

DS #:

05270-1.

APN:

137-01-301-024

PROJECT:

Cl. f8 Shadows? Hickam - Update #1

SUBMITTAL:

2nd

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM

DATE:

July 8, 2020

TO:
Land Development Services
Department of Building & Safety

FROM:
Jennifer Shinn, P.E. *JS*
Flood Control, Engr. Associate
Department of Public Works

SUBJECT: Drainage Study for:
Cliff Shadows & Hickam – Update #1

COPIES TO:
Triton Engineering

Cross Streets: Cliff Shadows Pkwy and Hickam Ave

DR Horton

File Number: F:\Depot\DSMemos\DS5270B.doc

Bart Anderson, P.E., DevCo

Parcel Number: 137-01-301-024

Zoning Action: TMP-78025; SDR-78024

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	4/16/2020 & 5/20/2020	5/12/2020 & 5/20/2020	See Comments Below	\$400.00	3821275: \$400
2 nd Submittal	6/11/2020	7/6/2020	See Comments Below	\$100.00	3882208: \$100
TOTAL FEES (LDDRS):				\$500.00	----

REMARKS:

2nd Submittal: Update #1 – Lowering FFs, offsite berm and inlet pipe

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.

1. Label Document Number or Book and Page Number for all existing easements on the grading plan, including the BLM Grant along the western boundary of the subject site.
2. Revise the invert elevations in the WSPG models and/or Profiles so that they match.
3. The project proposes to build a temporary drainage facility along the western boundary of the subject site. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements (off-site berms or channels) and post a minimum maintenance bond of \$50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facility and an exhibit that adequately shows the location and limits of the drainage facility to City of Las Vegas Flood Control for approval. Once the drainage study is conditionally approved, the engineer should contact the City's Land Development Section (229-6371) to begin the agreement process.

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

The temporary drainage facilities shall be maintained by the Master Developer and shall not be transferred to any HOAs.

4. Provide a minimum 12-foot access along the berm and to the inlet pipe. Access to all manholes shall also be provided.

** Native in lieu → geotech must verify of Type II*

5. Provide a headwall at the inlet pipe as well as a concrete (not shotcrete) pad.
6. Provide a hydraulic section along the western berm to demonstrate the amount of freeboard provided by the berm. Address any erosion mitigation measures if applicable.

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: T20S/R59E/01

AREA K-01

Update #1
To The
TECHNICAL DRAINAGE STUDY
FOR
Cliff Shadows & Hickam

City of Las Vegas, Nevada

Prepared for:
DR Horton
1081 Whitney Ranch Drive, #141
Henderson, NV 89014
Office: (702)635-3600 - Fax: (702)538.0735

Prepared by:
Triton Engineering
6757 W. Charleston Blvd., Suite B
Las Vegas, NV 89146
Office: (702) 254-1480 - Fax: (702) 254-3062

APN 137-01-301-024

June 2020

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Update #1 Technical Drainage Study for Cliff Shadows & Hickam Date: June 11, 2020

Location of Development: a) Descriptive (Cross Streets) North/South: Cliff Shadows Parkway
East/West: Hickam Avenue

b) Section: 1 Township: 20S Range: 59E

c) APN: 137-01-301-024

Name of Owner: USA (OWNERS) DR Horton (DEVELOPER)

Telephone No.: (702) 672-1939 Fax No.: (702) 538-0735 E-Mail Address: JRGenovese@drhorton.com

Address: 1081 Whitney Ranch Drive #141, Henderson, NV 89014

Contact Person-Name: Kelly J. Wittwer, P.E. Telephone No.: (702) 254-1480

* E-Mail Address: KWittwer@tritoneng.com Fax No.: (702) 254-3062

Firm: Triton Engineering, LLC

Address: 6757 West Charleston Boulevard, Suite B, 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	

1. Total Owned Land Area: At Site: 10 ac Being Developed/Disturbed: 10 ac

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.): Residential

5. Approximate upstream land area which drains to the subject site: +/- 20 acres

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Conceptual Drainage Study for Cliff Shadows & Hickam DS5256A

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Storm drain facility on the northeast side of the property and Hickam Avenue

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



6/11/20
Engineer's Seal

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

***New Required Field**

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

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Update 1 Cliff Shadows & Hickam TDS

Map ID:

Firm Name: Triton Engineering

Engineer: Kelly Wittwer, P.E.

Address: 6757 West Charleston Boulevard, Suite B

City: Las Vegas

State: NV

Zip: 89146

Phone Number: (702) 254-1480

Fax Number: (702) 254-3062

Property Owner: USA (Owner) DR Horton (Developer)

Address: 1081 Whitney Ranch Drive #141

City: Henderson

State: NV

Zip: 89014

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

☒

☐

Design Manual **Standard Form 1** with the engineer's seal and signature.

UPDATE

☐

Design Manual **Standard Form 4**.

☒

☐

2 copies of the 24" x 36" Drainage Plan.

☐

NA

A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

Yes

No

☐

UPDATE

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

☐

UPDATE

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

III. DRAINAGE PLAN

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
	NA	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.
X		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.
X		Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
X		Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
X		Building and/or lot numbers.
	NA	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
	NA	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	
_____	NA	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.
_____	NA	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.
_____	NA	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes	No	
_____	UPDATE	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
_____	_____	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.
_____	_____	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.
_____	_____	Use of correct precipitation values in and around the McCarran Airport rainfall area.
_____	_____	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
_____	_____	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
_____	_____	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
_____	_____	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
_____	NA	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

- | | | |
|-------|-------|---|
| _____ | NA | Flow split calculations and supporting documentation or reference for the method of flow split calculations used. |
| X | _____ | Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q ₁₀₀ and Q ₁₀ flows representing the worst case for interior and all perimeter streets. Q ₁₀₀ d x v ≤ 8. Q ₁₀ d x v ≤ 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. |
| _____ | NA | Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.) |
| X | _____ | Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate. |
| X | _____ | Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q ₁₀₀ weir height or flow depth, whichever is greater. |
| X | _____ | A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. <ul style="list-style-type: none"> • 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. |
| _____ | NA | Provide a 50 percent clogging factor in the capacity calculation for drop inlets. |
| _____ | NA | Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation. |
| X | _____ | The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed. |
| _____ | NA | 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 (CCRFC) 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 CCRFC Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFC 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	
	NA	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.)
	NA	Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
X		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
X		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
X		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
X		Back of lot elevations and lot drainage pattern for all lots including common lots.
X		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.)
X		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.
X		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	
X		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.
X		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.
	NA	The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
X		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
X		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	
	NA	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.
	NA	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.



June 10, 2020

Albert Sung
City of Las Vegas
Flood Control Division Department of Public Works
333 N. Rancho Drive
Las Vegas, NV 89106

**Subject: Update #1 to the Technical Drainage Study for Cliff Shadows & Hickam
(DS5270A)**

Mr. Sung:

This document and attachments will serve as Update #1 to the Technical Drainage Study for Cliff Shadows & Hickam which was approved by the City of Las Vegas on May 20, 2020 (see attached Figures 1 & 2 for vicinity & location map). The original drainage study was prepared to address drainage and grading improvements for a proposed 10-acre residential subdivision. This update addresses the following changes:

- Lowering finished floors of lots 15 – 51 and lots 58 -66 to meet the water pressure requirement.
- Redesign of the drainage facility to intercept the 40 cfs at point DPT1 as shown on Figure 5
- Addition of an earthen berm along a portion of the western boundary to intercept runoff from basin OFF1E and convey it onsite via a proposed 10-foot-wide trapezoidal rip rap channel.

Excerpts from the original TDS are included in the appendix for reference.

