 30+00.00, 4.00' RT. INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 194.47 L.F. 24" RCP SEE SHEET SD24 & SD25

NOTE:

FOR UTILITY ADJUSTMENT & RELOCATION SEE SHEET U1 THRU U13

FOR SANITARY SEWER INFORMATION SEE SHEET SS1 THRU SS8

FOR LANDSCAPING INFORMATION SEE LANDSCAPE PLANS

FOR DRAINAGE & GRADING IMPROVEMENTS NOT REFERENCED ON THIS SHEET SEE SHEET SD8 & SD9

FOR "FRW" BRIDGE SLOPED CONCRETE PAVEMENT DETAILS SEE SHEET C23

GRADING KEYNOTES:

KEY NOTE	NORTHING	EASTING	ELEVATION	DESCRIPTION
14	26821794.16	739088.01	2726.08	PRC
15	26821788.71	739181.81	2723.19	PT
16	26821796.38	739281.38	2719.37	PT
17	26821808.14	739312.40	2716.31	END MAINT. ROAD/PT
18	26821809.99	739090.41	2725.78	PRC
19	26821804.72	739181.35	2722.85	PT

KEY NOTE	NORTHING	EASTING	ELEVATION	DESCRIPTION
20	26821812.35	739280.26	2719.05	PC
21	26821820.58	739302.32	2716.61	END MAINT. ROAD/PT
22	26822027.00	739102.03	2724.50	DITCH - GB
23	26822037.34	739142.08	2721.89	END MAINT. ROAD
24	26822051.61	739132.79	2722.22	END MAINT. ROAD

NOTE TO CONTRACTOR REGARDING FINISHED GRADES:

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ADJUST THE CONCRETE INLET APRON AND/OR GRATE TO THE FINISHED GROUND SURFACE OR TO THE FINISHED GRADE OF THE ROADWAY SURFACE (WHICHEVER IS APPLICABLE). IF THE APRON AND/OR GRATE IS CONSTRUCTED PRIOR TO FINALIZING THE FINISHED GRADE, AND THE APRON EDGES AND CORNERS AND/OR GRATE IS BEYOND 0.02' VERTICAL TOLERANCE TO THE FINISHED GRADE, THE CONTRACTOR SHALL REMOVE AND REPLACE THE APRONS AND/OR GRATE AT HIS OWN EXPENSE TO WITHIN THIS TOLERANCE IF THIS CONDITION OCCURS.

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CLARK COUNTY TRAFFIC OPERATIONS
1-702-456-7544

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CITY OF LAS VEGAS, NV
277 SOUTH RAINBOW BOULEVARD LAS VEGAS, NEVADA 89146-5048
PH (702) 875-1550 FAX (702) 382-2587
nevada consulting engineers • PLANNERS • LAND SURVEYORS

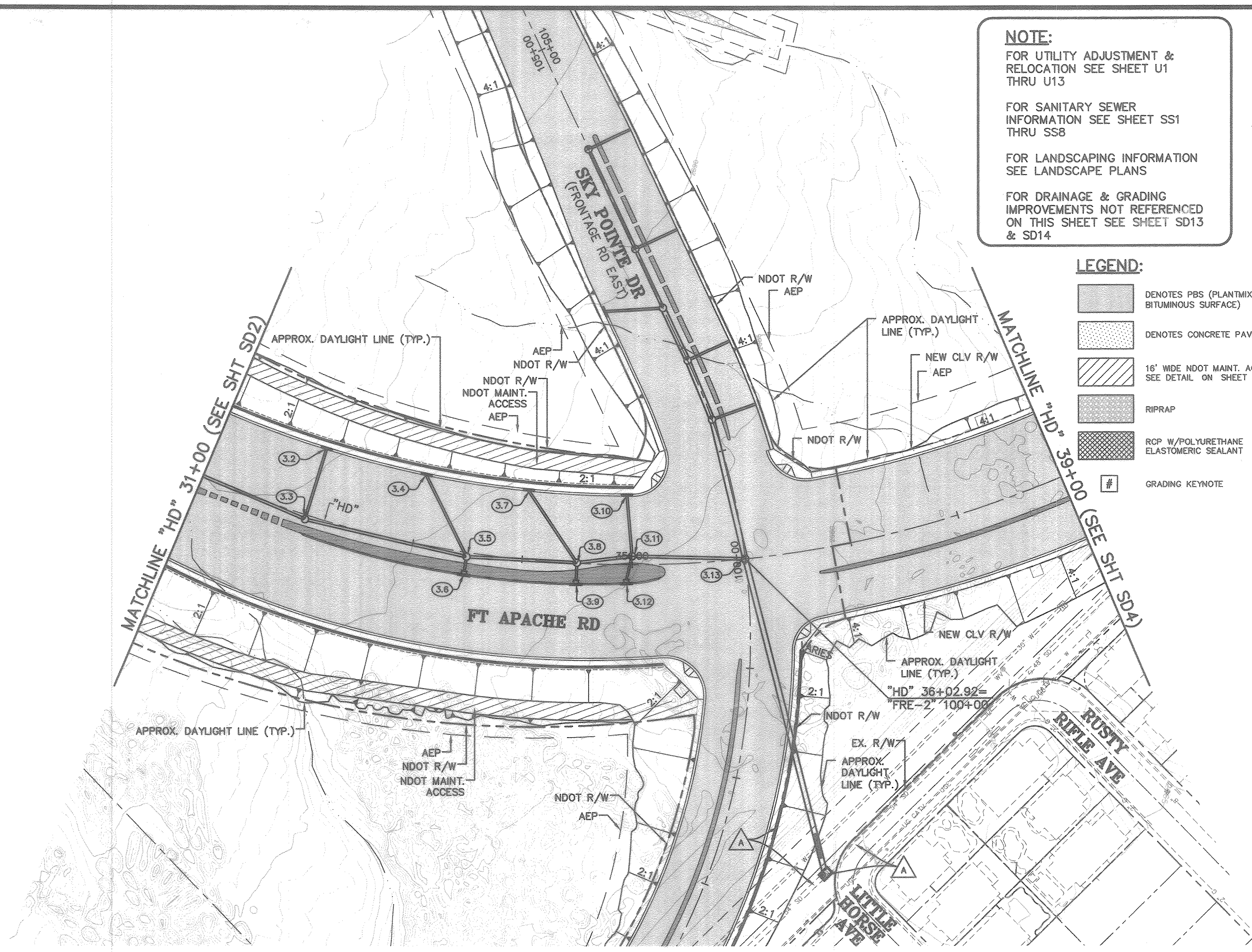
STORM DRAIN AND GRADING PLAN
"HD" 20+00 TO "HD" 31+00
HORSE DRIVE / US 95 INTERCHANGE

DRAWN BY: JLB
DESIGNED BY: JLB
CHECKED BY: JLB
PROJECT NO: 6500
SCALE: 1"=50' N/A

DATE: 06/10/2008
DATE: 06/10/2008
DATE: 06/10/2008

SHEET SD2
OF SHEETS
DRAWING NO. 107V3759

REVISION
DATE
BY
REV
05/10/10
LW
REVISED DURING CONSTRUCTION

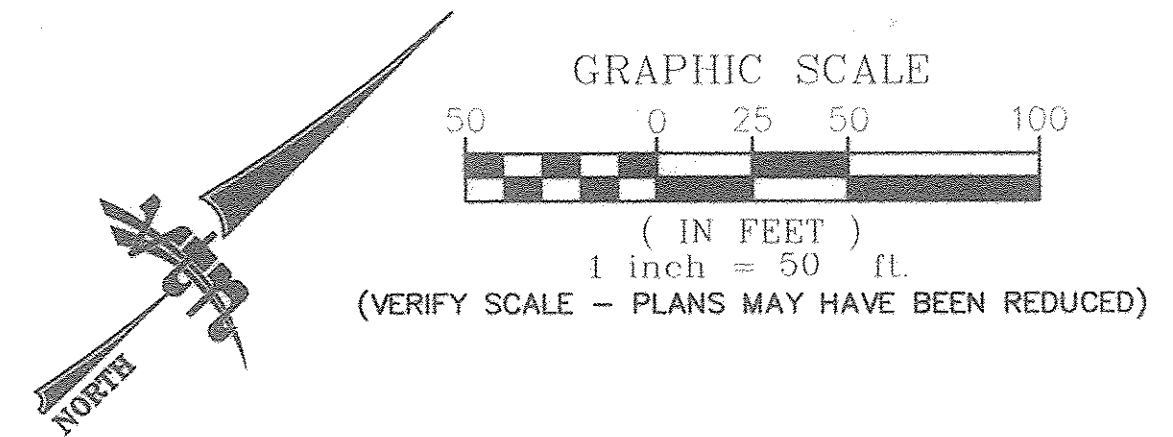


NOTE:
FOR UTILITY ADJUSTMENT & RELOCATION SEE SHEET U1 THRU U13

FOR SANITARY SEWER INFORMATION SEE SHEET SS1 THRU SS8

FOR LANDSCAPING INFORMATION SEE LANDSCAPE PLANS

FOR DRAINAGE & GRADING IMPROVEMENTS NOT REFERENCED ON THIS SHEET SEE SHEET SD13 & SD14



- LEGEND:**
- [Pattern] DENOTES PBS (PLANTMIX BITUMINOUS SURFACE)
 - [Pattern] DENOTES CONCRETE PAVEMENT
 - [Pattern] 16' WIDE NDOT MAINT. ACCESS SEE DETAIL ON SHEET SD1
 - [Pattern] RIPRAP
 - [Pattern] RCP W/POLYURETHANE ELASTOMERIC SEALANT
 - [Symbol] # GRADING KEYNOTE

DRAINAGE CONSTRUCTION NOTES:

- (3.1) NOTE NOT USED
- (3.2) "HD" 32+00.00, 63.50' LT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 61.52 L.F. 18" RCP SEE SHEET SD25
- (3.3) "HD" 32+00.00, 4.00' RT. INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 144.46 L.F. 24" RCP SEE SHEET SD24 & SD25
- (3.4) "HD" 33+00.00, 63.50' LT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 77.42 L.F. 18" RCP SEE SHEET SD25
- (3.5) "HD" 33+50.00, 4.00' RT. INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 94.23 L.F. 24" RCP SEE SHEET SD24 & SD25
- (3.6) "HD" 33+50.00, 20.36' RT. INSTALL 8" TYPE "A" DROP INLET INSTALL 10.35 L.F. 18" RCP SEE SHEET SD25
- (3.7) "HD" 34+00.00, 63.50' LT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 73.78 L.F. 18" RCP SEE SHEET SD25
- (3.8) "HD" 34+50.00, 0.50' LT. INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 44.32 L.F. 24" RCP SEE SHEET SD24 & SD25
- (3.9) "HD" 34+50.00, 18.50' RT. INSTALL 8" TYPE "A" DROP INLET INSTALL 13.01 L.F. 18" RCP SEE SHEET SD25
- (3.10) "HD" 34+95.00, 63.50' LT. INSTALL NDOT TYPE 3 DROP INLET (PER NDOT STD. DWG. R-4.2.3) INSTALL 49.97 L.F. 18" RCP SEE SHEET SD25
- (3.11) "HD" 35+00.00, 7.75' LT. INSTALL NDOT 72" TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) INSTALL 97.13 L.F. 24" RCP SEE SHEET SD24 & SD25
- (3.12) "HD" 34+95.00, 16.67' RT. INSTALL 8" TYPE "A" DROP INLET INSTALL 19.03 L.F. 18" RCP SEE SHEET SD25
- (3.13) "HD" 36+02.92, 0' RT. = "FRE-2" 100+00.00, 0' RT. INSTALL 72" NDOT TYPE 2 MODIFIED MANHOLE (PER NDOT STD. DWG. R-4.3.1) (SAME AS NOTE #13.8) SEE SHEET SD24 & SD31

NOTE TO CONTRACTOR REGARDING FINISHED GRADES:
IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ADJUST THE CONCRETE INLET APRON AND/OR GRATE TO THE FINISHED GROUND SURFACE OR TO THE FINISHED GRADE OF THE ROADWAY SURFACE (WHICHEVER IS APPLICABLE). IF THE APRON AND/OR GRATE IS CONSTRUCTED PRIOR TO FINALIZING THE FINISHED GRADE, AND THE APRON EDGES AND CORNERS AND/OR GRATE IS BEYOND 0.02' VERTICAL TOLERANCE TO THE FINISHED GRADE, THE CONTRACTOR SHALL REMOVE AND REPLACE THE APRONS AND/OR GRATE AT HIS OWN EXPENSE TO WITH IN THIS TOLERANCE IF THIS CONDITION OCCURS.

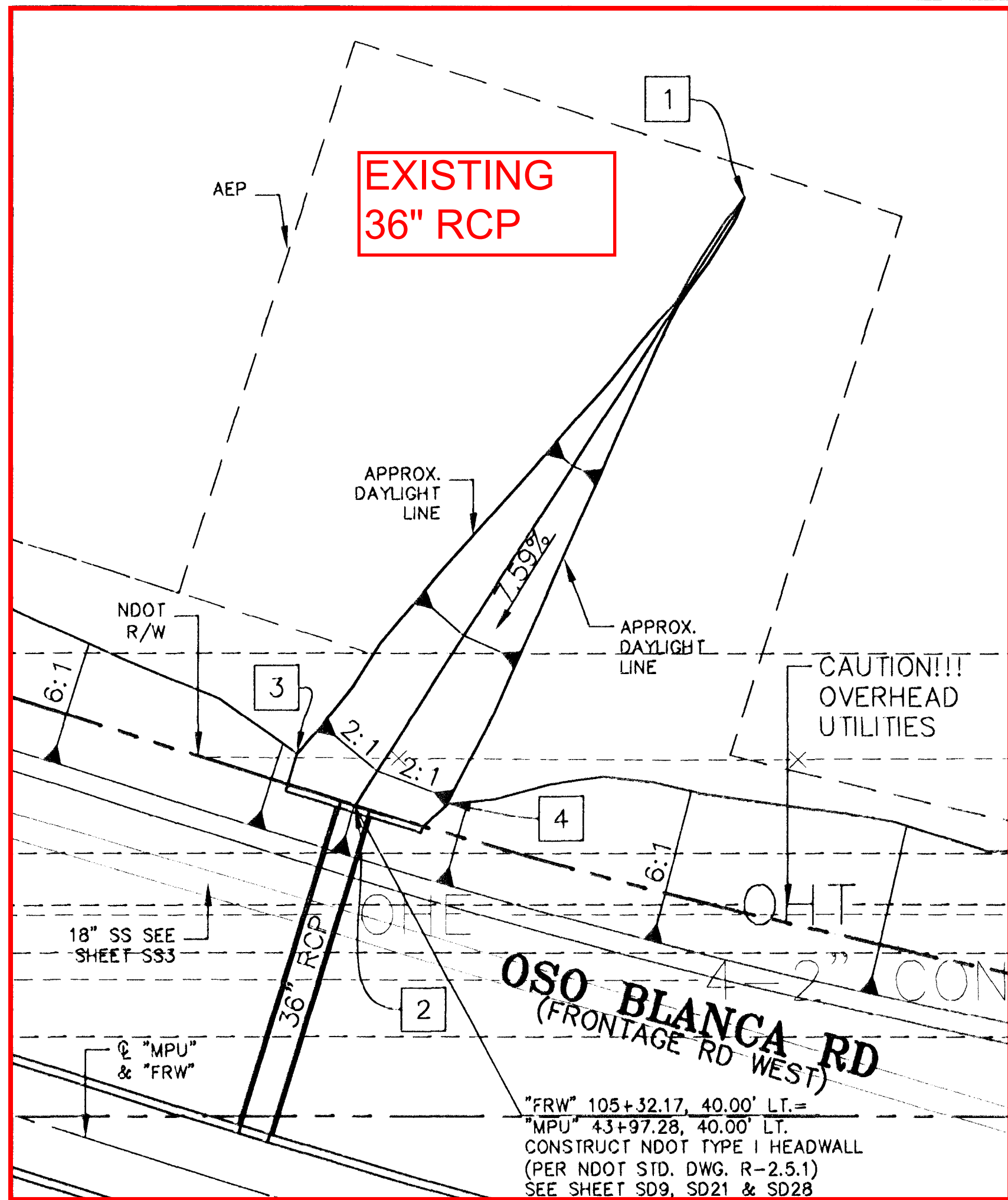
NOTE:
A PROTECT IN PLACE

APPROVED
[Signature] 7/14/08
LAS VEGAS VALLEY WATER DISTRICT
LVMWD PROJECT # H80315
DATE

Call before you Dig
1-702-227-2029
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

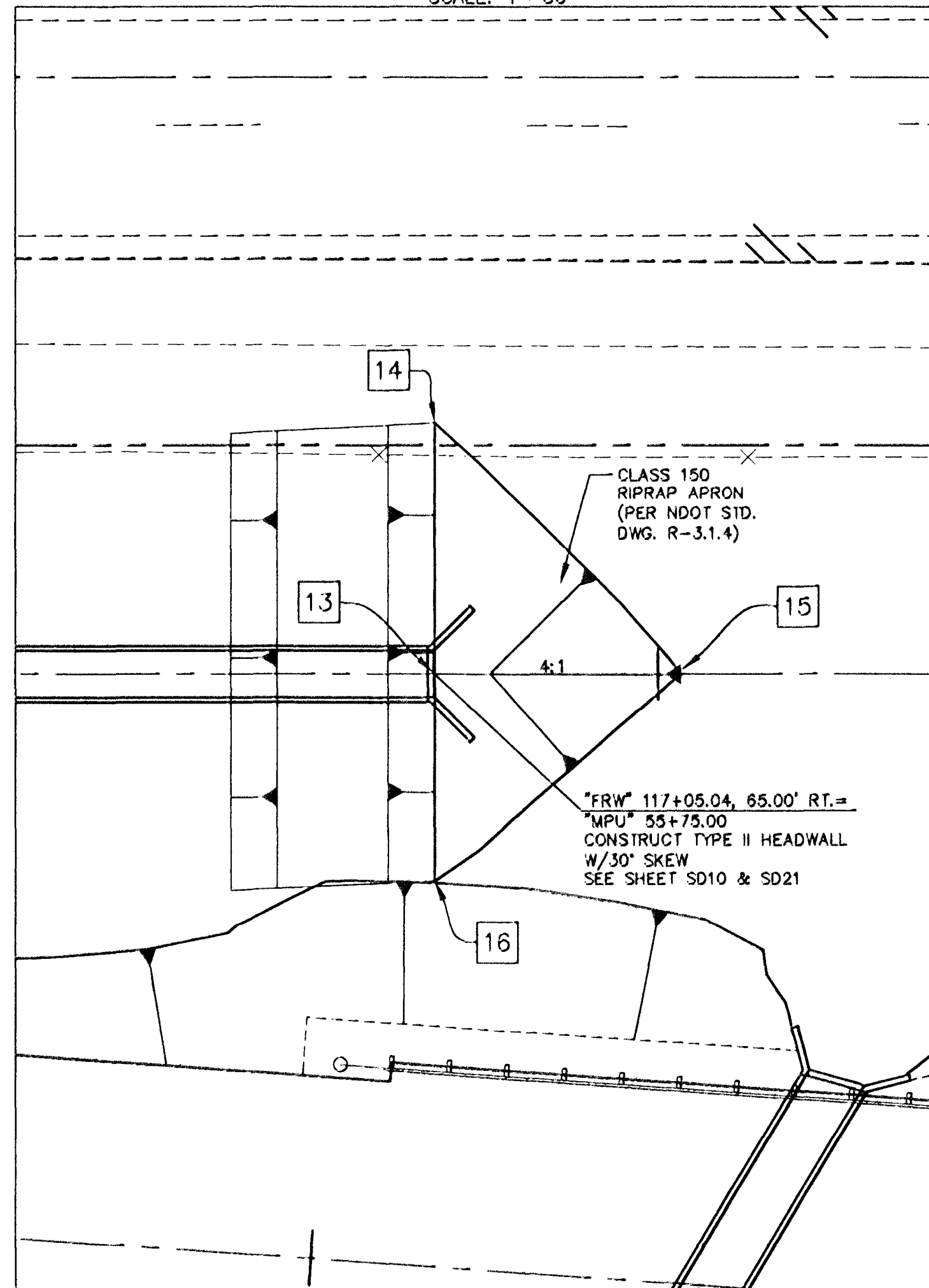
Call 811
1-800-227-8800
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