HYDROLOGY

The hydrology only slightly changed due to the revisions in this update. Since the slope of Wild Parsley Avenue was reduced from 1.95% to 1.22% the half street capacity was reduced from 10 cfs to 8 cfs. Therefore, it is likely that 2 cfs on the north side of the street might overtop the crown to the south side and flow south down Desert Flora Street. However, the analysis in the original report is conservative to assume that the 2 cfs impacts the adjacent Concordia Residential site. Therefore, the hydrology was not revised. Ultimately all runoff is combined in Hickam Avenue following the natural drainage path.

HYDRAULICS

Normal Depth Hydraulics

An earthen berm is proposed along a portion of the western boundary of the site. This berm will convey runoff generated by basin OFF1E to a 10 foot wide rip rap channel designed to concentrate the runoff into the 5 foot wide concrete channel - as opposed to the original design allowing it to sheet flow down the embankment. The original Section A has been relocated to this rip rap channel and explained below:

Section A: Section A is a 10-foot-wide trapezoidal rip rap channel at a 40% slope. Upstream runoff is generated by basin OFF1E and estimated to be 7 cfs. Per the attached rip rap calculations, the $d_{50} = 1.50$ feet.

Due to minor street slope revisions, the following street sections were revised:

Section 1: Section 1 was taken across the northern half street of Wild Parsley Avenue to estimate the half street capacity. With a revised slope of 1.22%, the half street capacity was reduced from 10 cfs to 8 cfs. Please note the hydrology analyses was not revised – see discussion above under HYDROLOGY.

Section 2: Section 2 was taken across Desert Flora Street. Since the street slopes slightly changed from the original TDS, this section was revised. Calculations are attached and the results are shown on Figure 5.

WSPG

The design to intercept runoff from point DPT1 onto the subject site has been revised with this update. The original concept was to allow runoff to sheet flow down a block wall into a 10-foot-wide concrete channel and be routed east to the existing storm drain system adjacent to Concordia. The attached revised design proposes to intercept the runoff from point DPT1 via a headwall entrance into a 36" RCP storm drain system with two drop manholes. This storm drain system will outlet into the 10-foot-wide concrete channel as shown on Figure 5. Three separate WSPG's were modeled to best estimate the HGL in the drop manhole system and explained below:

LAT 1: The WSPG System Outlet starts at the 10-foot-wide concrete channel where it transitions to rip rap near the northeast corner of the subject site. The outlet HGL input into the WSPG model is the invert of the channel at the outlet - which defaults to critical depth. The System Headworks is at SDMH #2. The headworks HGL input into the WSPG model is the headworks invert plus 3.3 feet (which is the depth estimated from the attached nomograph chart for inlet control of a 36" RCP with a Q100 of 40 cfs). Please note the channel portion of this section was modeled with runoff from point DPT1c (48 cfs) to simplify the analysis and to provide conservative results. Also note that the channel portion of LAT1 was only analyzed to check for hydraulic jumps and to provide downstream conditions from the drop manhole structure – therefore the HGL in the channel is not plotted on any profiles in the plan set. The hydraulic model is attached along with results shown on the WSPG Summary Table.

LAT 2: The WSPG System Outlet starts at the SDMH#2. The system outlet HGL input into the WSPG model is the invert of the outlet - which defaults to critical depth. The System Headworks is at SDMH #1. The headworks HGL input into the WSPG model is the invert the plus 3.3 feet (which is the depth estimated from the attached nomograph chart for inlet control of a 36" RCP with a Q100 of 40 cfs). The hydraulic model is attached along with results shown on the WSPG Summary Table.

LAT 3: The WSPG System Outlet starts at the SDMH#1. The system outlet HGL input into the WSPG model is the invert of the outlet which defaults to critical depth. The System Headworks is at the headwall entrance into a 36" RCP. The headworks HGL input into the WSPG model is the invert the plus 3.3 feet (which is the depth estimated from the attached nomograph chart for inlet control of a 36" RCP with a Q100 of 40 cfs). The hydraulic model is attached along with results shown on the WSPG Summary Table.

CRITERIA

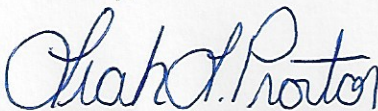
The revisions of this update meet all criteria that was discussed in the original submittal.

CONCLUSION

The purpose of this update was to submit a revised plan to intercept offsite runoff from the west. This update also addresses revisions to various finished floor elevations to meet water pressure requirements. There was no change in hydrology. All Criterion is met and there are no negative impacts due to the revision.

If you have any questions, please contact me at 720-244-5574, or email Leah@MomentumEngineers.com.

Sincerely,



Momentum Engineers, Ltd.

Leah L. Proctor, P. E.