PUBLIC WORKS DEPARTMENT LAS VEGAS, NV 702-227-6272		CITY OF LAS VEGAS, NV 277 SOUTH RAINBOW BOULEVARD LAS VEGAS, NEVADA 89146-5148 PH (702) 877-7550 FAX (702) 352-2587 nevada CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS	
STORM DRAIN AND GRADING PLAN "HD" 31+00 TO "HD" 39+00		HORSE DRIVE / US 95 INTERCHANGE	
DRAWN BY: 08/20/2008	DESIGNED BY: 08/20/2008	CHECKED BY: 08/20/2008	PROJECT NO: SCALE: 1"=50' HORIZ. VERT. N/A
SHEET SD3		112 OF 153 SHEETS	
DRAWING NO. 107V3759			



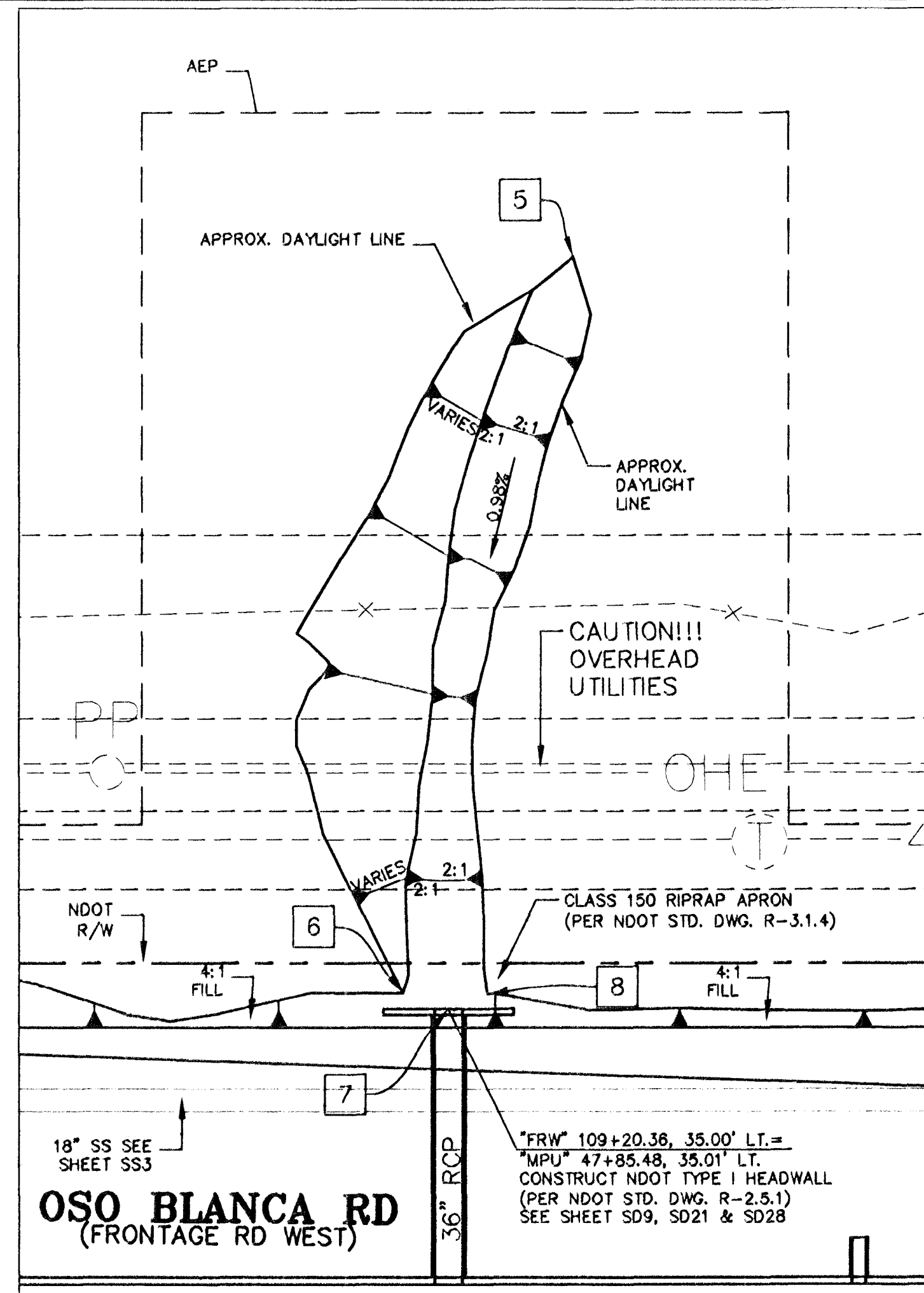
GRADING DETAIL STRUCTURE 9.4

SCALE: 1"=30'



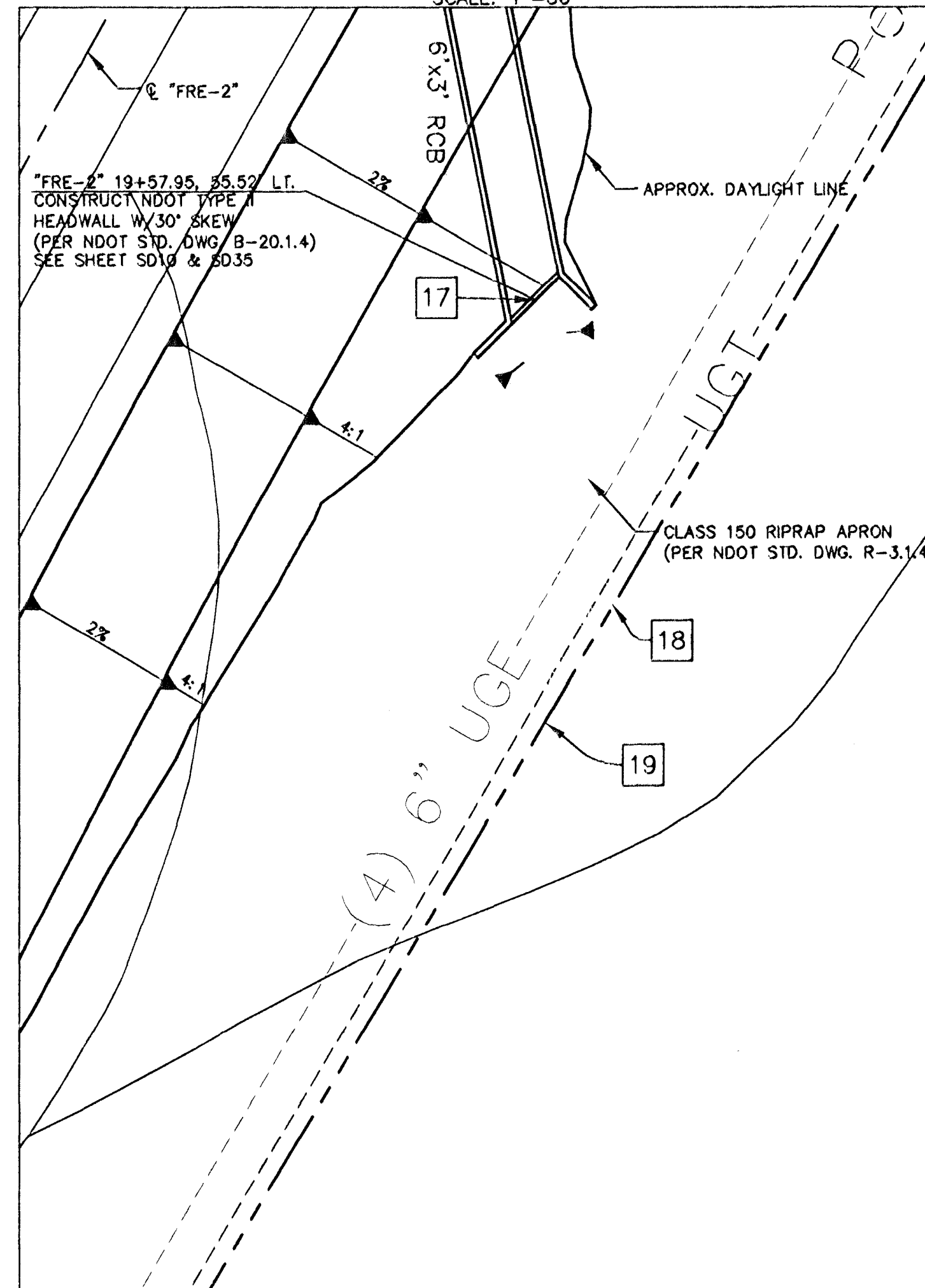
GRADING DETAIL STRUCTURE 10.4

SCALE: 1"=30'



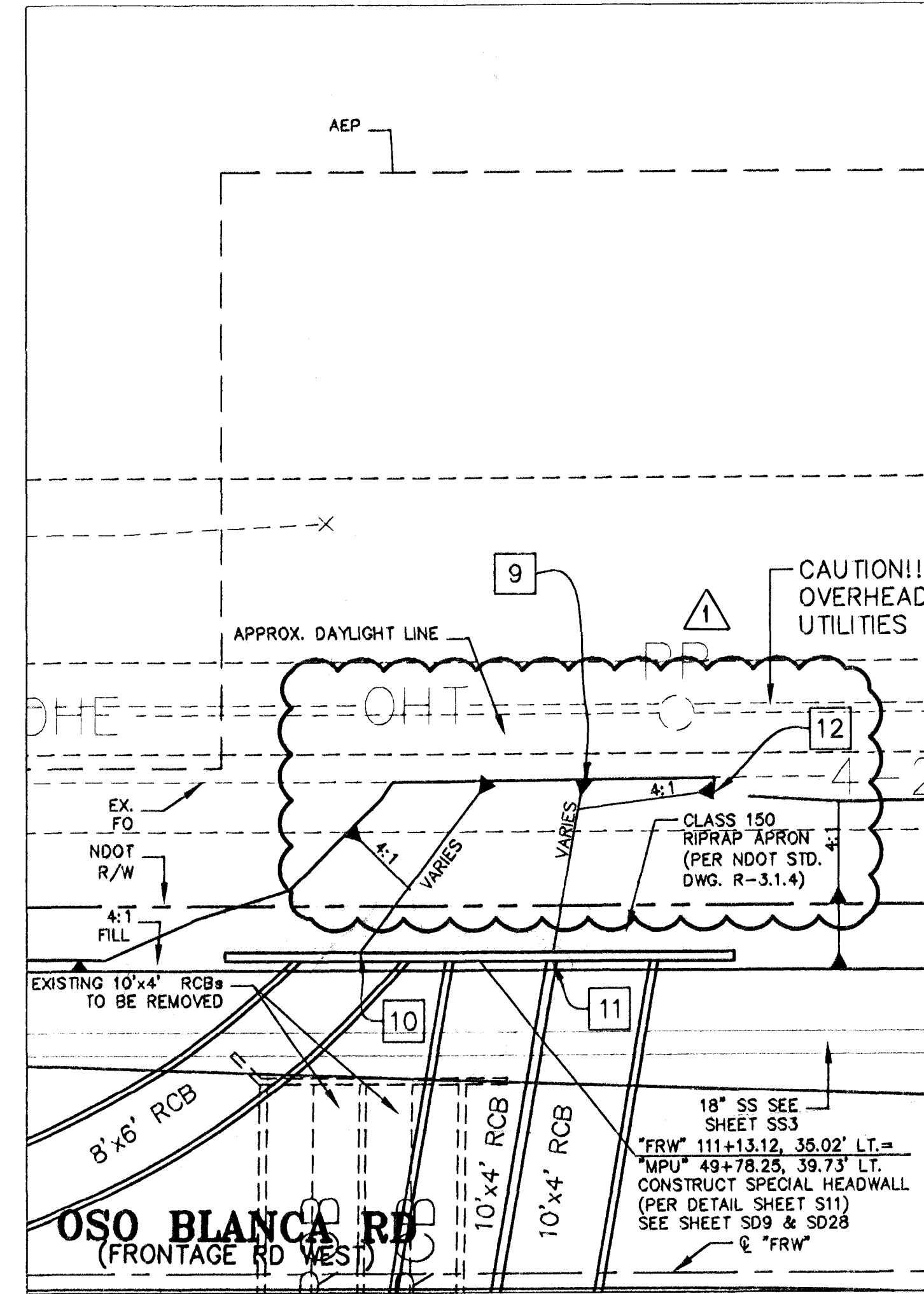
GRADING DETAIL STRUCTURE 9.11

SCALE: 1"=30'



GRADING DETAIL STRUCTURE 10.4

SCALE: 1"=30'



GRADING DETAIL STRUCTURE 9.18

SCALE: 1"=30'

GRADING NOTES:
FOR GRADING KEYNOTES SEE SHEET SD38.

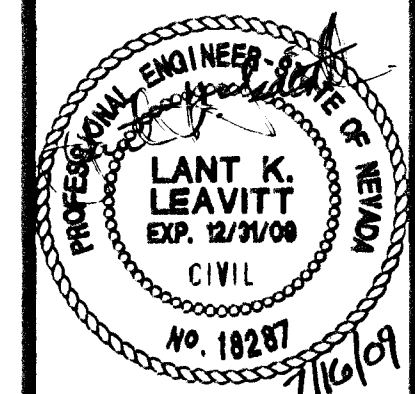
GEOTEXTILE FILTER FABRIC PER SPECIFICATIONS.

NOTES:

- CONTRACTOR TO VERIFY ALL HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING UTILITY CROSSINGS AND/OR CONFLICTS PRIOR TO EXCAVATION.
- CONTRACTOR TO PROTECT EXISTING UTILITIES IN PLACE, UNLESS NOTED OTHERWISE.
- SEE SHEET SD39 FOR TYPICAL EXCAVATION & TRENCH DETAILS.

Call before you Overhead
1-702-227-2929
NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT

Call before you Dig
1-800-227-2800
CLARK COUNTY PUBLIC UTILITIES DEPARTMENT



SHEET
SD37
OF
SHEETS
DRAWING NO.
107V3759

PUBLIC WORKS DEPARTMENT

CITY OF LAS VEGAS, NV

4400 E. STEWART AVE.
LAS VEGAS, NV 89101
702-228-0272

2777 SOUTH RANCHO BOULEVARD LAS VEGAS, NEVADA 89146-5148
PH: (702) 873-7500 FAX: (702) 362-2867

mt Nevada CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS

GRADING DETAILS

HORSE DRIVE / US 95 INTERCHANGE

DRAWN BY: 6/30/2008

DESIGNED BY: 6/30/2008

CHECKED BY: 6/30/2008

PROJECT NO: SCALE: 1"=50' HORIZ. VERT. N/A

REVISIONS DURING CONSTRUCTION

1:65000 (DWG) DESIGN 65500-SD-MARKING

D.4

**GRAND CANYON APARTMENTS PARCEL MAP STUDY
DS5175**

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		August 27, 2019
TO: Land Development Services Department of Building & Safety		FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT: Drainage Study for: Grand Canyon Apartments – Parcel Map		COPIES TO: VTN Nevada
Cross Streets:	Grand Canyon Drive & Skye Canyon Park Drive	Warmington Apartment Communities
File Number:	F:\Depot\DSMemos\DS5175A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-07-201-004, 125-07-601-006, 125-07-101-008	CCRFCD
Zoning Action:	PMP-76472	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	8/7/2019 & 8/19/2019	8/26/2019	See Comments Below	\$400.00	3518614: \$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:
	must be resubmitted or supplemented including the following:
X	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works concurrence.

1. This technical drainage study is for the mapping of the subject site. Future development of the subject site will require a technical drainage study update(s).

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

jks

T/R/S: T19S/R60E/07
AREA G-07

REGIONAL FLOOD CONTROL DISTRICT



Steven C. Parrish, P.E.
General Manager/Chief
Engineer

September 12, 2019

BOARD OF DIRECTORS

Lawrence L. Brown, III
Chair
Clark County

Mayor Debra March
Vice-Chair
City of Henderson

George Gault
City of Mesquite

James B. Gibson
Clark County

Mayor Carolyn Goodman
City of Las Vegas

Stavros Anthony
City of Las Vegas

Isaac Barron
City of North Las Vegas

Mayor Kieman McManus
City of Boulder City

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

**DISTRICT CONCURRENCE: GRAND CANYON APARTMENTS - PARCEL MAP
(DS5175A) (RFCN No. 19-11351)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated August 7, and 2019, and Supplement No. 1 dated August 16, 2019 for above-mentioned project as submitted by VTN NEVADA. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated August 27, 2019.

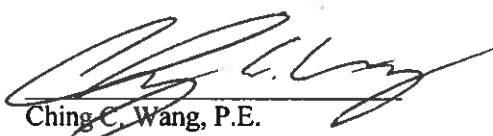
District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works.

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

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

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

BY:


Ching C. Wang, P.E.
Senior Civil Engineer

CCW:dd

c: Paul L. Morton, P.E., VTN Nevada

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2019\L-19-11351.doc

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 05AUG19 TIME 14:19:31
*
*****

EX-GCA.OUT

*****
*
* 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   X
XXXXXX XXXX X   XXXX X
X   X X   X   X   X
X   X X   X   X   X
X   X XXXXXX XXXX   XXX

```

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

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

1 HEC-1 INPUT PAGE 1

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

*DIAGRAM

*** FREE ***

```

1 ID EXISTING CONDITION HYDROLOGIC MODEL
2 ID INPUT FILE DATE = AUG 5, 2019
3 ID DESIGN STORM = 100-YEAR 6-HR STORM
4 ID STORM DISTRIBUTION = SDN #3
5 ID MODELED BY VTN (ACY)
6 ID
7 ID
8 ID * GRAND CANYON APARTMENTS *
9 ID *****
10 ID
11 ID
12 ID AREA DARF DARF
13 ID SQ. MI. 100-Year 10-Year
14 ID 0-0.5 1.00 0.58
15 ID
16 ID
17 ID 100-YEAR, 6-HOUR STORM, SDN3
18 ID
19 IT 5 0 0 300
20 IN 5 0 0
21 IO 5 0 0
22 JR PREC .55 1.000
*

```

```

23 KK EX1
24 KM ONSITE UNDEVELOPED BASIN
25 BA 0.0130
26 PB 2.90
27 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
28 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
29 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
30 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
31 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
32 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
33 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
34 PC .998 .999 1.00
35 LS 0 88.0
36 UD 0.152
*

```