Subcontractor for

Triton Engineering, LLC

LIST OF APPENDICES

Figures

Figure 5 – Developed Conditions Drainage Map

Hydraulic Calculations

Nomograph Calculations

Normal Depth Street Capacity & Easement Calculations

Rip Rap Calculation

WSPG Analysis

WSPG Summary Table

WSPG Input and Output Models for LAT1, LAT2 & LAT3

Reference Material

Cliff Shadows & Hickam TDS

Plans and Details

FIGURES

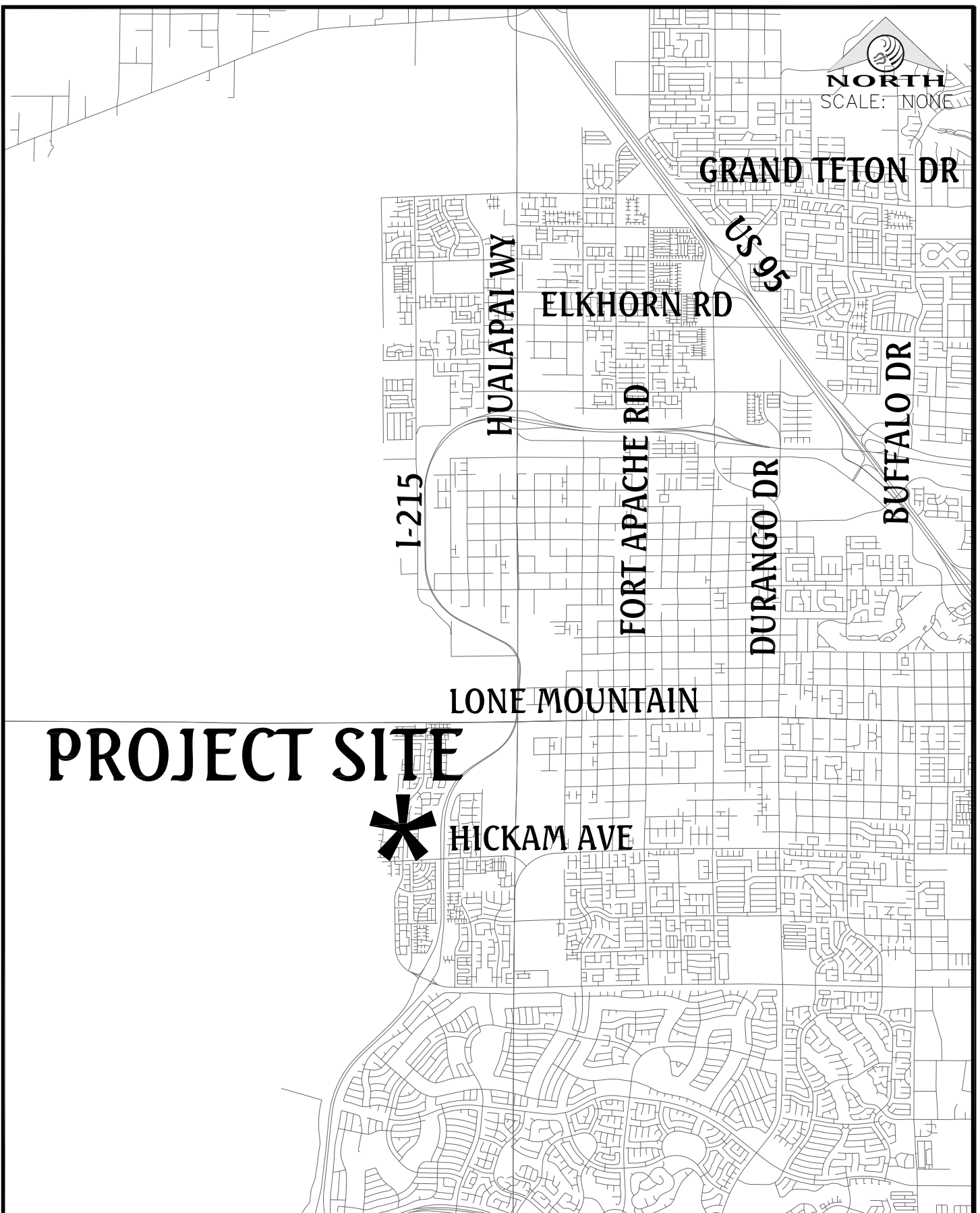


FIGURE 1

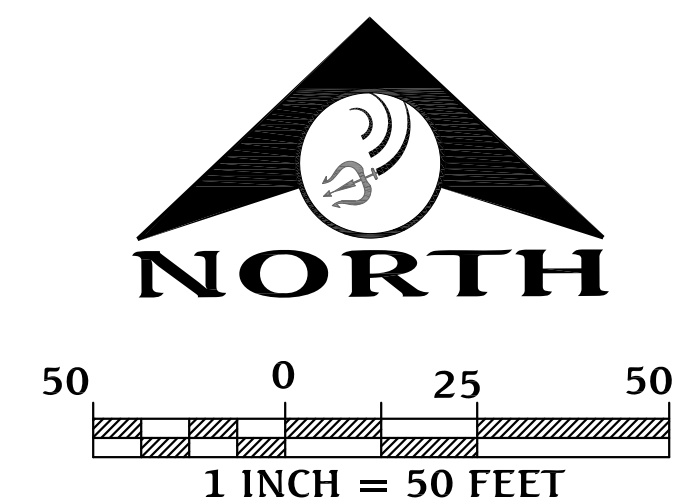
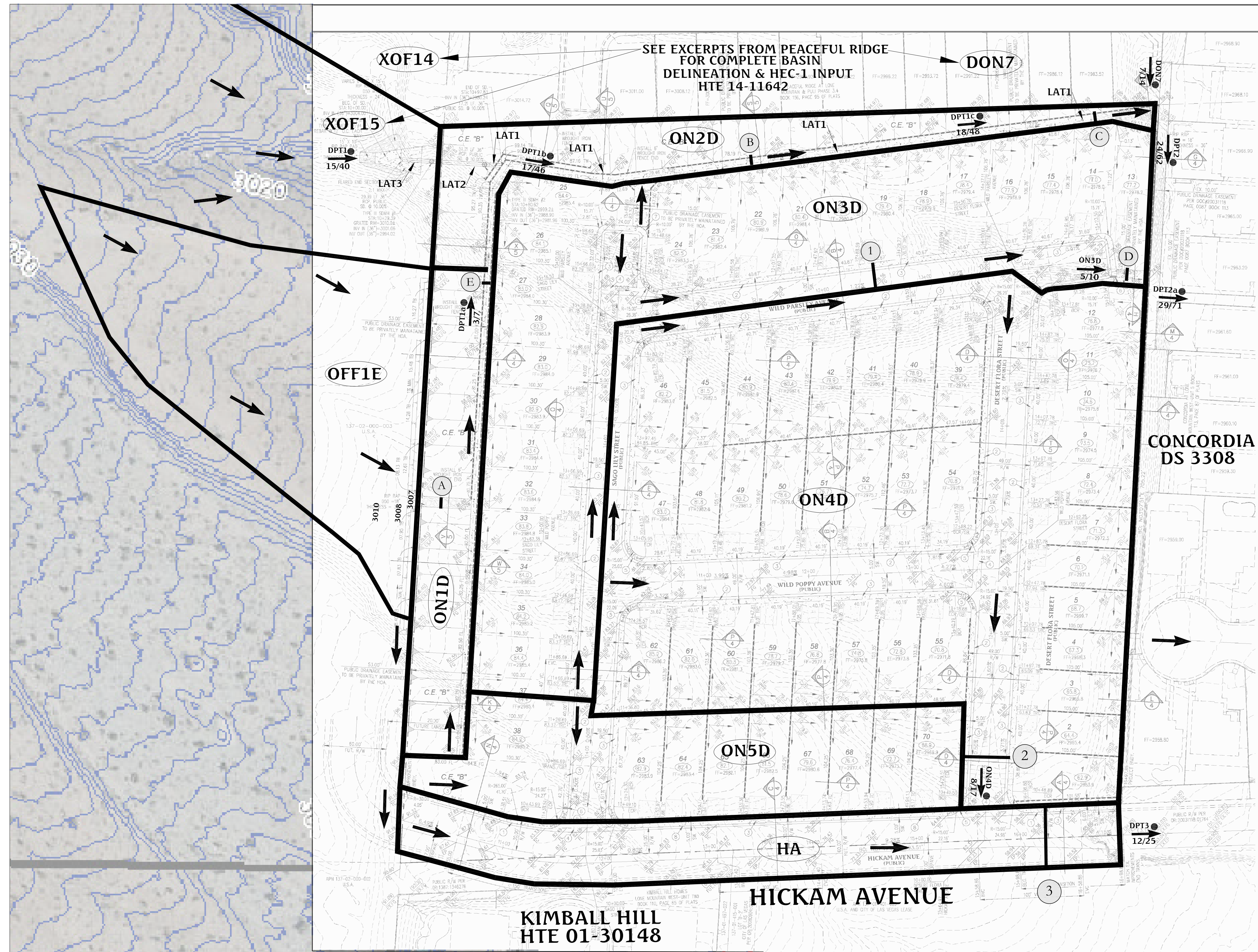


FIGURE 2

**CLIFF SHADOWS & HICKAM
LOCATION MAP**



Triton
Engineering



DRAINAGE LEGEND	
XT32	BASIN IDENTIFICATION
—	BASIN BOUNDARY
● CPT4	CONCENTRATION POINT
→	FLOW PATH
X	HYDRAULIC CROSS SECTION
XX/XX	10YR/100YR RUNOFF CFS

PEAK FLOW RATES FOR DEVELOPED CONDITIONS TDS CLIFF SHADOWS & HICKAM				
CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS		NOTES
		10-YR	100-YR	
XOF14		3	8	1
XOF15		12	33	1
DPT1		15	40	
OFF1E	1.67	2	5	
ON1D	0.58	1	2	
DPT1a		3	7	
DPT1b		17	46	
ON2D	0.75	1	3	
DPT1c		18	48	
DON7		7	14	1
DPT2		24	62	
ON3D	3.01	5	10	
DPT2a		29	71	
ON4D	5.07	8	17	
ON5D	1.22	2	4	
HA	0.98	2	4	
DPT3		12	25	