```

37 KK EX2
38 KM ONSITE UNDEVELOPED BASIN
39 BA 0.0049
40 LS 0 88.0
41 UD 0.147
*

```

```

42 KK EX3
43 KM ONSITE UNDEVELOPED BASIN

```

44 BA 0.0102
 45 LS 0 88.0
 46 UD 0.155
 *

1

HEC-1 INPUT

PAGE 2

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

47 KK EX4
 48 KM COMBINE ON2I AND ON3I
 49 BA 0.0095
 50 LS 0 88.0
 51 UD 0.169
 52 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

23 EX1
 .
 .
 37 . EX2
 .
 .
 42 . EX3
 .
 .
 47 . EX4
 .

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****
 *
 * FLOOD HYDROGRAPH PACKAGE (HEC-1) *
 * JUN 1998 *
 * VERSION 4.1 *
 *
 * RUN DATE 05AUG19 TIME 14:19:31 *
 *

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

EXISTING CONDITION HYDROLOGIC MODEL
 INPUT FILE DATE = AUG 5, 2019
 DESIGN STORM = 100-YEAR 6-HR STORM
 STORM DISTRIBUTION = SDN #3
 MODELED BY VTN (ACY)

 * GRAND CANYON APARTMENTS *

AREA	DARF	DARF
SQ. MI.	100-Year	10-Year
0-0.5	1.00	0.58

100-YEAR, 6-HOUR STORM, SDN3

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

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

COMPUTATION INTERVAL .08 HOURS
 TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS
 DRAINAGE AREA SQUARE MILES
 PRECIPITATION DEPTH INCHES
 LENGTH, ELEVATION FEET
 FLOW CUBIC FEET PER SECOND

EX-GCA.OUT

STORAGE VOLUME
SURFACE AREA
TEMPERATURE

ACRE-FEET
ACRES
DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

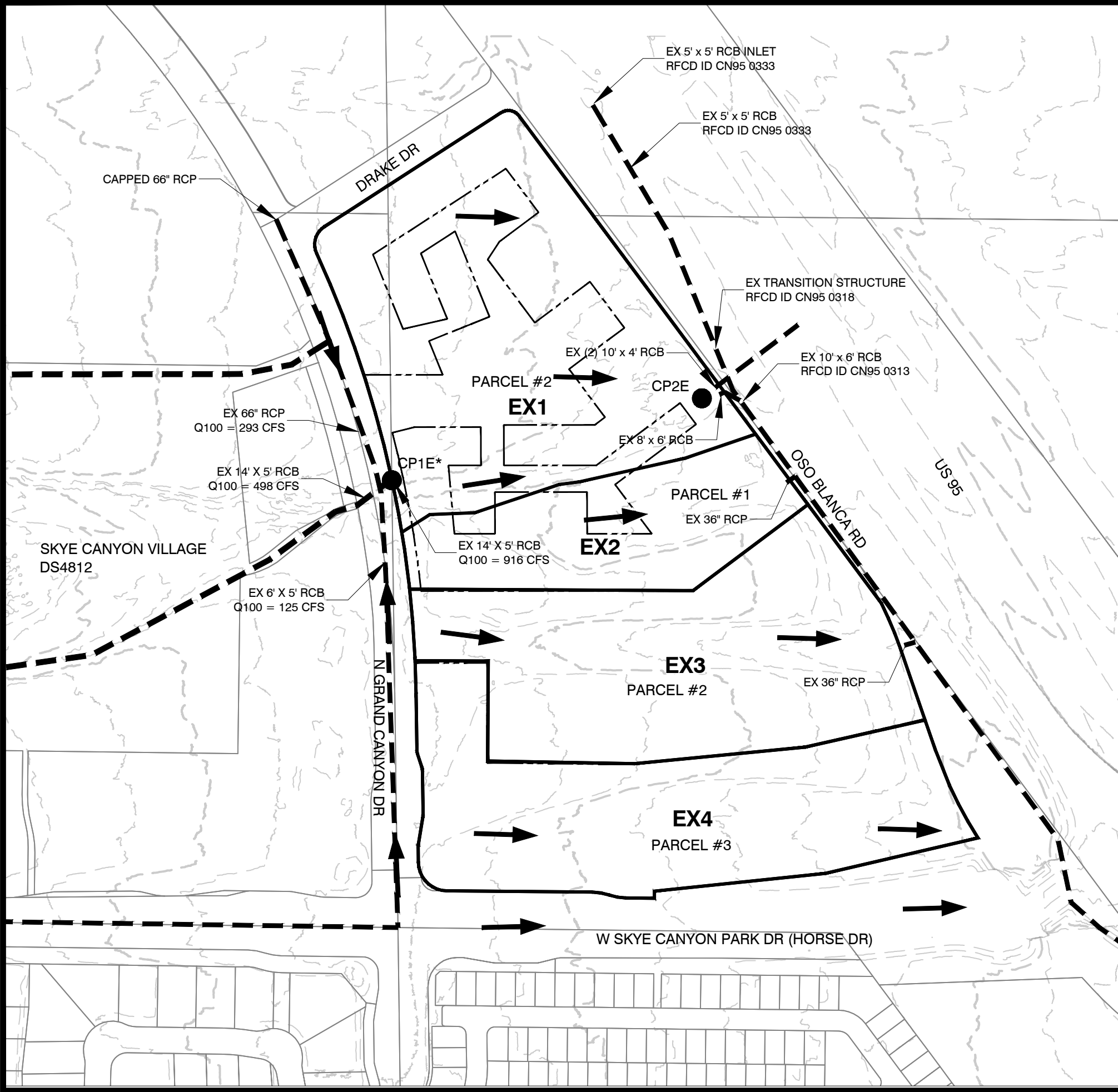
JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.55 1.00

1

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

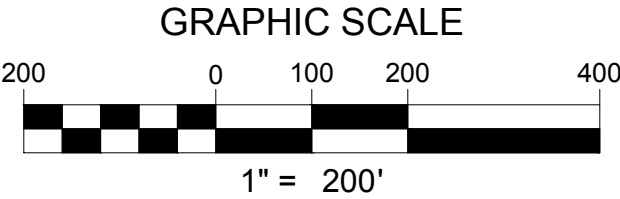
OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1 .55	RATIO 2 1.00
HYDROGRAPH AT +	EX1	.01	1 FLOW TIME	7. 3.58	19. 3.58
HYDROGRAPH AT +	EX2	.00	1 FLOW TIME	3. 3.58	7. 3.58
HYDROGRAPH AT +	EX3	.01	1 FLOW TIME	6. 3.58	15. 3.58
HYDROGRAPH AT +	EX4	.01	1 FLOW TIME	5. 3.58	13. 3.58

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



EXISTING CONDITION HEC-1 SUMMARY TABLE			
Basin ID	Area (ac)	Q10 (cfs)	Q100 (cfs)
CP1E*	-	-	916
EX1	8.34	7	19
CP2E (CP1E*+ EX1)	-	-	935
EX2	3.16	3	7
EX3	6.50	6	15
EX4	6.10	5	13

*Existing storm drain flow referenced from Skye Canyon Village (DS4812) and Skye Canyon Phase 3A Infrastructure (DS4931)



LEGEND

- CONCENTRATION POINT
- BASIN BOUNDARY
- - - EXISTING DRAINAGE FACILITY
- POSSIBLE FUTURE DRAINAGE FACILITY
- · - · - PARCEL BOUNDARY
- OFF1 BASIN DESIGNATION
- FLOW ARROW



W.O.#: 7934
DATE: 8/1/2019
BY: RBR/ACY
SCALE: 1"=200'
SHEET 1 OF 1

GRAND CANYON APARTMENTS
FIGURE 6- EXISTING CONDITION BASIN MAP

D.5
TECHNICAL DRAINAGE STUDY FOR
GRAND CANYON APARTMENTS
DS5276

CITY OF LAS VEGAS			DATE:
INTER-OFFICE MEMORANDUM			November 5, 2020
TO: Land Development Services Department of Building & Safety			FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:		COPIES TO:
	Grand Canyon/Skye Canyon Park Apartments		VTN
Cross Streets:	Grand Canyon Drive and Skye Canyon Park Drive		Warmington Apartment Communities
File Number:	F:\Depot\DSMemos\DS5276B.doc		Bart Anderson, P.E., DevCo
Parcel Number:	125-07-601-008, 25-07-601-009		CCRFCFCD
Zoning Action:	SDR-77362		NDOT
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	5/5/2020	6/1/2020	See Comments Below	\$400.00	3841616: \$400
2 nd Submittal	9/16/2020	10/22/2020 & 11/5/2020		\$400.00	3995590: \$400
			TOTAL FEES (LDDRS):	\$800.00	----

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.
	is conditionally approved subject to NDOT concurrence.

1. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCFCD) master planned facility. Therefore, CCRFCFCD concurrence is required prior to final approval of the drainage study.

Please note that effective March 15, 2019, the CCRFCFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

<http://gustfront.ccrfcd.org/LandDev/LandDev.aspx>

2. The project proposes to construct facilities and/or increase flows within *Nevada Department of Transportation* (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project. Concurrence from NDOT is required.
3. All special structures and mainline storm drain connection require details and structural calculations to be reviewed by the *City of Las Vegas Building & Safety Department*. Approval by the *Building Department* must be obtained prior to the final approval of the subject drainage study.

4. All storm drain inlets that are more than 10'-deep require a special structural detail and calculations. Submit structural design and calculations to City Building & Safety Department for review and approval prior to the final approval of the drainage study.
5. Per the Skye Canyon Master Drainage Study (DS4420) and Skye Canyon Phase 3A Infrastructure Study (DS4931), an Ultimate Condition storm drain facility is proposed in Drake Drive as a hydrologic cutoff of flows from the north/northwest. The development of this project, including the half street improvements for Drake Drive, requires this facility as well as the downstream connection to the regional facility and the upstream connection to the existing storm drain system be constructed with this project. Note that there is an interim sediment basin that discharges to the existing 5'x5' RCB in Oso Blanca Road at Drake Drive. Positive drainage must be maintained to allow the interim flows to enter the regional system in Oso Blanca Road.
6. In the Future Condition of the dual 10'x4' RCBs being plugged, it is unclear how the onsite flows collected just north of the proposed RCA will enter the system with the center wall in place. Please provide discussion on methodology of where the proposed plug would be and how the onsite flows would continue to enter the storm drain system.
7. Provide a minimum of 6-inches of flood protection from the adjacent top of curb grades for the small building just southwest of Building #2 as it appears that the finish floor elevation is set below the adjacent top of curb elevations.
8. The WSPG models shall account for the onsite flows entering the system just south Building #6.
9. Provide an emergency overflow path in the event the onsite drop inlets south of Building #6 gets completely clogged.
10. Callout and label the existing storm drain facilities with their respective CLV Drawing Numbers.

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/R60E/7
AREA G-07

GRAND CANYON VILLAGE

APN: 125-07-601-008, 125-07-601-009 &
125-07-601-010

CITY OF LAS VEGAS STATE OF NEVADA DEVELOPED BY: GRAND CANYON VILLAGE LLC

10655 PARK RUN DRIVE, STE 160
LAS VEGAS, NEVADA 89144
702-220-4500

SHEET INDEX		
SHEET NUMBER	SHEET	SHEET DESCRIPTION
1	CV	COVER SHEET
2	NT	NOTE SHEET
3	MGRD	MASTER GRADING PLAN
4	GR1	GRADING PLAN 1
5	GR2	GRADING PLAN 2
6	GR3	GRADING PLAN 3
7	GR4	GRADING PLAN 4
8	GR5	GRADING PLAN 5
9	GR6	GRADING PLAN 6
10	GR7	GRADING PLAN 7
11	DT1	DETAIL SHEET 1
12	ST-1	STREET PLAN AND PROFILE 1
13	ST-2	STREET PLAN & PROFILE 2

BENCHMARK
NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
(REVISED 2008)
CITY OF LAS VEGAS BENCHMARK: 6LV007C4
NAVD88 ELEVATION: 841.20 METERS (2759.84 FEET)
RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF
HORSE DRIVE AND GRAND CANYON DRIVE.

BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE
NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS
VEGAS ZONE, NORTH AMERICAN DATUM OF 1983, SAID
MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE
GREENWICH MERIDIAN.
LINEAR UNIT: US SURVEY FOOT (FTUS)
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)
ZONE: LAS VEGAS
PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID
ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FTUS)
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333
FTUS)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)
NOTES:
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE
PROJECTED (GRID) VALUES BASED ON THE PRECEDING
PROJECTION DEFINITION. THE PROJECTION WAS DEFINED
SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT
TO 'GROUND' DISTANCES IN THE PROJECT AREA.