1. See Excerpts from Peaceful Ridge

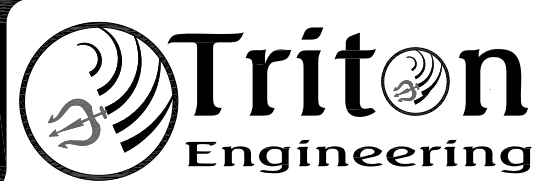
NORMAL DEPTH CALCULATIONS FOR EASEMENTS, CHANNELS, & SWALES						
DEVELOPED CONDITIONS						
HYDRAULIC SECTION LABEL	DESCRIPTION	SLOPE, PERCENT	Q ₁₀₀ CFS	D ₁₀₀ NORMAL FEET	V ₁₀₀ NORMAL FEET/SEC	V ₁₀₀ Vel. Head FEET
A	Rip Rap Channel	40	5	0.015	7.67	0.91
B	10-ft Concrete Easement	1.5	48	0.67	8.83	1.21
C	Rip Rap Channel (varying width)	7.3	48	0.72	8.08	1.02
D	15-ft Concrete Easement	1.33	10	0.24	3.98	0.25

STREET CAPACITY CALCULATIONS UPDATE #1 TDS CLIFF SHADOWS & HICKAM						
DEVELOPED CONDITIONS						
HYDRAULIC SECTION	SLOPE, %	RUNOFF BASIN/POINT	Q ₁₀ / Q ₁₀₀ CFS	D ₁₀ / D ₁₀₀ , FEET	V ₁₀ / V ₁₀₀ , FPS	V ₁₀ * D ₁₀ / V ₁₀₀ * D ₁₀₀
1 (Half Street Capacity)	1.22	*	na / 8	na / 0.38	na / 2.84	na / 1.07
2	0.5 (min)	ON4D	8 / 17	0.35 / 0.44	1.17 / 2.09	0.41 / 0.92
2	4.27 (max)	ON4D	8 / 17	0.26 / 0.32	3.86 / 4.61	1.00 / 1.47
3 (Hickam Half Street)	4.15	DPT3	12 / 25	0.43 / 0.55	5.28 / 5.40	2.27 / 2.97

* This section was analyzed to estimate the half street capacity only

UDPATE #1 TECHNICAL DRAINAGE STUDY FOR CLIFF SHADOWS & HICKAM
DEVELOPED CONDITIONS DRAINAGE MAP

FIGURE 5

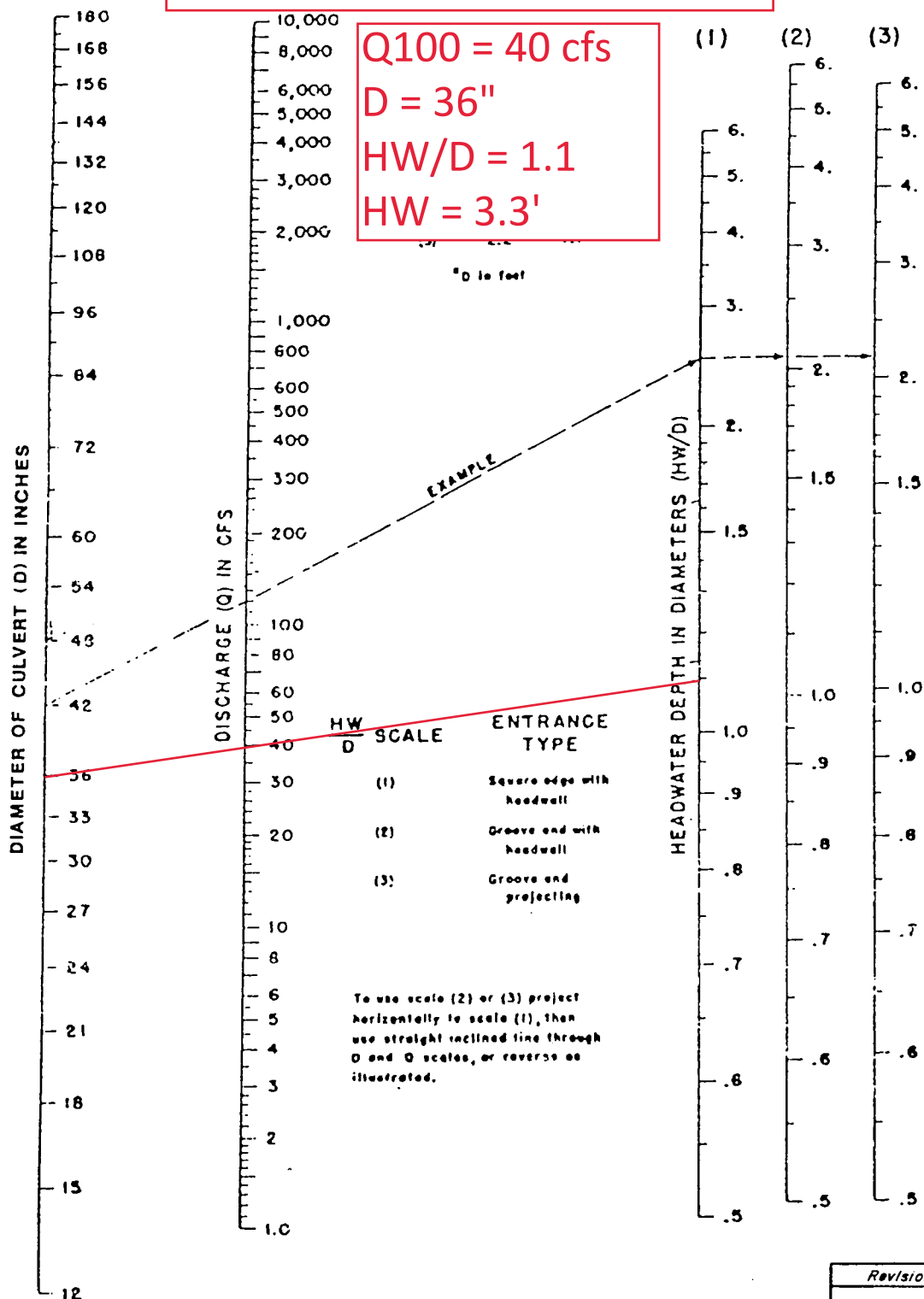


HYDRAULIC CALCULATIONS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

NOMOGRAPH 36" RCP



Revision	Date

Worksheet for Section 1 Half Street Capacity

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 0.01220 ft/ft
Normal Depth 0.38 ft
Section Definitions

Station (ft)	Elevation (ft)
0+00.000	1.00
0+00.000	0.48
0+05.000	0.38
0+05.000	0.38
0+07.000	0.00
0+08.000	0.08
0+08.000	0.12
0+25.000	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 1.00)	(0+25.000, 0.38)	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

Discharge 8.33 ft³/s
Elevation Range 0.00 to 1.00 ft
Flow Area 2.93 ft²
Wetted Perimeter 20.08 ft
Hydraulic Radius 0.15 ft

Worksheet for Section 1 Half Street Capacity

Results

Top Width	20.00	ft
Normal Depth	0.38	ft
Critical Depth	0.41	ft
Critical Slope	0.00683	ft/ft
Velocity	2.84	ft/s
Velocity Head	0.13	ft
Specific Energy	0.51	ft
Froude Number	1.31	
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	0.38	ft
Critical Depth	0.41	ft
Channel Slope	0.01220	ft/ft
Critical Slope	0.00683	ft/ft