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID
COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO
MERIDIAN CONVERGENCE.

THESE PLANS AND THE DESIGN CRITERIA CONTAINED WITHIN THESE PLANS ARE BASED
UPON THE INFORMATION PRESENTLY KNOWN BY THE ENGINEER AND INTENDED SOLELY AS
A GENERAL GUIDELINE FOR CONSTRUCTION. ALL CONSTRUCTION SHALL BE IN
CONFORMANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL STATUTES, LAWS,
CODES, REGULATIONS AND ORDINANCES, INCLUDING BUT NOT LIMITED TO THE FEDERAL
FAIR HOUSING AMENDMENTS ACT, AMERICANS WITH DISABILITIES ACT, THE ARCHITECTURAL
BARRIERS ACT AND ANY APPLICABLE UNIFORM STANDARDS, SPECIFICATIONS OR DRAWINGS.
THE PERSON OR ENTITY PERFORMING THE CONSTRUCTION SHALL BE SOLELY RESPONSIBLE
TO MAKE SURE CONSTRUCTION IS IN CONFORMANCE WITH ALL LOCAL, STATE AND FEDERAL
STATUTES, LAWS, CODES, REGULATIONS, STANDARDS, GUIDELINES AND ORDINANCES AND
FURTHER, IS IN CONFORMANCE WITH ANY APPLICABLE DESIGN CRITERIA, INCLUDING BUT
NOT LIMITED TO SOILS REPORTS, TRAFFIC STUDIES, GEOTECHNICAL REPORTS,
ARCHITECTURAL PLANS AND SPECIFICATIONS, DRAINAGE PLANS OR STUDIES AND ANY
OTHER CRITERIA, STANDARDS OR REQUIREMENTS LISTED IN THE PLANS OR THE GENERAL
NOTES RELATED TO THESE PLANS OR PROVIDED BY ANYONE IN REFERENCE TO THIS
PROJECT.

APPROVALS

LAS VEGAS FIRE & RESCUE _____ DATE

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK _____ DATE

"THE AFFIXED CENTURY LINK NEVADA APPROVAL DOES NOT
ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN
CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS.
RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT
TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR
PUBLIC UTILITY COMMISSION RULES AND REGULATIONS."

NV ENERGY _____ DATE

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE
SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NVENERGY
RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE
FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY
CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY
COMMISSION'S RULES AND REGULATIONS.

COX COMMUNICATIONS LAS VEGAS, INC. _____ DATE

SOUTHWEST GAS CORPORATION _____ DATE

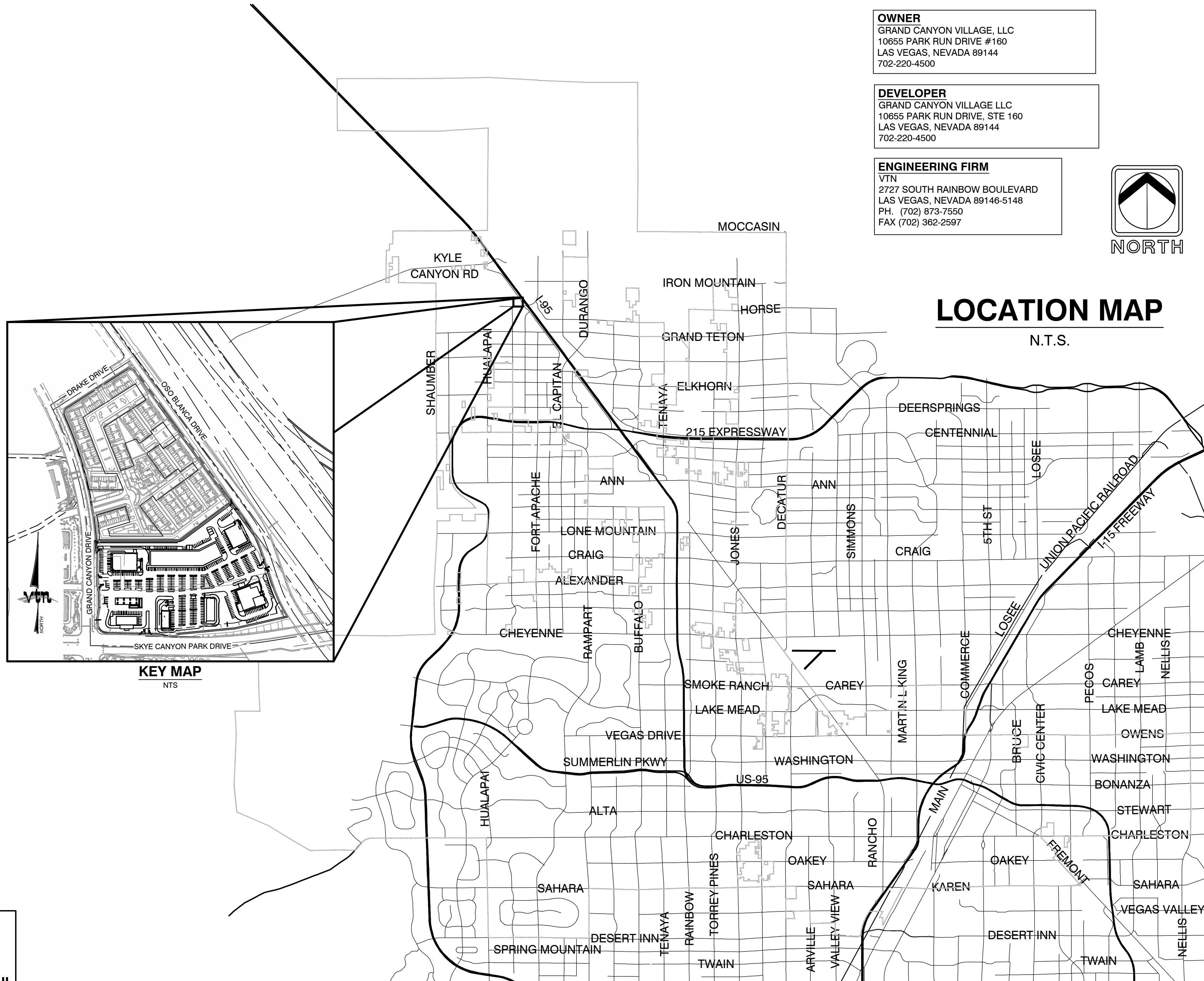
LAS VEGAS VALLEY WATER DISTRICT

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING AND PLANNING SERVICES MANAGER

PROJECT: _____ DATE: _____

SHEETS: _____



OWNER
GRAND CANYON VILLAGE, LLC
10655 PARK RUN DRIVE #160
LAS VEGAS, NEVADA 89144
702-220-4500

DEVELOPER
GRAND CANYON VILLAGE LLC
10655 PARK RUN DRIVE, STE 160
LAS VEGAS, NEVADA 89144
702-220-4500

ENGINEERING FIRM
VTN
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 873-7550
FAX: (702) 362-2597



LOCATION MAP

N.T.S.

FIRE DEPARTMENT APPROVAL

APPROVAL BY THE FIRE DEPARTMENT HAVING
JURISDICTION IS REQUIRED PRIOR TO OBTAINING
FINAL APPROVAL FROM THE LVWVD.

AVOID HITTING OVERHEAD
POWER LINES. IT'S COSTLY.

**CALL BEFORE
YOU DIG
OVERHEAD**

1-702-227-2929

Call before you Dig
Avoid cutting underground
utility lines. It's costly.

811

OR
1-800-227-2600
AND
1-702-455-9111
CLARK COUNTY TRAFFIC
OPERATIONS

AVOID HITTING UNDERGROUND
UTILITY LINES. IT'S COSTLY.

**Call
before you
Underground**

1-702-455-9111
CLARK COUNTY TRAFFIC
OPERATIONS
LAS VEGAS AREA COMPUTED TRAFFIC SYSTEM

CITY OF LAS VEGAS		CITY OF LAS VEGAS	
GRAND CANYON VILLAGE LLC		GRAND CANYON VILLAGE LLC	
10655 PARK RUN DRIVE, STE 160 LAS VEGAS, NEVADA 89144 702-220-4500		10655 PARK RUN DRIVE, STE 160 LAS VEGAS, NEVADA 89144 702-220-4500	
2727 SOUTH RAINBOW BOULEVARD LAS VEGAS, NEVADA 89146-5148 PH: (702) 873-7550 FAX: (702) 362-2597 WEB: WWW.VTNN.COM		2727 SOUTH RAINBOW BOULEVARD LAS VEGAS, NEVADA 89146-5148 PH: (702) 873-7550 FAX: (702) 362-2597 WEB: WWW.VTNN.COM	
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS		CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS	
COVER SHEET		COVER SHEET	
GRAND CANYON VILLAGE OFFSITES		GRAND CANYON VILLAGE OFFSITES	
DRAWN BY: RC	SEP 2020	DRAWN BY: RC	SEP 2020
DESIGNED BY: DMO	SEP 2020	DESIGNED BY: DMO	SEP 2020
CHECKED BY: ---	---	CHECKED BY: ---	---
PROJECT NO: 9025	SCALE: N/A N/A	PROJECT NO: 9025	SCALE: N/A N/A
DARYN M. OHTA EXP: 12/31/21 CIVIL		DARYN M. OHTA EXP: 12/31/21 CIVIL	
12/21/2020		12/21/2020	
SHEET CV		SHEET CV	
1 OF -- SHEETS		1 OF -- SHEETS	
DRAWING NO. ----		DRAWING NO. ----	

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 ISSUE, 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 ISSUED 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 TO BE VERIFIED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV 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 UTILITIES 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-AND-A-HALF INCH (1 1/2") ABOVE TOP 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 SOILS REPORT AS PREPARED BY: , PROJECT NO. , DATED , APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAVCUT 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 RELOCATIONS.
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.R.S. STATUTE NO. 625.380 A 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.

WALL NOTES:

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 SECTIONS 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 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 ONE-AND-A-HALF INCH (1 1/2") AND STORM DRAIN MAIN. IN ADDITION, 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.
24. REVISED 06/04/2018

1. ALL STREET LIGHTING INSTALLATION SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA," LATEST REVISION (USD), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
2. DESIGN PROFESSIONAL AND CONTRACTOR SHALL VERIFY CITY'S LATEST LED FIXTURE SPECIFICATIONS AND APPROVED FIXTURES PER CLV WEBSITE, UNDER BUILDING AND SAFETY FORMS, PRIOR TO ORDERING MATERIALS.
3. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.
4. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.03.01 OF THE USS.
5. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. #8 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
6. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, SHALL LEAVE A MINIMUM CLEARANCE IN COMPLIANCE WITH USD NO. 320A WHEN POLE IS INSTALLED BETWEEN SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
7. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
8. SERVICE POINTS SHALL BE COORDINATED WITH NO ENERGY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICEPOINTS SHALL BE SHOWN ON THE PLANS.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREETLIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BARS ARE INSTALLED, AT NO EXPENSE TO THE CITY OF LAS VEGAS.
10. THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

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 ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE LOCATION 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 THE CITY OF LAS VEGAS AND LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE 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 THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVW0000000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR THEIR AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE SUBJECT TO EROSION, AND AREAS OF EROSION AND SILT LOCATIONS, AND DUMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR THEIR 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 NVW0000000, SECTION III.A.5.
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% OR MORE TO THE NEXT.

NOTES:

1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO 'GROUND' DISTANCES IN THE PROJECT AREA.

2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEADS ARE INSTALLED ON A SINGLE SYSTEM. FOR SYSTEMS REQUIRED TO HAVE TWO (2) SOURCES OF WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEADS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. FOR SYSTEMS PERMITTED TO HAVE ONE SOURCE OF WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 3 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEADS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. [IJC § 503.104]