Cross Section for Section 1 Half Street Capacity

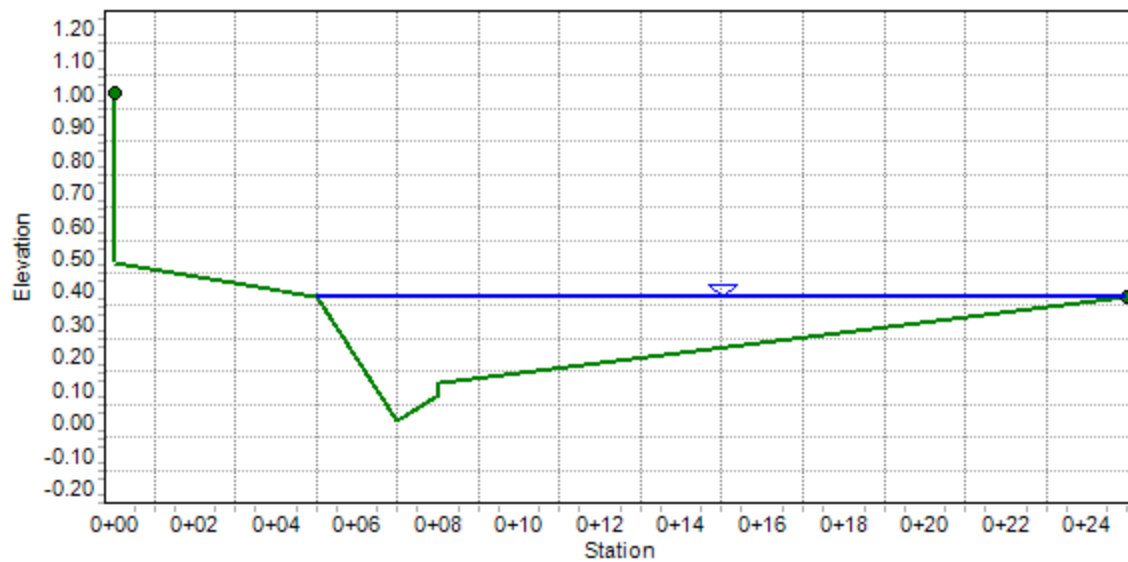
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01220	ft/ft
Normal Depth	0.38	ft
Discharge	8.33	ft ³ /s

Cross Section Image



Worksheet for Section 2 10yr max

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04270	ft/ft
Discharge	8.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.000	1.00
0+00.000	0.48
0+05.000	0.38
0+05.000	0.38
0+07.000	0.00
0+08.000	0.08
0+08.000	0.12
0+25.000	0.38
0+42.000	0.12
0+42.000	0.08
0+43.000	0.00
0+44.000	0.38
0+44.000	0.38
0+49.000	0.48
0+49.000	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 1.00)	(0+49.000, 1.00)	0.016

Options

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

Worksheet for Section 2 10yr max

Results

Normal Depth		0.26	ft
Elevation Range	0.00 to 1.00 ft		
Flow Area		2.07	ft ²
Wetted Perimeter		23.05	ft
Hydraulic Radius		0.09	ft
Top Width		22.89	ft
Normal Depth		0.26	ft
Critical Depth		0.33	ft
Critical Slope		0.00755	ft/ft
Velocity		3.86	ft/s
Velocity Head		0.23	ft
Specific Energy		0.49	ft
Froude Number		2.26	
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	0.26	ft
Critical Depth	0.33	ft
Channel Slope	0.04270	ft/ft
Critical Slope	0.00755	ft/ft

Cross Section for Section 2 10yr max

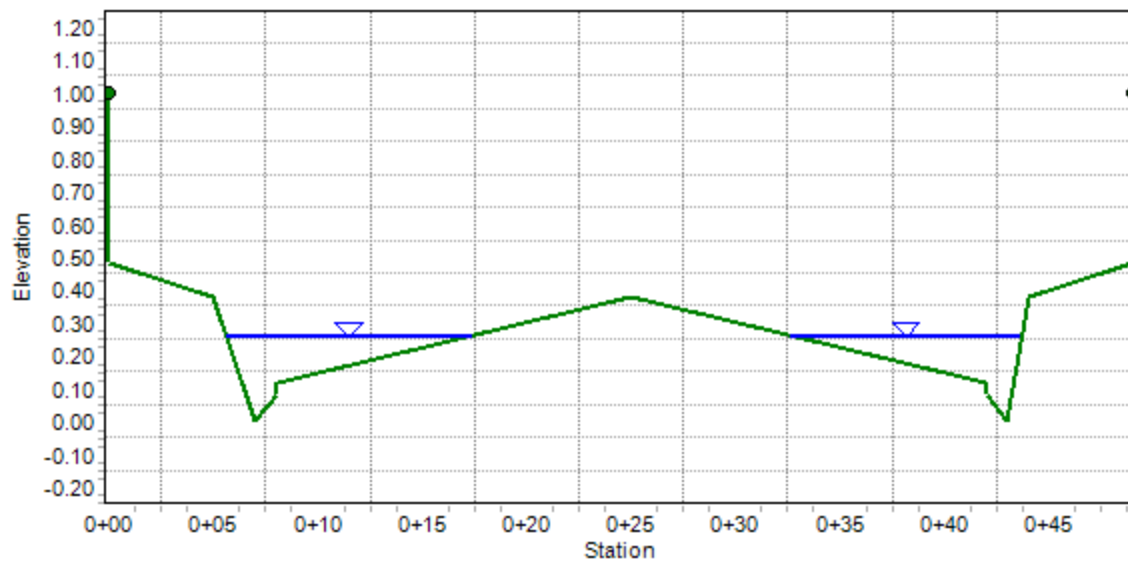
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04270	ft/ft
Normal Depth	0.26	ft
Discharge	8.00	ft ³ /s

Cross Section Image



Worksheet for Section 2 10yr min

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	8.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.000	1.00
0+00.000	0.48
0+05.000	0.38
0+05.000	0.38
0+07.000	0.00
0+08.000	0.08
0+08.000	0.12
0+25.000	0.38
0+42.000	0.12
0+42.000	0.08
0+43.000	0.00
0+44.000	0.38
0+44.000	0.38
0+49.000	0.48
0+49.000	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 1.00)	(0+49.000, 1.00)	0.016

Options

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

Worksheet for Section 2 10yr min

Results

Normal Depth		0.35	ft
Elevation Range	0.00 to 1.00 ft		
Flow Area		4.69	ft ²
Wetted Perimeter		35.53	ft
Hydraulic Radius		0.13	ft
Top Width		35.34	ft
Normal Depth		0.35	ft
Critical Depth		0.33	ft
Critical Slope		0.00755	ft/ft
Velocity		1.71	ft/s
Velocity Head		0.05	ft
Specific Energy		0.40	ft
Froude Number		0.83	
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	0.00500	ft/ft
Critical Slope	0.00755	ft/ft

Cross Section for Section 2 10yr min

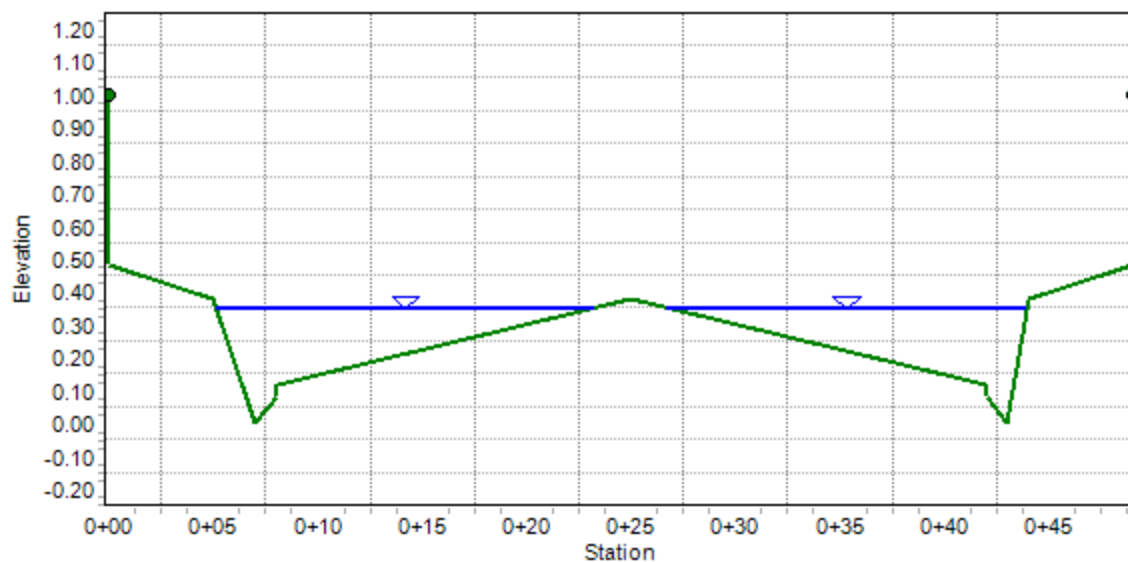
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.35	ft
Discharge	8.00	ft ³ /s

Cross Section Image



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

Options

Bentley Systems, Inc. Haestad Methods Software Center Master V8i (SELECTseries 1) [08.11.01.03]
6/10/2020 9:32:23 AM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for Section 2 100yr max

Results

Normal Depth		0.32	ft
Elevation Range	0.00 to 1.00 ft		
Flow Area		3.68	ft ²
Wetted Perimeter		31.33	ft
Hydraulic Radius		0.12	ft
Top Width		31.15	ft
Normal Depth		0.32	ft
Critical Depth		0.42	ft
Critical Slope		0.00678	ft/ft
Velocity		4.61	ft/s
Velocity Head		0.33	ft
Specific Energy		0.65	ft
Froude Number		2.36	
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	0.32	ft
Critical Depth	0.42	ft
Channel Slope	0.04270	ft/ft
Critical Slope	0.00678	ft/ft

Cross Section for Section 2 100yr max

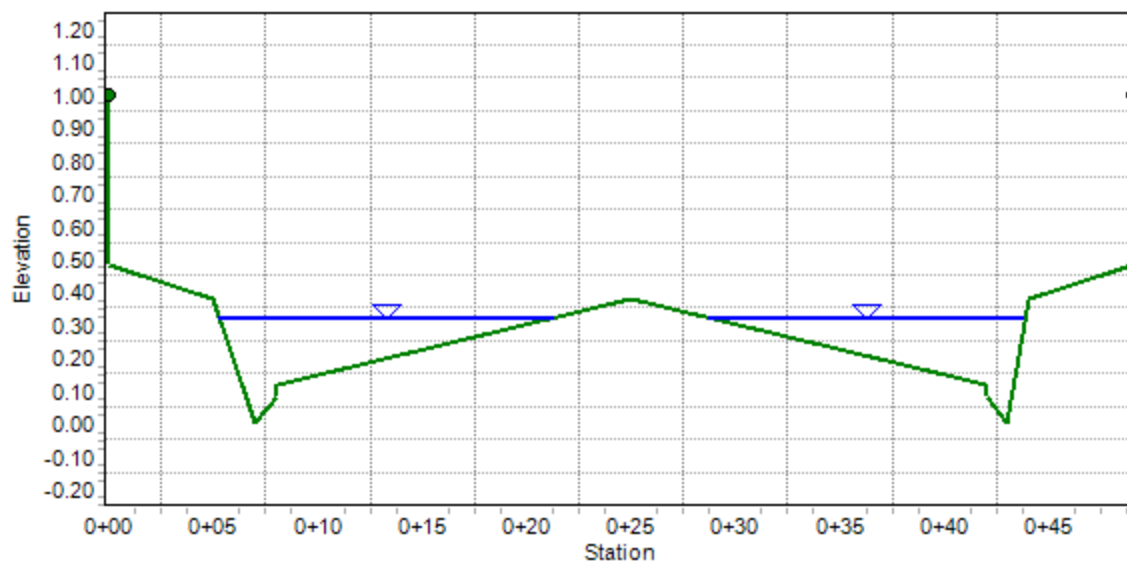
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04270	ft/ft
Normal Depth	0.32	ft
Discharge	17.00	ft ³ /s

Cross Section Image



Worksheet for Section 2 100yr min

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	17.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.000	1.00
0+00.000	0.48
0+05.000	0.38
0+05.000	0.38
0+07.000	0.00
0+08.000	0.08
0+08.000	0.12
0+25.000	0.38
0+42.000	0.12
0+42.000	0.08
0+43.000	0.00
0+44.000	0.38
0+44.000	0.38
0+49.000	0.48
0+49.000	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 1.00)	(0+49.000, 1.00)	0.016

Options

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

Worksheet for Section 2 100yr min

Results

Normal Depth		0.44	ft
Elevation Range	0.00 to 1.00 ft		
Flow Area		8.12	ft ²
Wetted Perimeter		45.05	ft
Hydraulic Radius		0.18	ft
Top Width		44.85	ft
Normal Depth		0.44	ft
Critical Depth		0.42	ft
Critical Slope		0.00678	ft/ft
Velocity		2.09	ft/s
Velocity Head		0.07	ft
Specific Energy		0.51	ft
Froude Number		0.87	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.44	ft
Critical Depth	0.42	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00678	ft/ft

Cross Section for Section 2 100yr min

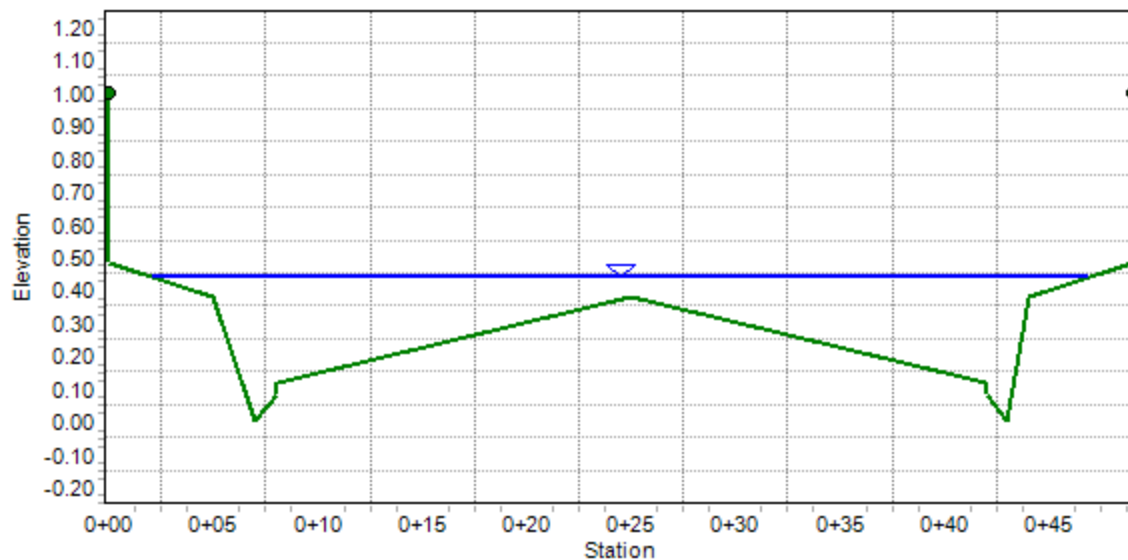
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.44	ft
Discharge	17.00	ft ³ /s

Cross Section Image



Worksheet for Section A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.033	
Channel Slope	0.40000	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	5.00	ft ³ /s