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. [IJC § 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 FT POINT OR TO AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IJC § 503.2.7, § 503.2.8]

21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. [IJC § 503.2.4]

22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. [IJC § 503.2.1]

23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 33 FT WITH PARKING ON BOTH SIDES MEASURED TO FACE OF CURB, NOT LESS THAN 28 FT WIDE WITH PARKING RESTRICTED TO ONE SIDE MEASURED TO FACE OF CURB, NOT LESS THAN 24 FT WIDE WITH NO PARKING ON EITHER SIDE MEASURED TO FACE OF CURB. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [IJC § 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. [IJC § 503.1.1]

25. APPROVED SECONDARY FIRE APPARATUS ACCESS ROAD SHALL BE PROVIDED FOR 200 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. CLV REGULATION AND MOU

26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, 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. CLV REGULATION

27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE. ONE SIGN AT THE END OF THE FIRE LANE WITH 150 FT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANE. 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. [IJC § 503.3.1]

28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. [IJC § 503.6]

29. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS, OR HAVING FOUR OR MORE TRAVEL LANES AND A TRAFFIC CONTROL OF MORE THAN 30.000 VEHICLES PER DAY, ALL HYDRANTS BEING UTILIZED TO DELIVER FIRE FLOW TO THE PROPOSED LOCATION SHALL BE LOCATED ON THE SAME SIDE OF THE STREET AS THE PROPOSED DEVELOPMENT. CLV REGULATION

EFFECTIVE DATE: FEBRUARY 4th, 2019

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCRATCHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD." THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL UTILIZE TYPE XI RETROREFLECTIVE SHEETING IN ACCORDANCE WITH OCAS86.627 AND 716 AND SHALL HAVE AN ANTI-GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO, AND OF THE SAME MANUFACTURER AS THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5) FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.

IMPROVEMENTS CALLED FOR BY THESE PLANS.

2. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.

3. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLUORESCENT OR INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR MSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.

4. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.

5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA (RTC), IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.

6. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 898-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.

7. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

8. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECTS OFFSITE INSPECTOR PRIOR TO INITIATING ANY WORK TO DISOBEY FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWING REGARDING LANE PAVERMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY BE NECESSARY. THE CONTRACTOR SHALL MAINTAIN ALL TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
(REVISED 2008)

CITY OF LAS VEGAS BENCHMARK: 6LV907C4
NAVD88 ELEVATION: 841.20 METERS (2759.84 FEET)

RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF
HORSE DRIVE AND GRAND CANYON DRIVE.

LVVWD PROJECT #.....

(REVISED 08/01/2017)

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 (258-7117) 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 PLATES, 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 CONTRACT SPECIFICATIONS 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 DRAFT OR 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 AND APPURTENANCES SHALL BE DISINFECTED, PRESSURE TESTED, AND HAVE AN ACCEPTABLE PASSING HEALTH WATER SAMPLE OBTAINED, PRIOR TO OPERATION AND USE.

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 APPROVED PRODUCTS LIST FOR NEW FACILITIES. LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS BY SUBMITTING SHOP DRAWINGS.

13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.

14. THE INSTALLATION OF 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.

15. ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNERS ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNERS ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN TEN FEET OF ANY DRIVEWAY 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 PLAIN 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.

15. 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 WILL NOT BE REUSED.

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. POLYVINYL (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 PAYING 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 LVWD 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 THE SPAN FOR 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.

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:

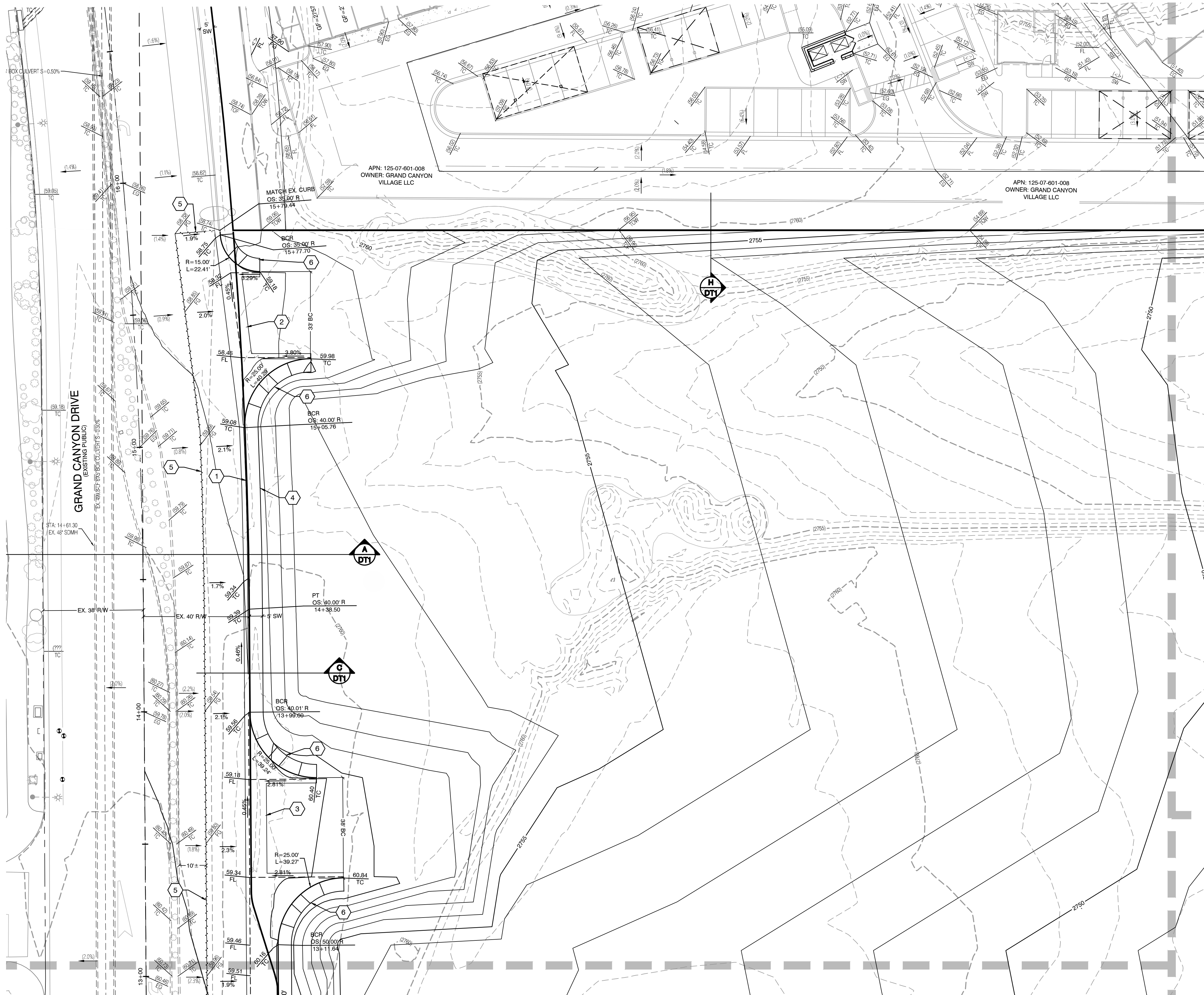
	HORIZONTAL	VERTICAL	COMPACTION
A PAVEMENT AREA SUBGRADE	0.1"	+0.00/-0.1"	SEE SOILS REPORT
B ENGINEERED FILL	0.5" +	+0.11/-0.1"	SEE SOILS REPORT
- REPORT COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.
7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL 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 PROMPTLY 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.

REVISED 04/15/10

FG	FINISH FLOOR	DI	DROP INLET
FG	FINISH GRADE	B	BASE FLOOR ELEVATION
FL	FLOW LINE	CCUSD	CLARK COUNTY UNIFORM STANDARD DRAWINGS
TC	TOP OF CURB	SW	SIDEWALK
TRC	TOP OF ROLL CURB	TSW	TOP OF SIDEWALK
EOP	EDGE OF ASPHALT PAVEMENT	INT.	INTERSECTION
FUT.	FUTURE	D.G.	DESIGN GRADE
EX.	EXISTING	C/L	CENTER LINE
VG.	VALLEY GUTTER	O/C	OFFSET CROWN
NG	NATURAL GROUND	BC	BACK OF CURB
H.P.	HIGH POINT	BCR	BEGIN CURB RETURN
L.P.	LOW POINT	BC/L	BACK OF CURB LENGTH
SSMH	SEWER MANHOLE	TF	TOP OF FOOTING
WTR	WATER	VB	GRADE BREAK
SD	STORM DRAIN	PC	POINT OF CURVATURE
RP	REINFORCED CONCRETE PIPE	TPW	TOP OF PLANTER WALL
PT	POINT OF TANGENCY	TRW	TOP OF RETAINMENT WALL
PRC	POINT OF REVERSE CURVATURE	TOP	TOP OF CHANNEL/SCARP
PCP	POINT OF COMPOUND CURVATURE	TOE	TOE OF CHANNEL/SCARP
BVC	BEGIN VERTICAL CURVE	TOB	TOP OF BOX
MVC	MID-POINT OF VERTICAL CURVE	PP	POWER POLE
ENC	END VERTICAL CURVE	TRANS.	TRANSITION
PRVC	POINT OF REVERSE VERTICAL CURVE	RET.	RETAINMENT
	RIGHT-OF-WAY		

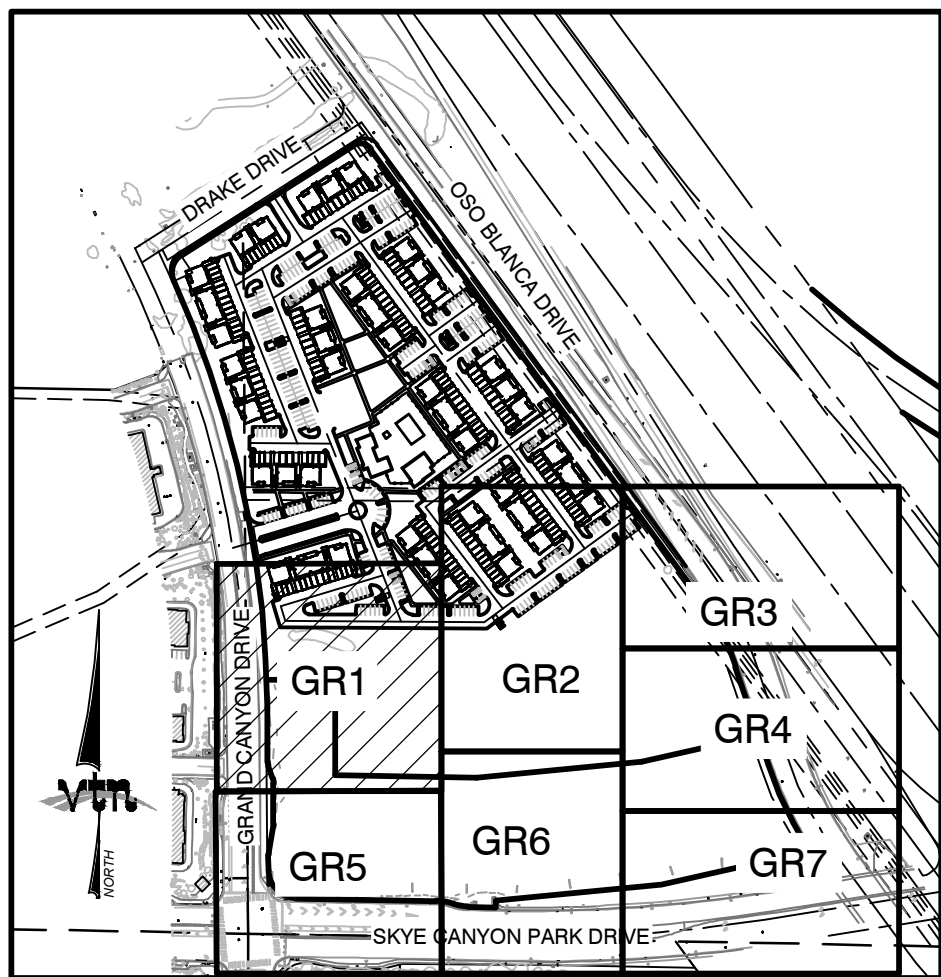
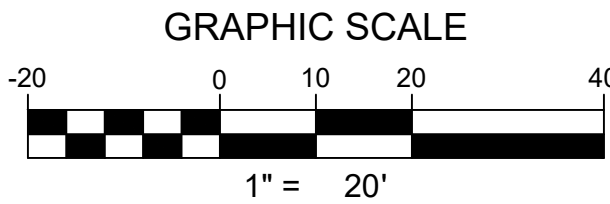
DESCRIPTION	PROPOSED	EXISTING	FUTURE
CONTOUR (5' INTERVAL)			
CONTOUR (1' INTERVAL)			
EDGE OF PAVEMENT			
SAW CUT			
RETAINING WALL			
SCREEN WALL			
RIGHT OF WAY			
CENTER LINE			
BACK OF CURB			
LIP OF GUTTER			
FACE OF CURB			
SIDEWALK			
UNIT BOUNDARY LINE			
UNIT BOUNDARY / ROW			
PROPERTY LINE			
SLOPE AND FLOW DIRECTION			
SCARP AREA			
MATCHLINE			
SIDEWALK RAMP			
SIGHT VISIBILITY ZONES			
PAVED ROAD			
PAVEMENT REMOVAL			
WATER UNDER 18"			
WATER 18" & OVER			
SANITARY SEWER UNDER 18"			
SANITARY SEWER 18" & OVER			
STORM SEWER			
FIRE HYDRANT			
SANITARY SEWER MAN HOLE			
CLEAN OUT			
STORM DRAIN MAN HOLE			

	DRAWN BY: _____ RC		GRADING PLAN 1	GRAND CANYON VILLAGE LLC 10685 PARK RUN DRIVE, STE 160 LAS VEGAS, NEVADA 89114 702-228-4500		CITY OF LAS VEGAS 2727 SOUTH RAINBOW BOULEVARD LAS VEGAS, NEVADA 89146-5148 PH. (702) 873-7550 FAX (702) 362-2887 WEB WWW.VTMV.COM CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS	REV	DATE	BY	REVISION
	DESIGNED BY: _____ DMO						###			
	CHECKED BY: _____ ...									
	PROJECT NO: _____ 8023						SCALE: 1" = 20' HORIZ. N/A			
SHEET GR1 4 OF -- SHEETS DRAWING NO. -----										



SEE SHEET GR5 FOR CONTINUATION

SEE SHEET GR2 FOR CONTINUATION



KEY MAP
NTS

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983, SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FTUS)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00 SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,666 FTUS)
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