Results

Normal Depth	0.15	ft
Flow Area	0.65	ft ²
Wetted Perimeter	4.68	ft
Hydraulic Radius	0.14	ft
Top Width	4.61	ft
Critical Depth	0.34	ft
Critical Slope	0.02467	ft/ft
Velocity	7.67	ft/s
Velocity Head	0.91	ft
Specific Energy	1.07	ft
Froude Number	3.59	
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	0.15	ft
Critical Depth	0.34	ft
Channel Slope	0.40000	ft/ft

Worksheet for Section A

GVF Output Data

Critical Slope 0.02467 ft/ft

Cross Section for Section A

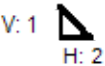
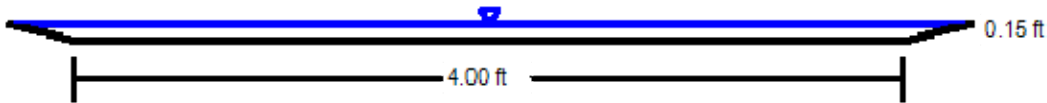
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.033	
Channel Slope	0.40000	ft/ft
Normal Depth	0.15	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	5.00	ft³/s

Cross Section Image



SIZING OF RIPRAP STONE FOR CHANNEL STABILITY SECTION A

Based on criteria stated in the *CCRFCD Hydrologic Criteria and Drainage Design MANUAL*

The **MANUAL** recommends that estimates of preliminary stone size be based on equations 734 and 735 as follows:

[734]

$$V = 3 (d_{50})^{0.5} (S_s - 1) / S^{0.17}$$

where V = mean channel velocity in feet per second
 S = longitudinal slope in feet per foot
 S_s = specific gravity of the stone (minimum S_s = 2.50)
 d₅₀ = Rock Size, in feet, for which 50% of the rock by weight is smaller

Spreadsheet calculation: $d_{50} = \{(V S^{0.17}) / 3(S_s - 1)\}^2$

Input: V= fps
 S= ft/ft
 S_s =

Output: d₅₀ = ft (an estimate)

[735]

$$d_{50} = 0.010 V^{2.44}$$

where V = mean channel velocity in feet per second
 d₅₀ = Rock Size, in feet, for which 50% of the rock by weight is smaller

Spreadsheet calculation: $d_{50} = 0.010 V^{2.44}$

Input: V= fps
 d₅₀ = ft (an estimate)

The **MANUAL** recommends that final design of stone size be based on equation 736 as follows:

[736]

$$d_{50} = 14.2 F_s Y_{\max} S_e / K_1$$

where d₅₀ = Rock Size, in feet, for which 50% of the rock by weight is smaller
 F_s = Stability Factor:

 =1.0 - 1.2, for straight or mildly curving reach
 =1.2 - 1.4, for moderate bend curvature with minor impact from floating debris
 =1.4 - 1.6, for sharp bend with significant impact from floating debris and waves
 =1.6 - 2.0, for rapidly varying flow with significant uncertainty in design

 Y_{max} = maximum channel depth in feet
 S_e = average energy slope, in feet per foot
 K₁ = bank angle modification factor

$K_1 = [1 - (\sin^2 \Theta / \sin^2 \varphi)]^{0.5}$
 Θ = bank angle with horizontal
 ϕ = riprap material angle of repose (use 42 deg.)

Spreadsheet calculation: $d_{50} = 14.2 F_s Y_{\max} S_e / K_1$

Input: F_s =
 Y_{max} = feet
 S_e = feet /foot
 Θ = degrees
 ϕ = degrees

Output: d₅₀ = ft (final design)

WSPG & SUPPORTING DOCUMENTS

LAT 1 WSPG SUMMARY TABLE UPDATE #1 CLIFF SHADOWS & HICKAM								
WSPG STA	DESCRIPTION OR MH#	FACILITY DIMENSION	Q100 (Upstream) cfs	INLET/JUNCTION cfs	FG/GRATE/RIM ft	HGL ft	FG - HGL ft	NOTES
-1569.83	CHANNEL	10' CHANNEL	48	NA	NA	2974.49	NA	OULTET AT LAT1*
(-1569.83) - (-1097.783)	CHANNEL REACH	10' CHANNEL	48	NA				
(-1097.830)	SD OUTFALL	36" RCP	40	8	NA	2981.53	NA	36" RCP DAYLIGHTS
(-1097.83) - (-1083.12)	SD REACH	36" RCP	40	NA				
(-1083.12) - (-1078.12)	SDMH#2	60" MANHOLE	40	NA	2999.20	2984.93	14.27	HEADWORKS AT LAT1

* HGL at Outlet is the WSPG default at critical depth

LAT 2 WSPG SUMMARY TABLE UPDATE #1 CLIFF SHADOWS & HICKAM								
WSPG STA	DESCRIPTION OR MH#	FACILITY DIMENSION	Q100 (Upstream) cfs	INLET/JUNCTION cfs	FG/GRATE/RIM ft	HGL ft	FG - HGL ft	NOTES
(-1078.12)	SDMH#2		40	NA	2999.20	2990.2	9.00	OULTET AT LAT2*
(-1078.12) - (-1031.89)	SD REACH	36" RCP	40	NA				
(-1031.89) - (1026.89)	SDMH#1	36" RCP	40	NA	3010	2996.99	13.01	HEADWORKS AT LAT2

* HGL at Outlet is the WSPG default at critical depth

LAT 3 WSPG SUMMARY TABLE UPDATE #1 CLIFF SHADOWS & HICKAM								
WSPG STA	DESCRIPTION OR MH#	FACILITY DIMENSION	Q100 (Upstream) cfs	INLET/JUNCTION cfs	FG/GRATE/RIM ft	HGL ft	FG - HGL ft	NOTES
(-1026.89)	SDMH#1		40	NA	3010	3002.23	7.77	OULTET AT LAT3*
(-1026.89) - (-1000.00)	SD REACH	36" RCP	40	NA				
(-1000.00) - (-999.99)	HEADWALL	36" RCP	40	40	NA	3007.51	NA	HEADWORKS AT LAT3

* HGL at Outlet is the WSPG default at critical depth

T1	LAT1 UPDATE1 CLIFF SHADOWS & HICKAM																		
T2	1		2		3		4		5		6		7		8		9		
T3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	
SO	-1569.8302973.950	1																	
	2973.950																		
R	-1207.8302979.600	1	.013																
R	-1097.8302980.240	1	.013																
JX	-1097.8302980.240	1	1	.013	8.000	2311.59										90.0	00.000	0	
WX	-1097.8302980.240	2																	
R	-1083.1202981.710	2	.013																
WE	-1083.1202981.710	3																	
R	-1078.1202981.920	3	.013																
SH	-1078.1202981.920	3	2985.220																
CD	1	3	0	.000	3.000	10.000	.000	.000	.00										
CD	2	4	0	.000	3.000	.000	.000	.000	.00										
CD	3	4	0	.000	5.000	.000	.000	.000	.00										
CD	4	3	0	.000	4.000	3.000	.000	.000	.00										
CD	5	4	0	.000	4.000	0.000	.000	.000	.00										
CD	6	3	0	.000	4.000	8.000	.000	.000	.00										
CD	8	3	0	.000	5.000	3.000	.000	.000	.00										
Q	40.000			.0															