NOTES:
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO GROUND DISTANCES IN THE PROJECT AREA.
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

BENCHMARK

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVDS88) (REVISED 2008)

CITY OF LAS VEGAS BENCHMARK: 6LV907C4
NAVDS88 ELEVATION: 841.20 METERS (2759.84 FEET)

RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF HORSE DRIVE AND GRAND CANYON DRIVE.

STORM DRAIN NOTE:

ALL ONSITE STORM DRAINS ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

FLOOD ZONE NOTE:

SITE IS LOCATED IN A ZONE X AS SHOWN IN FIRM MAP #32000C1735E, DATED SEPTEMBER 27, 2002. A ZONE X IS AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN.

GRADING PERMIT NOTE

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

GEOTECHNICAL NOTE:

REFER TO SOILS REPORT: ----
PROJECT # ----, DATED ----
CLV # ----

CONSTRUCTION NOTES

1. CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
2. CONSTRUCT 8" CROSS GUTTER PER CCAUSD # 228
3. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
4. CONSTRUCT SIDEWALK PER CCAUSD # 234
5. SAWCUT AND MATCH EXISTING PER CCAUSD #500.1 & #500.2
6. CONSTRUCT HANDICAP RAMP PER CCAUSD #235 CASE I
7. CONSTRUCT BUS TURNOUT CURB & GUTTER PER CCAUSD #234.1

SIGHT VISIBILITY ZONES:

NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

NOTE:

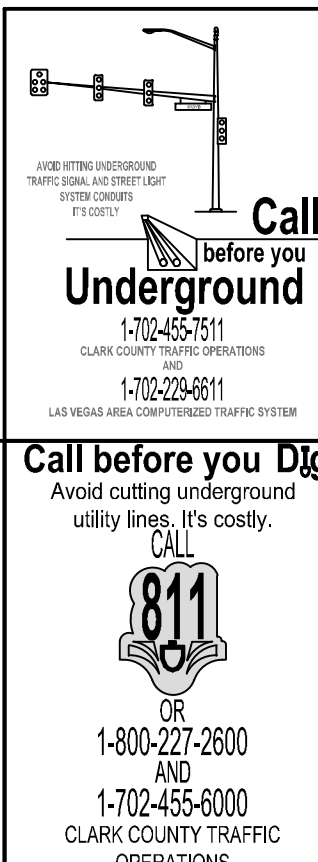
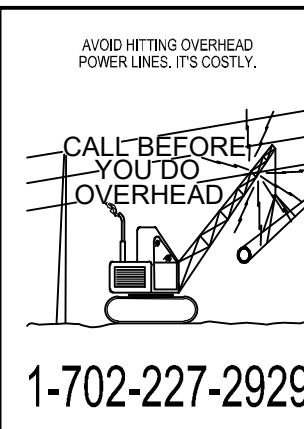
PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

ENGINEER DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH CITY OF LAS VEGAS, # ----

DARYN M. OHTA, P.E. No. 15906 DATE



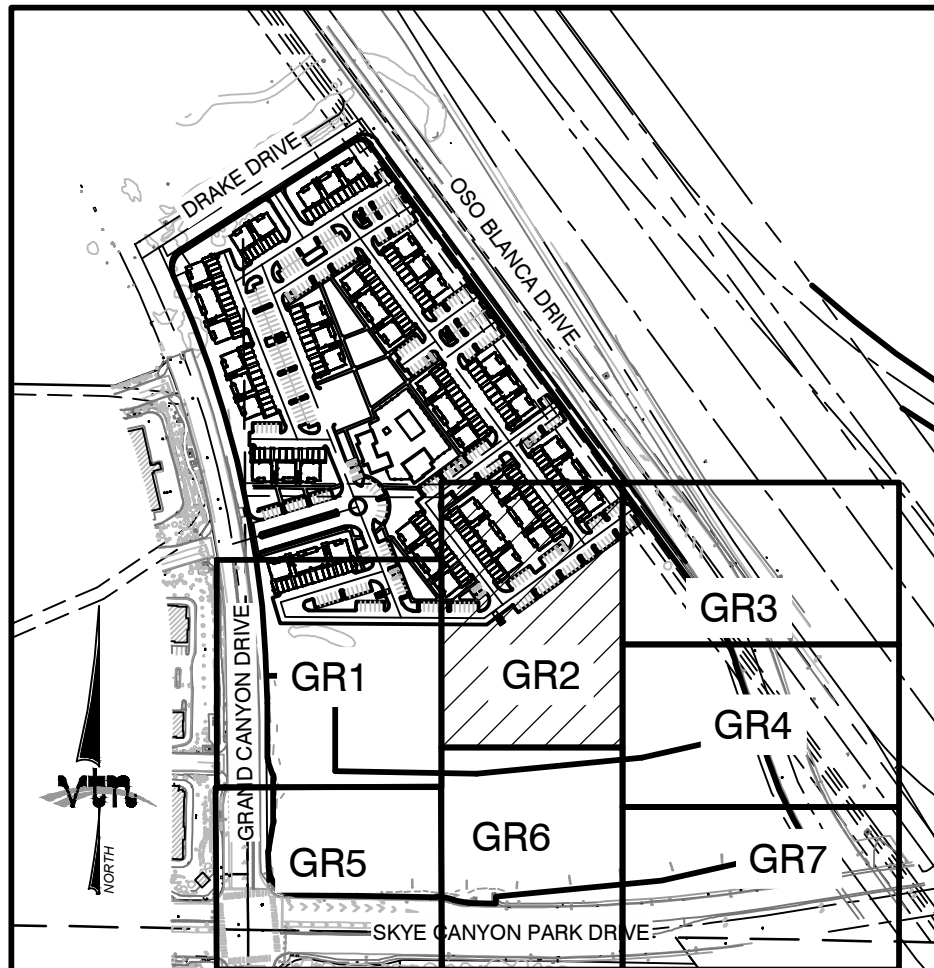
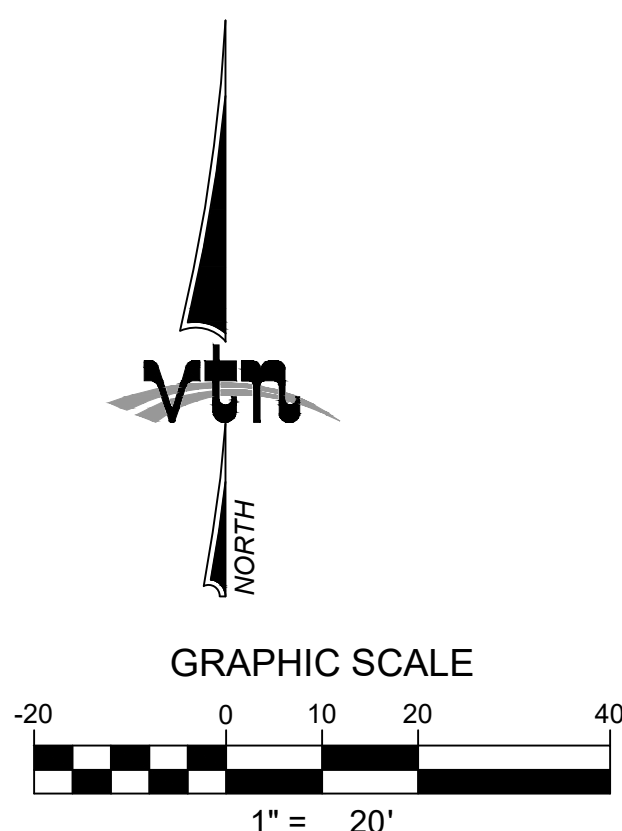
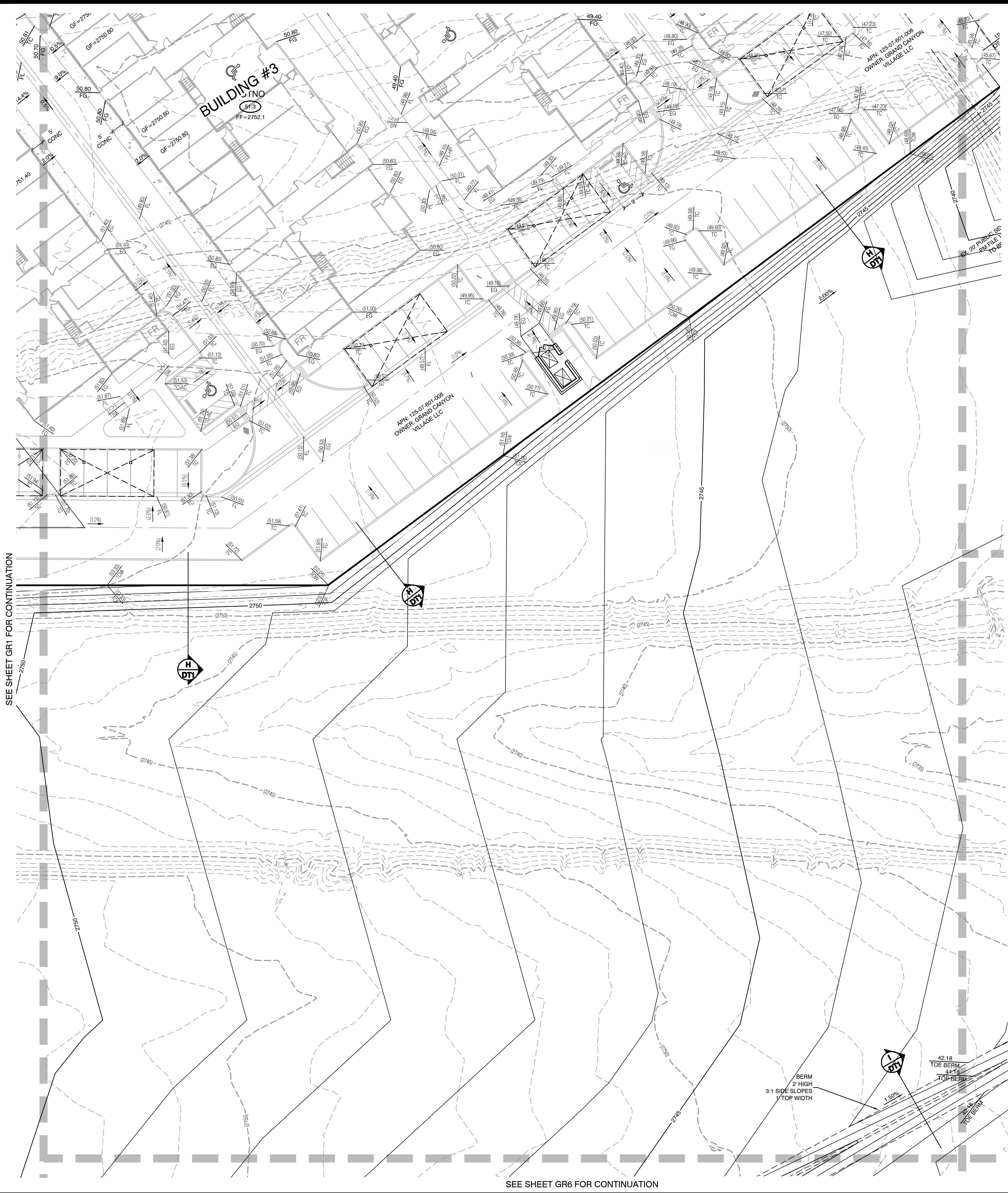
GRAND CANYON VILLAGE LLC
10655 PARK RUN DRIVE, STE 180
LAS VEGAS, NEVADA 89144
702.227.4606

GRADING PLAN 1
GRAND CANYON VILLAGE
OFFSITES

DRAWN BY: SEP 2020
DESIGNED BY: SEP 2020
CHECKED BY: SEP 2020
PROJECT NO: 9025
SCALE: 1" = 20' HORIZ.
N/A VERT.

PROFESSIONAL ENGINEER
DARYN M. OHTA
EXP: 12/31/21
CIVIL
12/21/2020
SHEET
GR1
4 OF -- SHEETS
DRAWING NO. ----

F:\8026\Sheet Set\DWG\8026-GRD.dwg, 12/21/2020 3:44 PM, daryno



KEY MAP

BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS). LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983, SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.
LINEAR UNIT: US SURVEY FOOT (FTUS)
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00 SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)
ZONE: LAS VEGAS
PROJECTION: TRANSVERSE MERCATOR STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,666 FTUS)
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)
NOTES:
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO 'GROUND' DISTANCES IN THE PROJECT AREA.
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE

BENCHMARK
NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (REVISED 2008)
CITY OF LAS VEGAS BENCHMARK: 6LV907C4
NAVD88 ELEVATION: 841.20 METERS (2759.84 FEET)
RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF HORSE DRIVE AND GRAND CANYON DRIVE.

STORM DRAIN NOTE:
ALL ONSITE STORM DRAINS ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

FLOOD ZONE NOTE:
SITE IS LOCATED IN A ZONE X AS SHOWN IN FIRM MAP #32000C1735E, DATED SEPTEMBER 27, 2002. A ZONE X IS AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN.

- CONSTRUCTION NOTES**
1. CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
 2. CONSTRUCT 8" CROSS GUTTER PER CCAUSD # 228
 3. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
 4. CONSTRUCT SIDEWALK PER CCAUSD # 234
 5. SAWCUT AND MATCH EXISTING PER CCAUSD #500.1 & #500.2
 6. CONSTRUCT HANDICAP RAMP PER CCAUSD #235 CASE I
 7. CONSTRUCT BUS TURNOUT CURB & GUTTER PER CCAUSD #234.1

GRADING PERMIT NOTE
THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

GEOTECHNICAL NOTE:
REFER TO SOILS REPORT: ----
PROJECT # ----, DATED ----
CLV # ----

SIGHT VISIBILITY ZONES:
NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT, MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

NOTE:
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.

ENGINEER DISCLAIMER NOTE:
UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

EASEMENT NOTE:
ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH CITY OF LAS VEGAS. #----

DARYN M. OHTA, P.E. No. 15906 DATE

GRAND CANYON VILLAGE LLC
10655 PARK RUN DRIVE, STE 180
LAS VEGAS, NEVADA 89144
(702) 227-4000

CITY OF LAS VEGAS

GRAND CANYON VILLAGE OFFSITES

GRADING PLAN 2

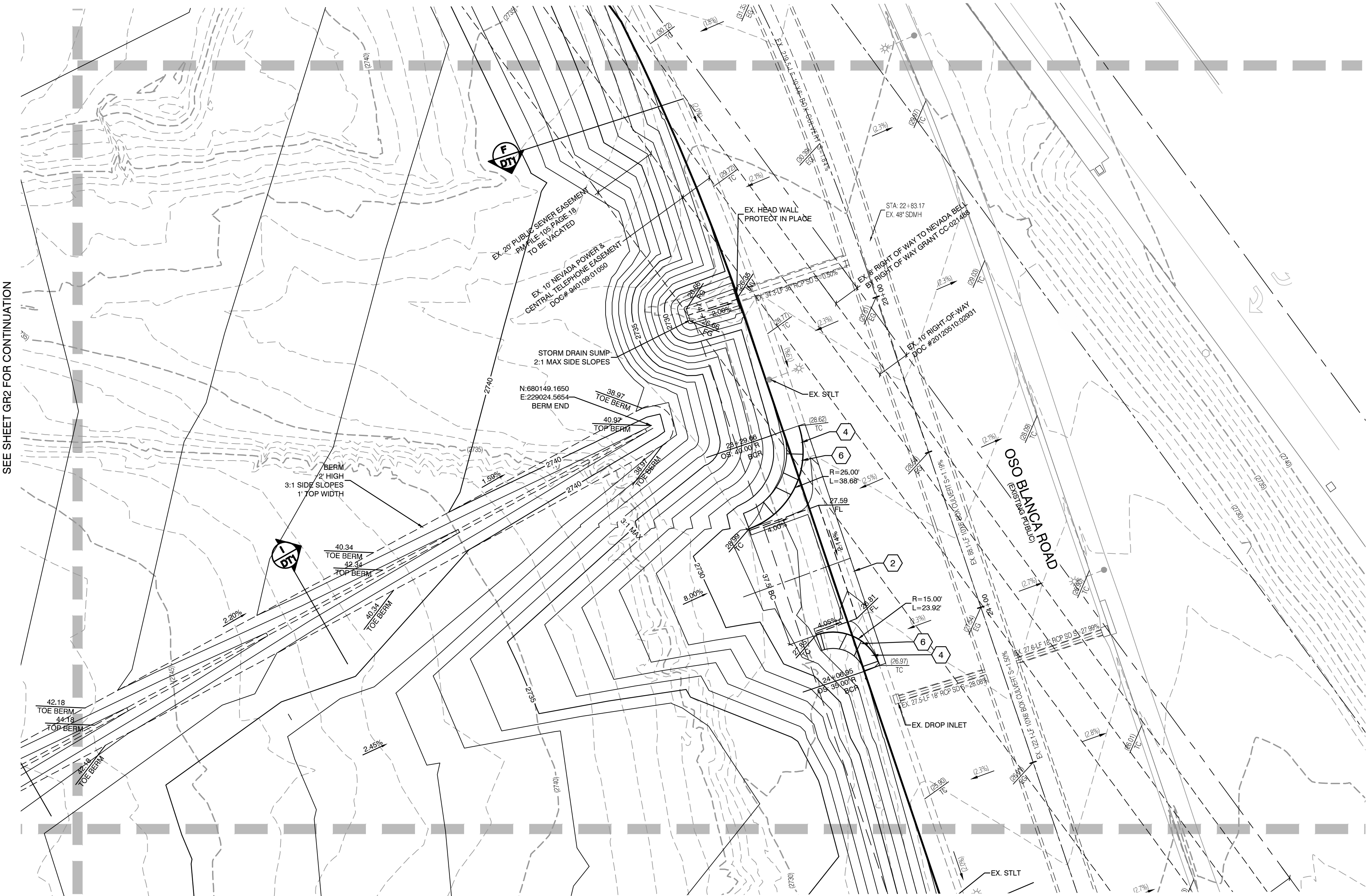
DRAWN BY: RC
DESIGNED BY: DMO
CHECKED BY: ---
PROJECT NO: 8025

SEP 2020
SEP 2020
SEP 2020

SCALE: 1" = 20' HORIZ.
N/A VERT.

SHEET
GR2
5 OF -- SHEETS
DRAWING NO. ----

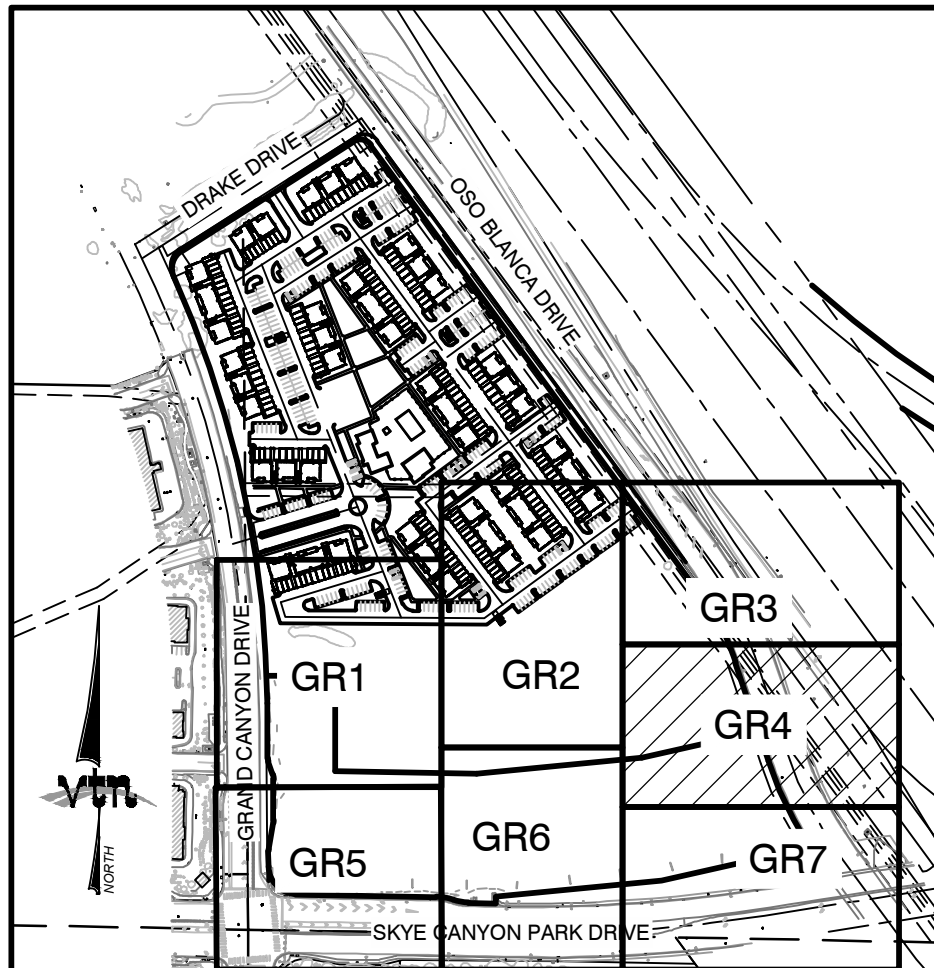
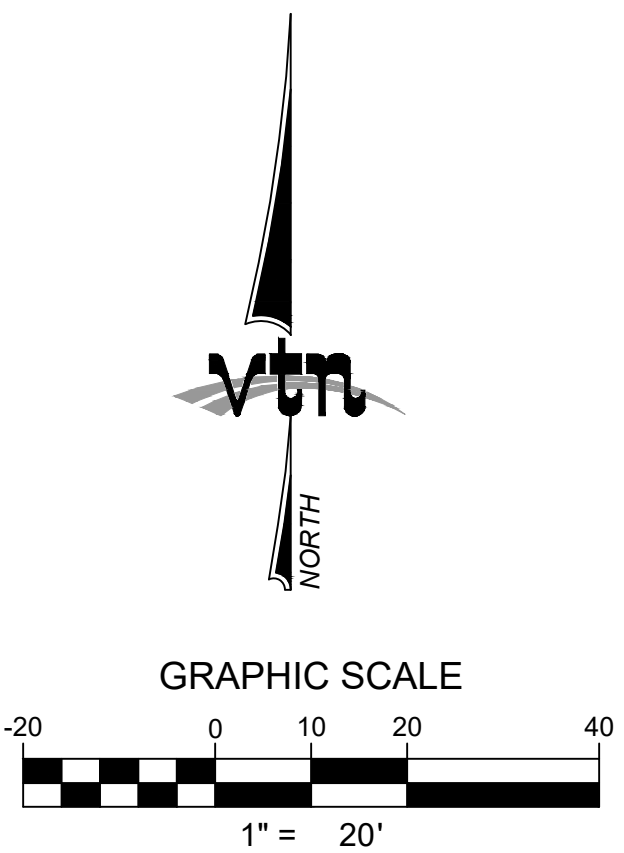
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SEE SHEET GR2 FOR CONTINUATION

SEE SHEET GR3 FOR CONTINUATION

SEE SHEET GR7 FOR CONTINUATION



BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS). LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983. SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FTUS)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00 SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS) ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FTUS) EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS) SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

NOTES:

1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO GROUND DISTANCES IN THE PROJECT AREA.

2. GRID BEARINGS SHOWN HEREON OR IMPLIED BY GRID COORDINATES DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

CONSTRUCTION NOTES

- CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
- CONSTRUCT 8" CROSS GUTTER PER CCAUSD # 228
- CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
- CONSTRUCT SIDEWALK PER CCAUSD # 234
- SAWCUT AND MATCH EXISTING PER CCAUSD #500.1 & #500.2
- CONSTRUCT HANDICAP RAMP PER CCAUSD #235 CASE I
- CONSTRUCT BUS TURNOUT CURB & GUTTER PER CCAUSD #234.1

BENCHMARK

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (REVISED 2008)

CITY OF LAS VEGAS BENCHMARK: 6LV907C4 NAVD88 ELEVATION: 841.20 METERS (2759.84 FEET)

RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF HORSE DRIVE AND GRAND CANYON DRIVE.

STORM DRAIN NOTE:

ALL ONSITE STORM DRAINS ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

FLOOD ZONE NOTE:

SITE IS LOCATED IN A ZONE X AS SHOWN IN FIRM MAP #32000C1735E, DATED SEPTEMBER 27, 2002. A ZONE X IS AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN.

ADA PATH LEGEND

GRADING PERMIT NOTE

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

GEOTECHNICAL NOTE:

REFER TO SOILS REPORT: ----
PROJECT # ----, DATED ----
CLV # ----

Call before you Dig

Avoid cutting underground utility lines. It's costly.

CALL 811

OR

1-800-227-2600
AND
1-702-455-6000
CLARK COUNTY TRAFFIC OPERATIONS

Call before you Dig

Avoid cutting underground utility lines. It's costly.

CALL 1-702-455-6011

OR

1-702-226-8611
CLARK COUNTY TRAFFIC OPERATIONS

SIGHT VISIBILITY ZONES:

NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

NOTE:

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.

ENGINEER DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH CITY OF LAS VEGAS, # ----

DARYN M. OHTA, P.E. No. 15906 DATE

GRAND CANYON VILLAGE LLC

10655 PARK RUN DRIVE, STE 180
LAS VEGAS, NEVADA 89144
702-226-4600

GRAND CANYON VILLAGE OFFSITES

CITY OF LAS VEGAS

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 973-7550 FAX: (702) 362-2887 WEB: WWW.VTNV.COM
CONSULTING ENGINEERS & LAND SURVEYORS

GRADING PLAN 4

ENGINEER'S SEAL

PROFESSIONAL ENGINEER
DARYN M. OHTA
EXP: 12/31/21
CIVIL
NO. 15906
12/21/2020

SHEET GR4

7 OF -- SHEETS
DRAWING NO. ----

SCALE: 1" = 20' HORIZ. N/A VERT.

PROJECT NO: 9025

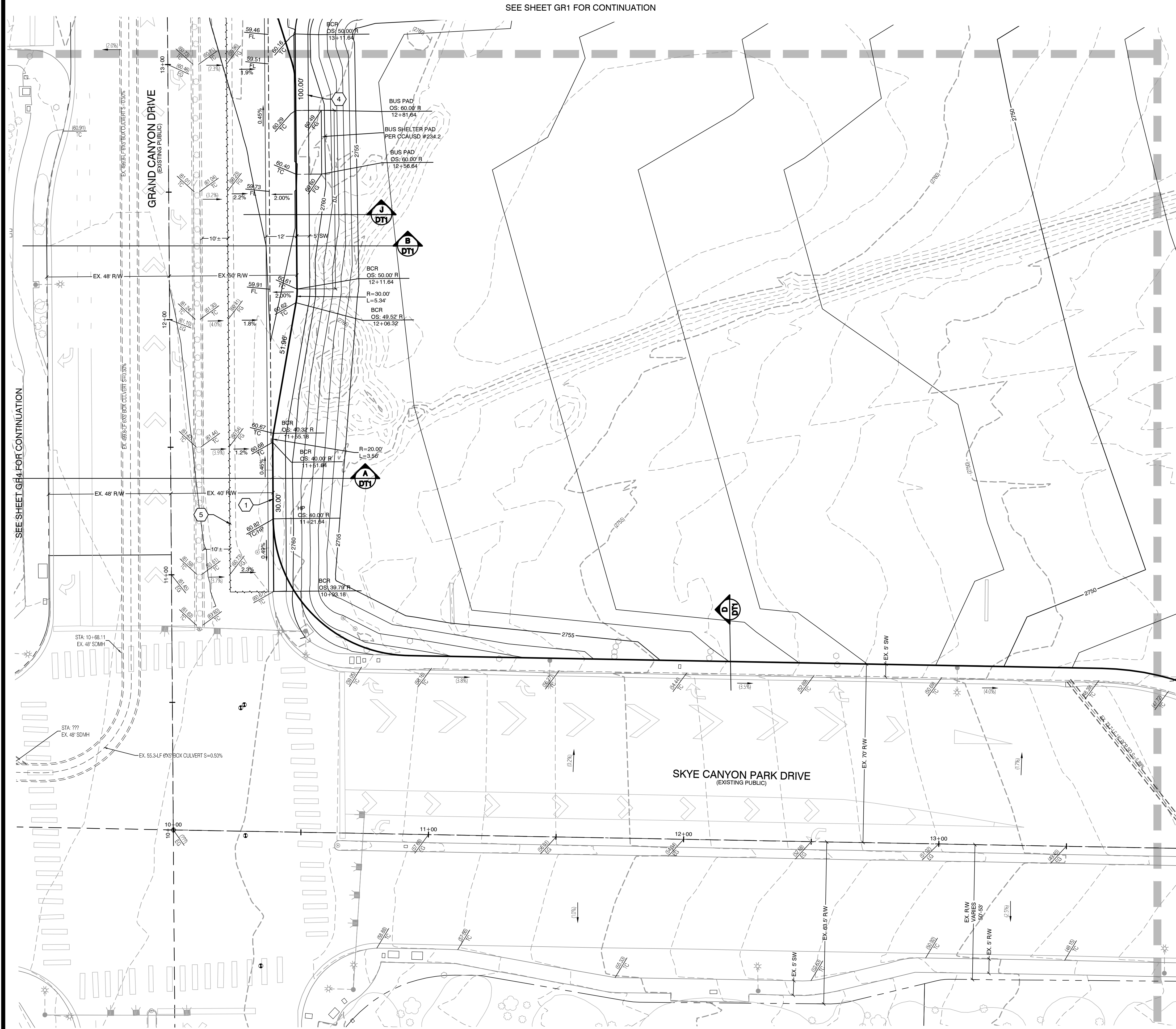
CHECKED BY: DMO

DESIGNED BY: DMO

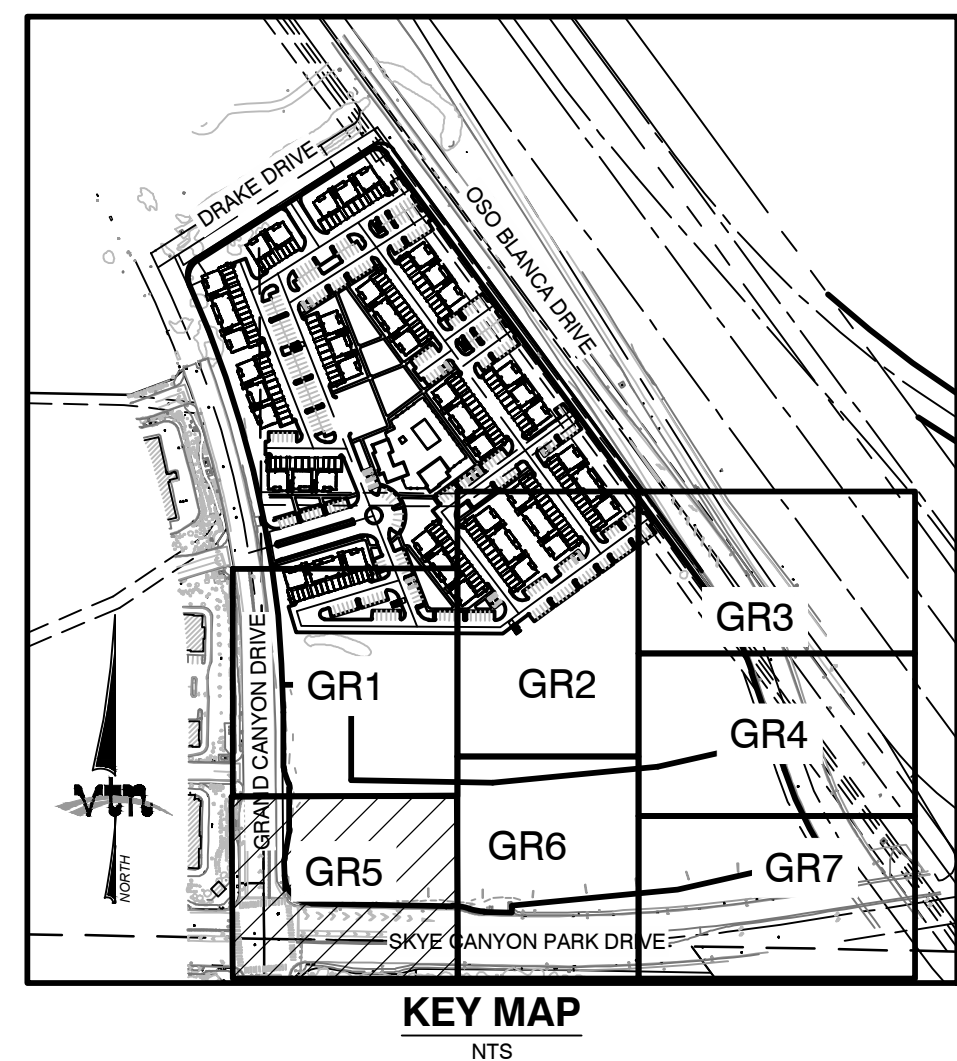
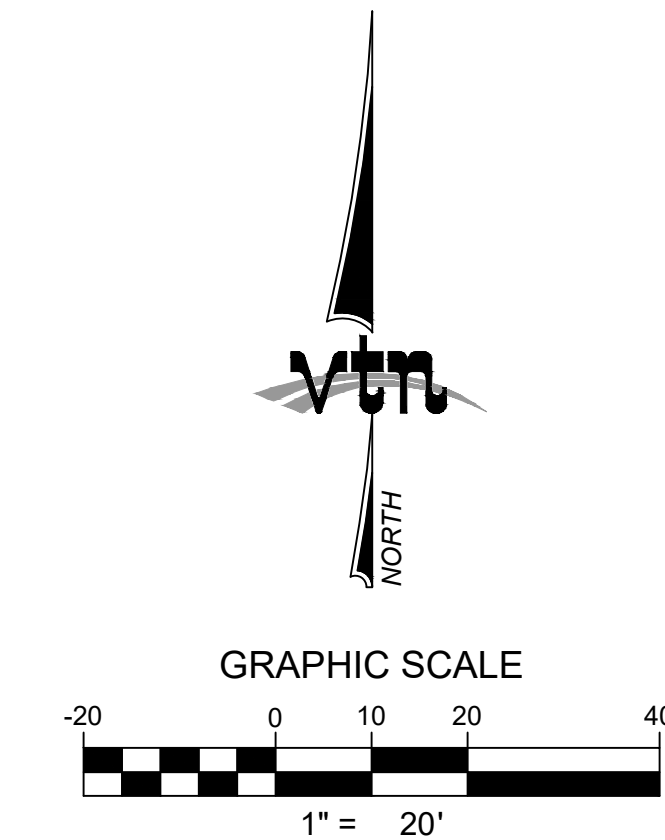
DRAWN BY: RC

DATE: SEP 2020

REVISION:



SEE SHEET GR1 FOR CONTINUATION



BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS). LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983. SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.
LINEAR UNIT: US SURVEY FOOT (FTUS)
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)
ZONE: LAS VEGAS
PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FTUS)
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)
NOTES:
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO GROUND DISTANCES IN THE PROJECT AREA.
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

BENCHMARK
NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (REVISED 2008)
CITY OF LAS VEGAS BENCHMARK: 6LV907C4
NAVD88 ELEVATION: 841.20 METERS (2759.84 FEET)
RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF HORSE DRIVE AND GRAND CANYON DRIVE.

STORM DRAIN NOTE:
ALL ONSITE STORM DRAINS ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

FLOOD ZONE NOTE:
SITE IS LOCATED IN A ZONE X AS SHOWN IN FIRM MAP #32000C1738E, DATED SEPTEMBER 27, 2009. A ZONE X IS AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN.

ADA PATH LEGEND
.....

GRADING PERMIT NOTE
THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

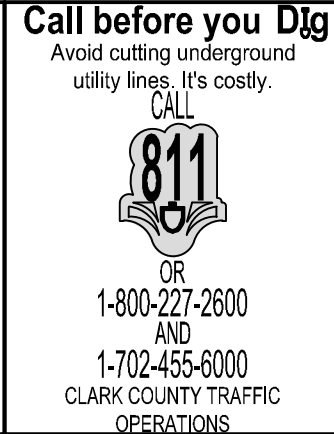
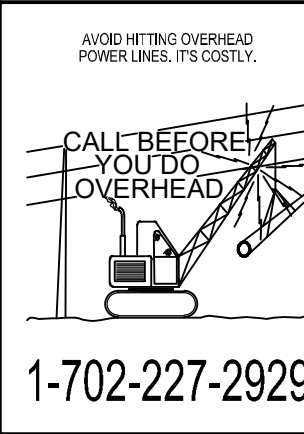
GEOTECHNICAL NOTE:
REFER TO SOILS REPORT: ----
PROJECT # ----, DATED ----
ONLY # ----

- CONSTRUCTION NOTES**
1. CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
 2. CONSTRUCT 8" CROSS GUTTER PER CCAUSD # 228
 3. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
 4. CONSTRUCT SIDEWALK PER CCAUSD # 234
 5. SAWCUT AND MATCH EXISTING PER CCAUSD #500.1 & #500.2
 6. CONSTRUCT HANDICAP RAMP PER CCAUSD #235 CASE I
 7. CONSTRUCT BUS TURNOUT CURB & GUTTER PER CCAUSD #234.1

NOTE:
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.

ENGINEER DISCLAIMER NOTE:
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SIGHT VISIBILITY ZONES:
NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.



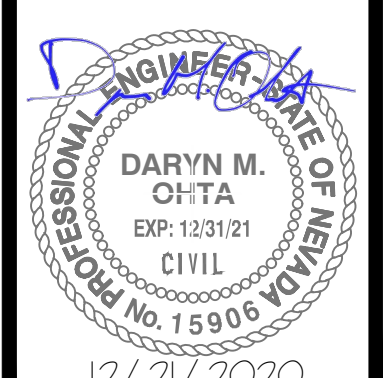
I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH CITY OF LAS VEGAS, # ----

DARYN M. OHTA, P.E. No. 15906 DATE

GRAND CANYON VILLAGE LLC
10855 PARK RUN DRIVE, STE 180
LAS VEGAS, NEVADA 89144
702.227.4000
2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 973-7550 FAX: (702) 382-2887 WEB: WWW.VTNNY.COM
CONSULTING ENGINEERS & LAND SURVEYORS

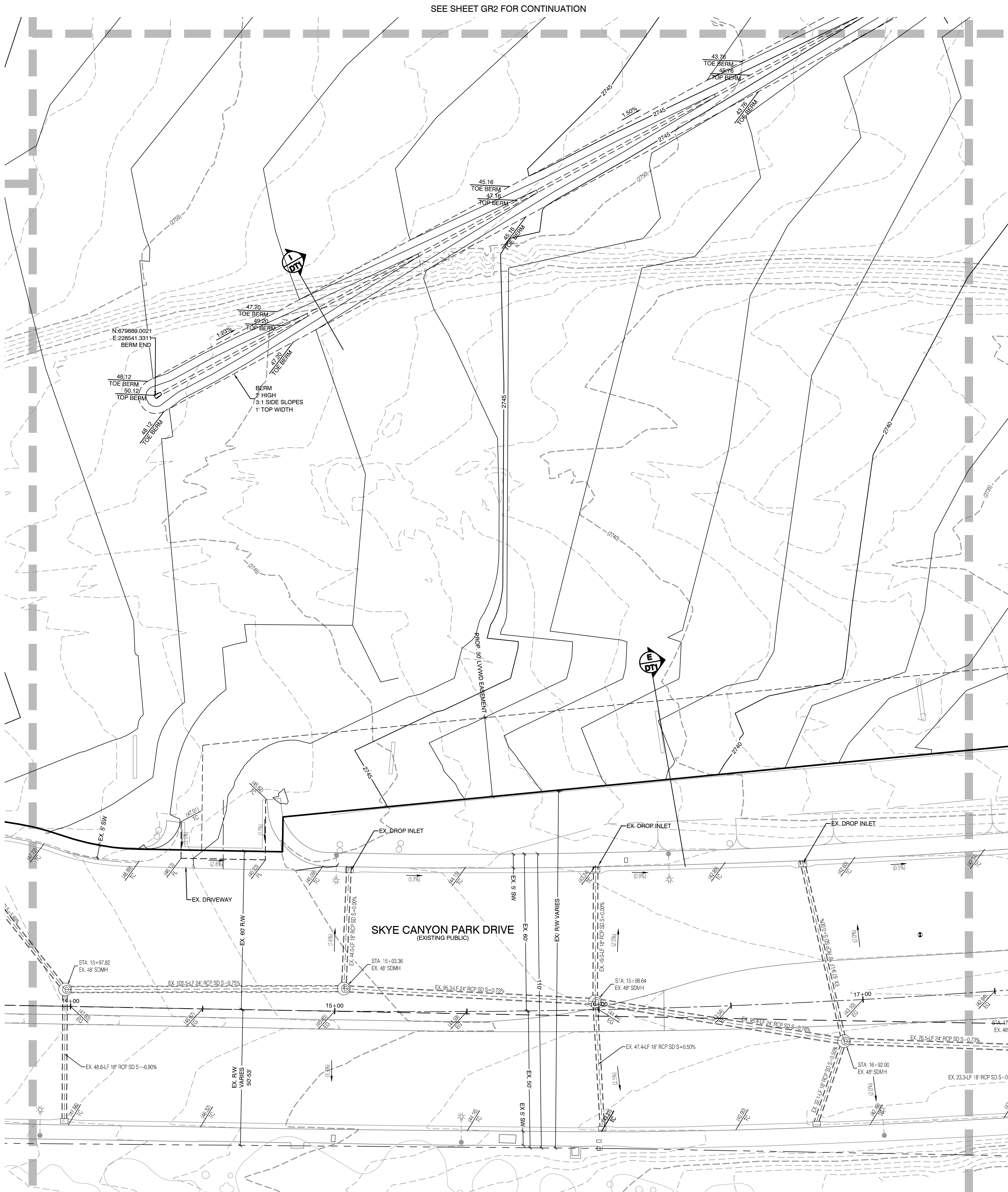
GRADING PLAN 5
GRAND CANYON VILLAGE OFFSITES

DRAWN BY: RC
DESIGNED BY: DMO
CHECKED BY: ---
PROJECT NO: 8025
SCALE: 1" = 20' HORIZ. N/A VERT.
SEP 2020
SEP 2020

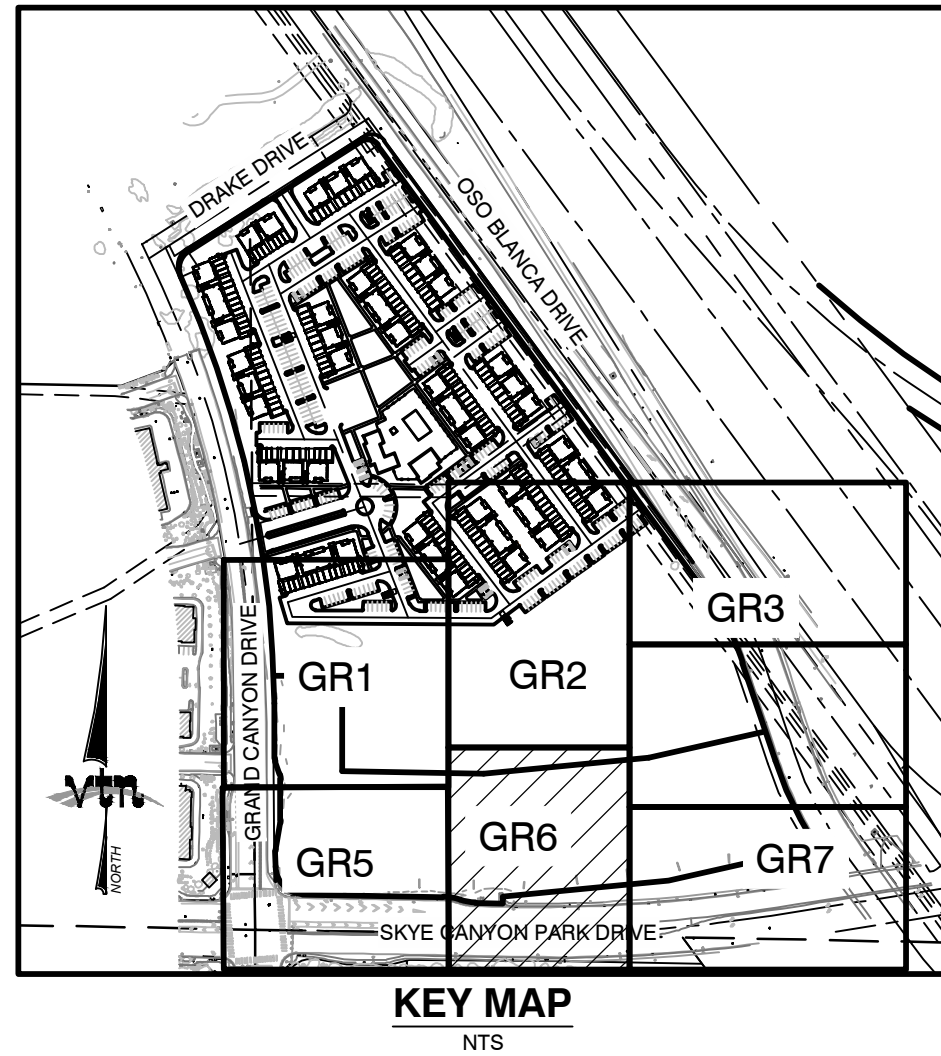
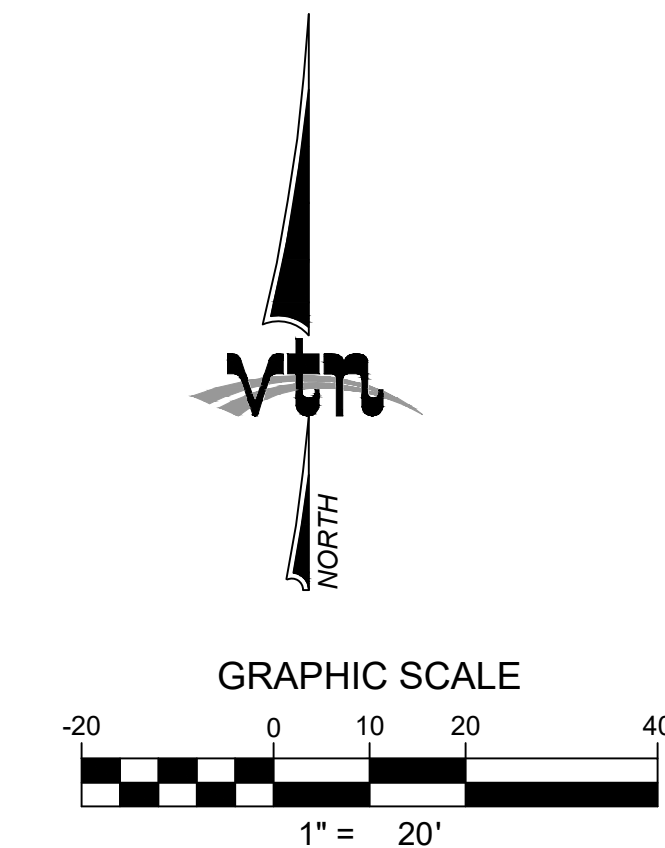


SHEET
GR5
8 OF -- SHEETS
DRAWING NO. ----

SEE SHEET GR5 FOR CONTINUATION



SEE SHEET GR7 FOR CONTINUATION



SIGHT VISIBILITY ZONES:

NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

STORM DRAIN NOTE:

ALL ONSITE STORM DRAINS ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

FLOOD ZONE NOTE:

SITE IS LOCATED IN A ZONE X AS SHOWN IN FIRM MAP #92080021735E, DATED SEPTEMBER 27, 2002. A ZONE X IS AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN.

CONSTRUCTION NOTES

1. CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
2. CONSTRUCT 8" CROSS GUTTER PER CCAUSD # 228
3. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
4. CONSTRUCT SIDEWALK PER CCAUSD # 234
5. SAWCUT AND MATCH EXISTING PER CCAUSD #500.1 & #500.2
6. CONSTRUCT HANDICAP RAMP PER CCAUSD #235 CASE I
7. CONSTRUCT BUS TURNOUT CURB & GUTTER PER CCAUSD #234.1

GRADING PERMIT NOTE

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE

GEOTECHNICAL NOTE:

REFER TO SOILS REPORT: ----
PROJECT # ----, DATED ----
ONLY # ----

BENCHMARK

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) (REVISED 2008)

CITY OF LAS VEGAS BENCHMARK: 6LV907C4
NAVD88 ELEVATION: 841.20 METERS (2759.84 FEET)

RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF HORSE DRIVE AND GRAND CANYON DRIVE

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FT/US)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00 SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,666 FT/US)
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FT/US)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

NOTES:
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO "GROUND" DISTANCES IN THE PROJECT AREA.
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

NOTE:

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.

ENGINEER DISCLAIMER NOTE:

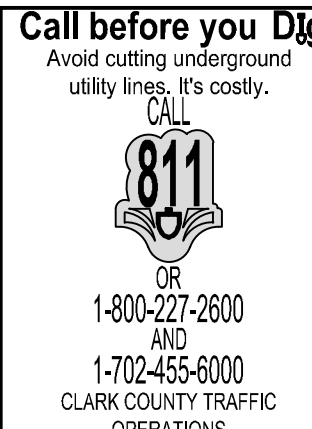
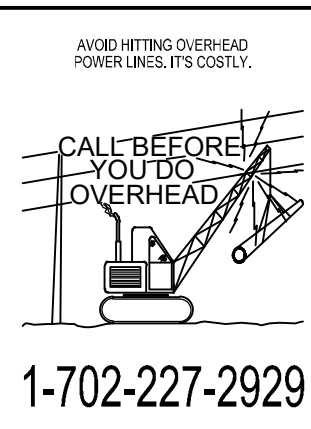
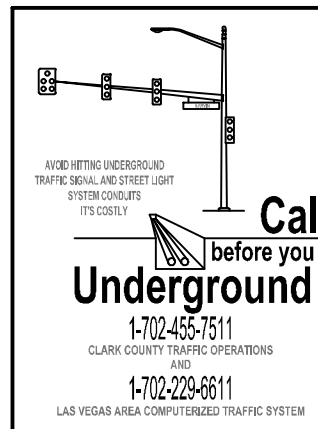
UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

EASEMENT NOTE:

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, AND PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOA.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH CITY OF LAS VEGAS, # ----

DARYN M. OHTA, P.E. No. 15906 DATE



CITY OF LAS VEGAS

GRAND CANYON VILLAGE LLC

GRADING PLAN 6

GRAND CANYON VILLAGE OFFSITES

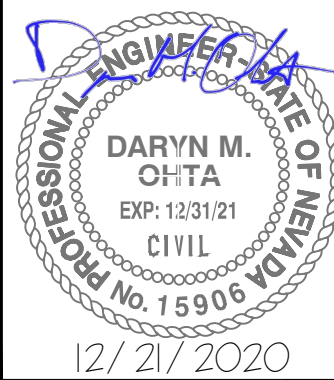
DRAWN BY: SEP 2020

DESIGNED BY: SEP 2020

CHECKED BY: SEP 2020

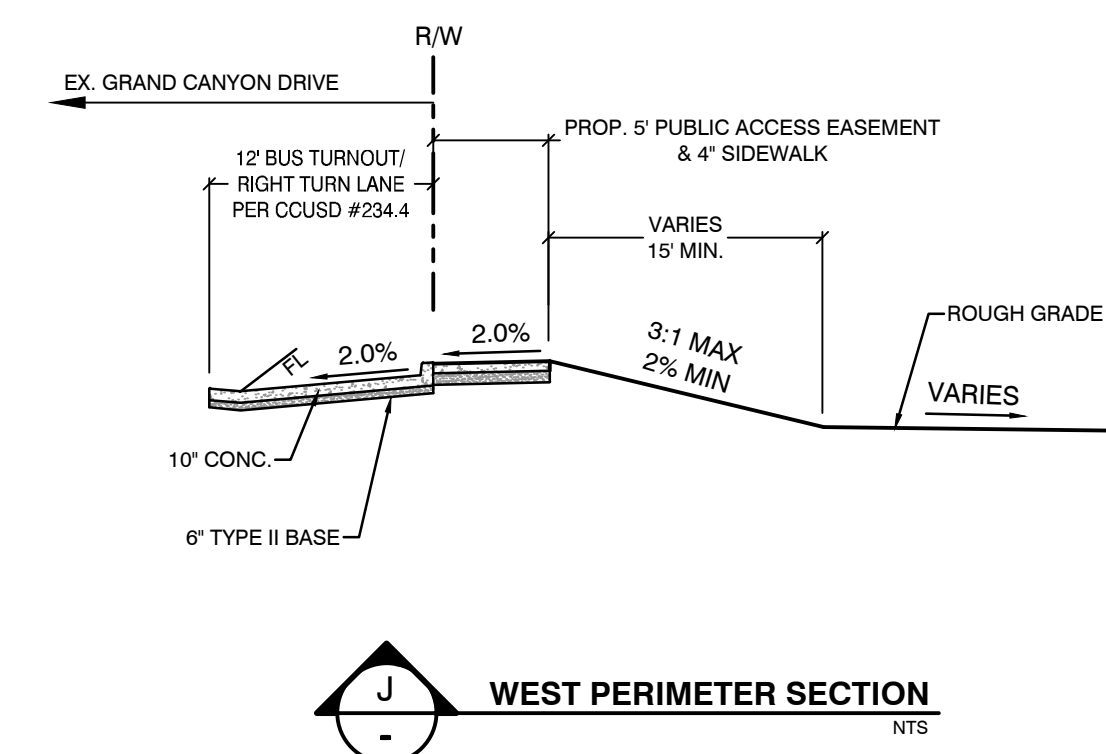
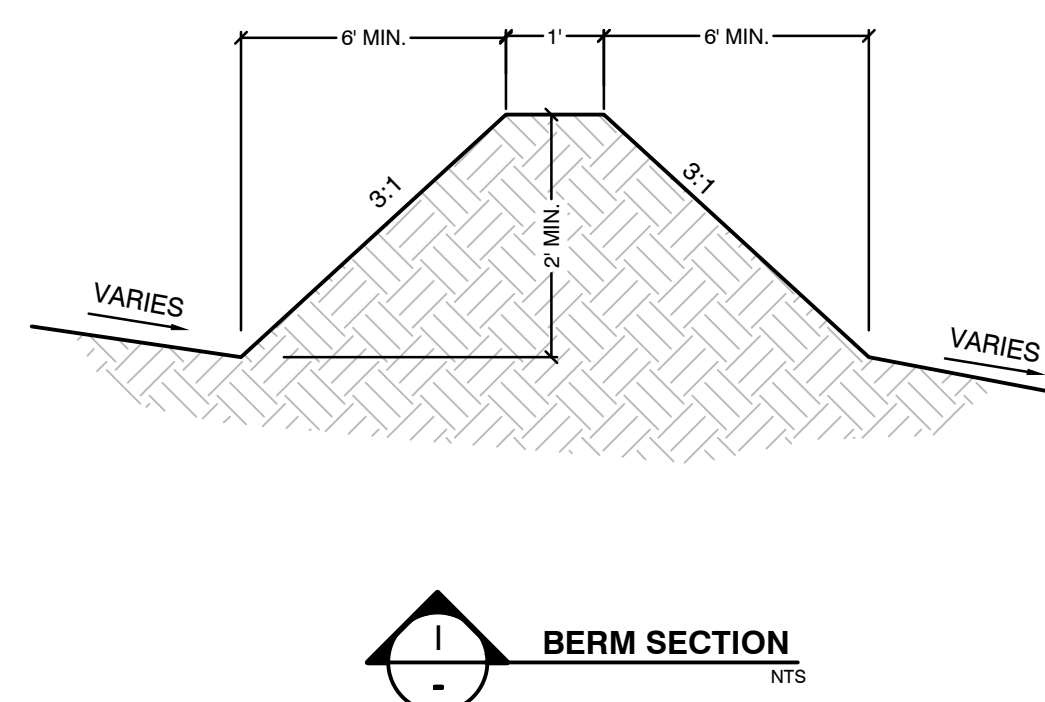
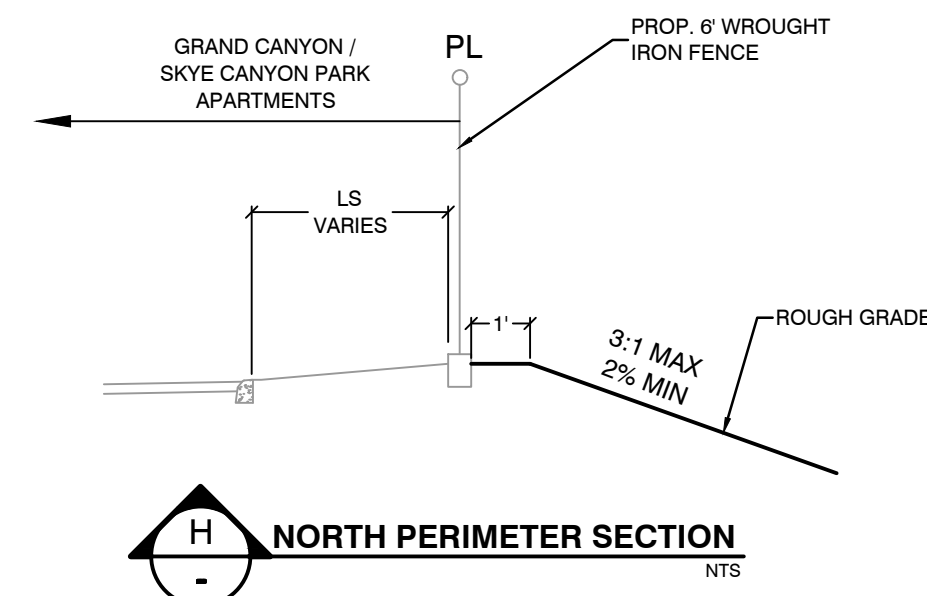
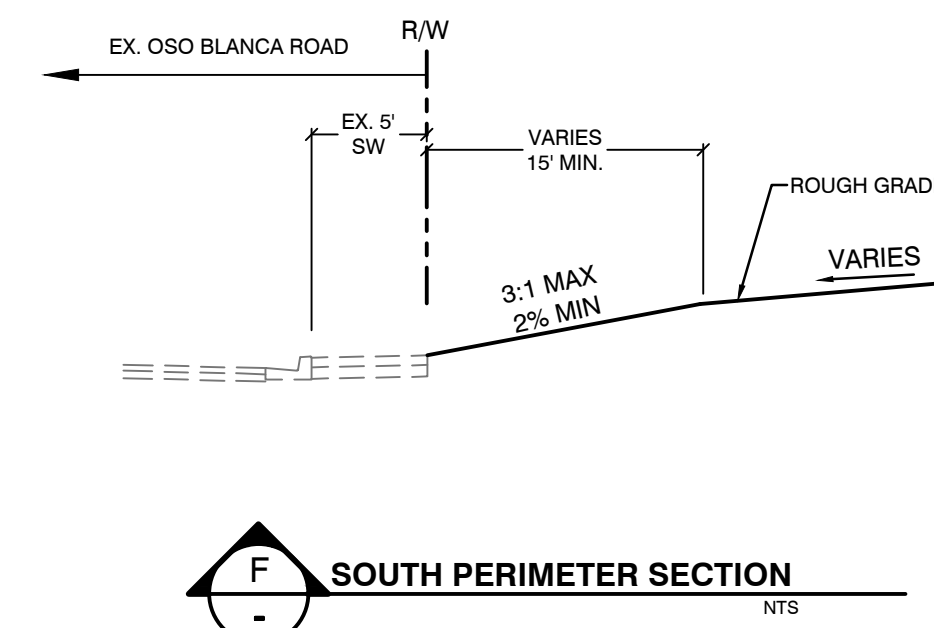
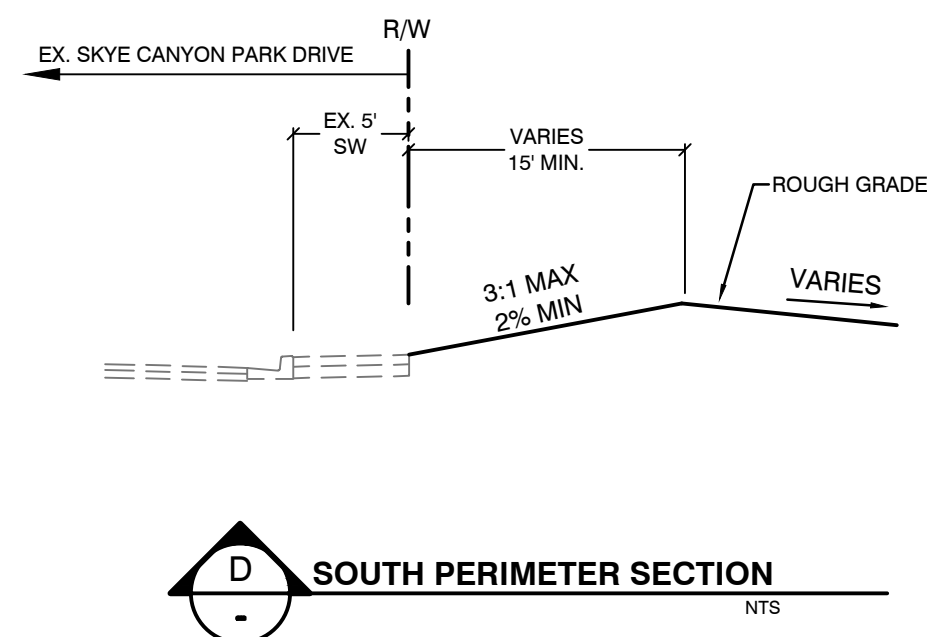
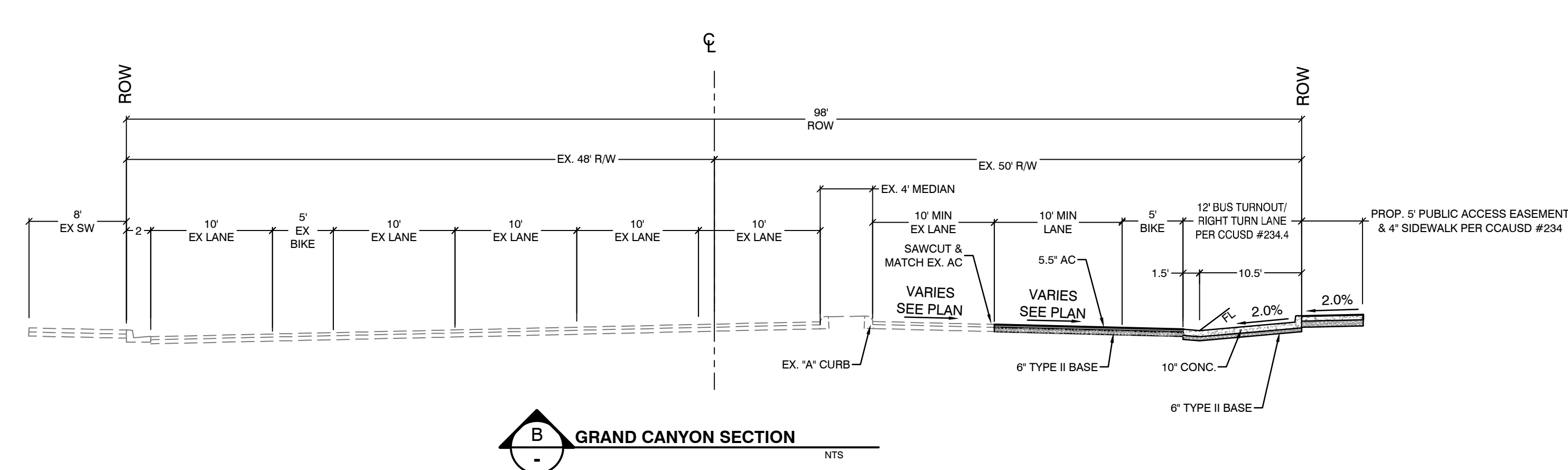
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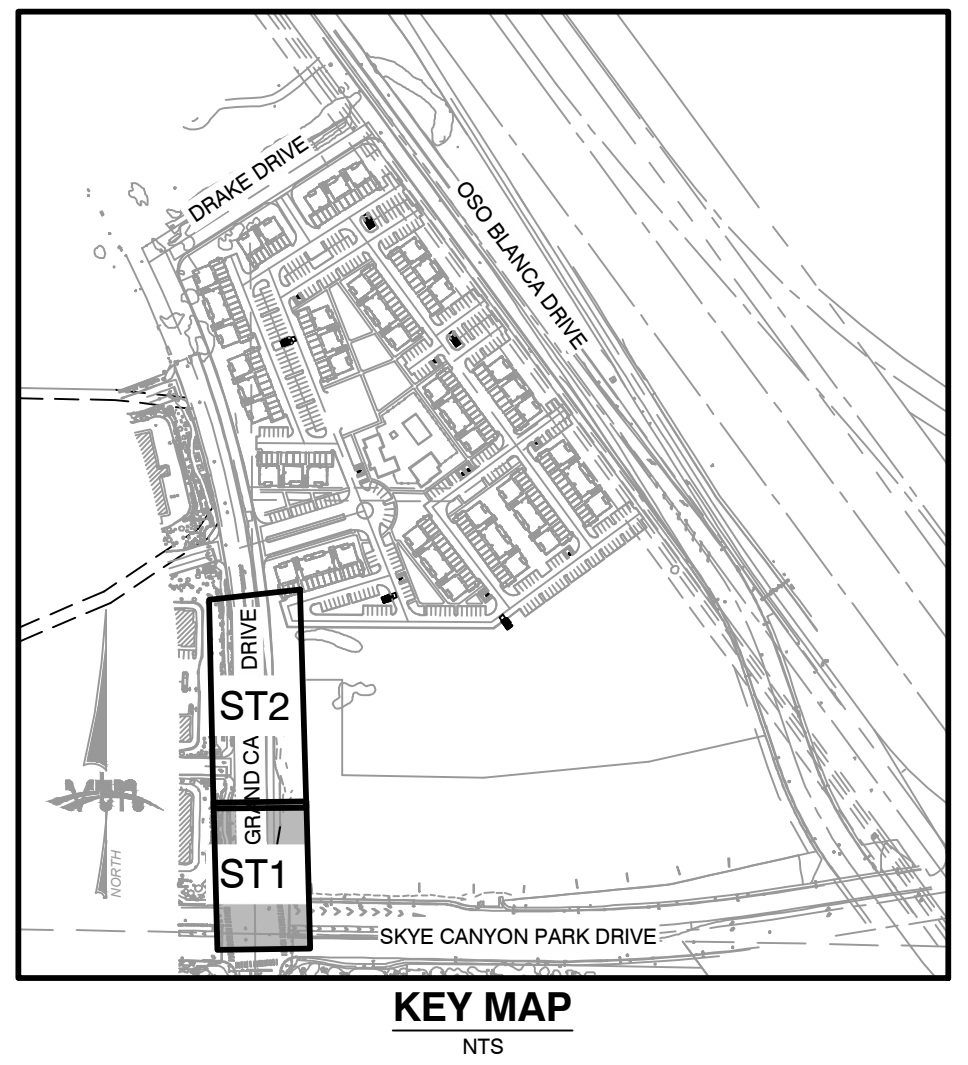
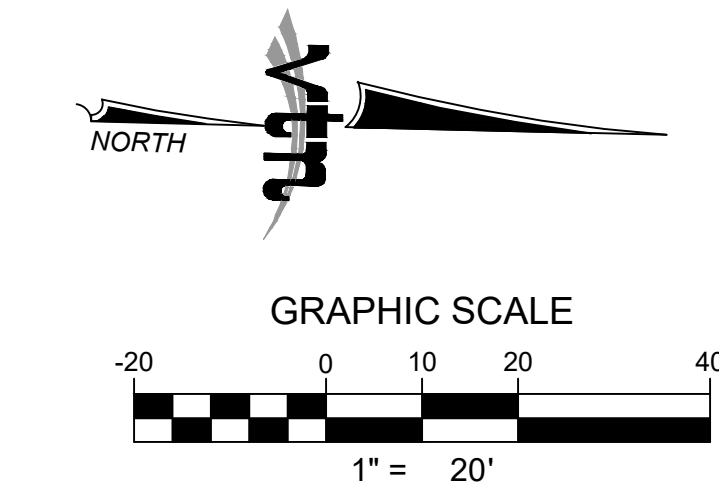
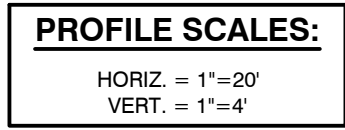
SCALE: 1" = 20' HORIZ. N/A VERT.



SHEET
9 OF 11 SHEETS
DRAWING NO. ----

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GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS). LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983. SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FTUS)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.0 SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 200,000,000.0 (6800, 16,986,067 FTUS)
EASTING AT CENTRAL MERIDIAN: 100,000,000.0 (3265, 985,3333 FTUS)

SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

- ① CONSTRUCT 24" TYPE "L" CURB & GUTTER
PER CCAUSD #216.
- ② CONSTRUCT 8" CROSS GUTTER
PER CCAUSD # 228
- ③ CONSTRUCT COMMERCIAL DRIVEWAY
PER CCAUSD #225
- ④ CONSTRUCT SIDEWALK PER CCAUSD # 234
- ⑤ SAWCUT AND MATCH EXISTING
PER CCAUSD #500.1 & #500.2
- ⑥ CONSTRUCT HANDICAP RAMP
PER CCAUSD #235 CASE I
- ⑦ CONSTRUCT BUS TURNOUT CURB & GUTTER
PER CCAUSD #234.1

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
(REVISED 2008)

CITY OF LAS VEGAS BENCHMARK: 6LV907C4
NAVD88 ELEVATION: 841.20 METERS (2759.44 FEET)

RIVET AND PLATE IN TOP OF CURB AT SOUTHEAST CORNER OF
HORSE DRIVE AND GRAND CANYON DRIVE.

SITE IS LOCATED IN A ZONE X AS SHOWN IN FIRM MAP #32003C1735E, DATED SEPTEMBER 27, 2002. A ZONE X IS AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN.

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

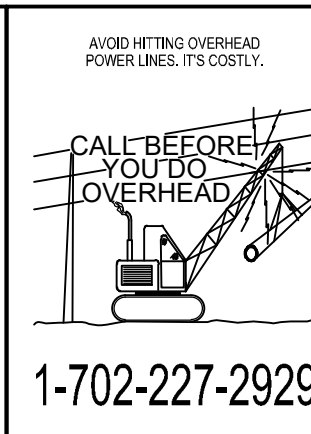
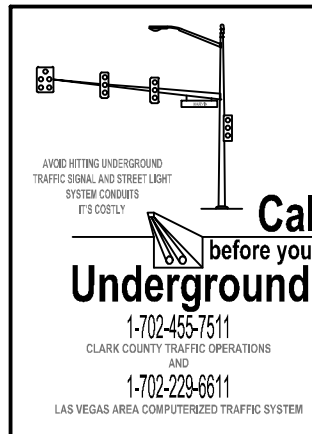
NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

CALL BEFORE YOU DIG

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS,
AND PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY
MAINTAINED BY HOA.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE
APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH
CITY OF LAS VEGAS, #----

DARYN M. OHTA, P.E. No. 15906 DATE



Call before you Dig
Avoid cutting underground utility lines. It's costly.

CALL
811

OR
1-800-227-2600
AND
1-702-455-6000

CLARK COUNTY TRAFFIC
OPERATIONS

GRAND CANYON VILLAGE LLC
10655 PARK RUN DRIVE, STE 160
LAS VEGAS, NEVADA 89144
702-220-4500

CITY OF LAS VEGAS

STREET PLAN AND PROFILE 1
GRAND CANYON DRIVE
10+00.00 TO 12+50.00

GRAND CANYON VILLAGE OFFSITES

DRAWN BY:

SIGNED BY:

1000

OBJECT NO: _____ SCALE: _____ 1"=20' HORIZ.

12/21/2020

SHEET
ST-1
12 OF -- SHEETS

DRAWING NO.

H:\8025\Sheet Set\DWG\8025-ST.dwg:12/21/2020 3:40 PM:dayno