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:37: 9

LAT1 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top	Height/Dia.-FT	Base Wt./I.D.	No ZL	Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
-1569.830	2973.950	.542	2974.492	48.00	8.86	1.22	2975.71	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
226.575	.0156					.0156	3.54	.54	2.12	.54	.013	.00	.00	BOX
-1343.255	2977.486	.542	2978.028	48.00	8.86	1.22	2979.25	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76.391	.0156					.0148	1.13	.54	2.12	.54	.013	.00	.00	BOX
-1266.864	2978.679	.561	2979.240	48.00	8.56	1.14	2980.38	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28.956	.0156					.0130	.38	.56	2.01	.54	.013	.00	.00	BOX
-1237.908	2979.131	.588	2979.719	48.00	8.16	1.03	2980.75	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.646	.0156					.0111	.16	.59	1.88	.54	.013	.00	.00	BOX
-1223.262	2979.359	.617	2979.976	48.00	7.78	.94	2980.92	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.180	.0156					.0096	.09	.62	1.75	.54	.013	.00	.00	BOX
-1214.081	2979.502	.647	2980.149	48.00	7.42	.85	2981.00	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.251	.0156					.0082	.05	.65	1.63	.54	.013	.00	.00	BOX
-1207.830	2979.601	.679	2980.279	48.00	7.07	.78	2981.06	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.223	.0058					.0078	.06	.68	1.51	.74	.013	.00	.00	BOX
-1199.607	2979.648	.666	2980.315	48.00	7.20	.81	2981.12	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17.058	.0058					.0087	.15	.67	1.56	.74	.013	.00	.00	BOX
-1182.549	2979.748	.635	2980.383	48.00	7.56	.89	2981.27	.00	.89	10.00	3.000	10.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.627	.0058					.0102	.14	.64	1.67	.74	.013	.00	.00	BOX

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:37: 9

LAT1 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem | Ch Slope |
***** | ***** |
         |          |
-1168.921 | 2979.827 | .606 | 2980.433 | 48.00 | 7.92 | .98 | 2981.41 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 11.550 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1157.371 | 2979.894 | .578 | 2980.472 | 48.00 | 8.31 | 1.07 | 2981.54 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 10.116 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1147.255 | 2979.953 | .551 | 2980.504 | 48.00 | 8.72 | 1.18 | 2981.68 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 9.042 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1138.213 | 2980.005 | .525 | 2980.531 | 48.00 | 9.14 | 1.30 | 2981.83 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 8.191 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1130.021 | 2980.053 | .501 | 2980.553 | 48.00 | 9.59 | 1.43 | 2981.98 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 7.490 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1122.531 | 2980.096 | .477 | 2980.574 | 48.00 | 10.06 | 1.57 | 2982.14 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 6.894 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1115.638 | 2980.136 | .455 | 2980.592 | 48.00 | 10.55 | 1.73 | 2982.32 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 6.377 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1109.261 | 2980.174 | .434 | 2980.607 | 48.00 | 11.06 | 1.90 | 2982.51 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 5.920 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
-1103.341 | 2980.208 | .414 | 2980.622 | 48.00 | 11.60 | 2.09 | 2982.71 | .00 | .89 | 10.00 | 3.000 | 10.000 | .00 | 0 | .0
         | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
         | 5.511 | .0058 | | | | | | | | | | | | | | |
         | | | | | | | | | | | | | | | |
*****

```

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:37: 9

LAT1 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
        | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem | Ch Slope |
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|
        |         |
-1097.830 2980.240 .394 2980.635 48.00 12.17 2.30 2982.93 .00 .89 10.00 3.000 10.000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
JUNCT STR .0000 .0739 .00 .39 3.41 .013 .00 BOX
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1097.830 2980.240 .269 2980.509 40.00 14.87 3.43 2983.94 .00 .79 10.00 3.000 10.000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
WALL EXIT
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1097.830 2980.240 1.292 2981.532 40.00 13.73 2.93 2984.46 .00 2.06 2.97 3.000 .000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
        .118 .0999 .0242 .00 1.29 2.44 .89 .013 .00 PIPE
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1097.712 2980.252 1.294 2981.546 40.00 13.71 2.92 2984.46 .00 2.06 2.97 3.000 .000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
        2.815 .0999 .0227 .06 1.29 2.44 .89 .013 .00 PIPE
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1094.897 2980.533 1.342 2981.875 40.00 13.07 2.65 2984.53 .00 2.06 2.98 3.000 .000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
        2.389 .0999 .0199 .05 1.34 2.27 .89 .013 .00 PIPE
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1092.508 2980.772 1.392 2982.164 40.00 12.46 2.41 2984.58 .00 2.06 2.99 3.000 .000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
        2.026 .0999 .0175 .04 1.39 2.12 .89 .013 .00 PIPE
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1090.482 2980.974 1.444 2982.418 40.00 11.88 2.19 2984.61 .00 2.06 3.00 3.000 .000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
        1.710 .0999 .0154 .03 1.44 1.98 .89 .013 .00 PIPE
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1088.772 2981.145 1.499 2982.644 40.00 11.33 1.99 2984.64 .00 2.06 3.00 3.000 .000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
        1.434 .0999 .0136 .02 1.50 1.84 .89 .013 .00 PIPE
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1087.338 2981.289 1.556 2982.845 40.00 10.80 1.81 2984.66 .00 2.06 3.00 3.000 .000 .00 0 .0
        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
        1.186 .0999 .0120 .01 1.56 1.71 .89 .013 .00 PIPE

```

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:37: 9

LAT1 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
        | Elev   | (FT)  | Elev   | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem  | Ch Slope |          |          |          |          | SF Ave | HF      | SE Dpth | Froude N | Norm Dp | "N"     | X-Fall | ZR | Type Ch
***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
-1086.152 | 2981.407 | 1.617 | 2983.023 | 40.00 | 10.30 | 1.65 | 2984.67 | .00 | 2.06 | 2.99 | 3.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | .966 | .0999 |          |          |          |          | .0106 | .01 | 1.62 | 1.59 | .89 | .013 | .00 | .00 | PIPE
-1085.186 | 2981.504 | 1.680 | 2983.184 | 40.00 | 9.82 | 1.50 | 2984.68 | .00 | 2.06 | 2.98 | 3.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | .763 | .0999 |          |          |          |          | .0093 | .01 | 1.68 | 1.48 | .89 | .013 | .00 | .00 | PIPE
-1084.423 | 2981.580 | 1.747 | 2983.327 | 40.00 | 9.36 | 1.36 | 2984.69 | .00 | 2.06 | 2.96 | 3.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | .578 | .0999 |          |          |          |          | .0082 | .00 | 1.75 | 1.37 | .89 | .013 | .00 | .00 | PIPE
-1083.845 | 2981.637 | 1.818 | 2983.455 | 40.00 | 8.93 | 1.24 | 2984.69 | .00 | 2.06 | 2.93 | 3.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | .405 | .0999 |          |          |          |          | .0073 | .00 | 1.82 | 1.27 | .89 | .013 | .00 | .00 | PIPE
-1083.440 | 2981.678 | 1.893 | 2983.571 | 40.00 | 8.51 | 1.13 | 2984.70 | .00 | 2.06 | 2.90 | 3.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | .240 | .0999 |          |          |          |          | .0065 | .00 | 1.89 | 1.18 | .89 | .013 | .00 | .00 | PIPE
-1083.201 | 2981.702 | 1.973 | 2983.675 | 40.00 | 8.12 | 1.02 | 2984.70 | .00 | 2.06 | 2.85 | 3.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | .081 | .0999 |          |          |          |          | .0057 | .00 | 1.97 | 1.09 | .89 | .013 | .00 | .00 | PIPE
-1083.120 | 2981.710 | 2.059 | 2983.769 | 40.00 | 7.73 | .93 | 2984.70 | .00 | 2.06 | 2.78 | 3.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | WALL ENTRANCE
-1083.120 | 2981.710 | 3.251 | 2984.961 | 40.00 | 2.96 | .14 | 2985.10 | .00 | 1.76 | 4.77 | 5.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | 2.823 | .0420 |          |          |          |          | .0004 | .00 | 3.25 | .31 | .93 | .013 | .00 | .00 | PIPE
-1080.297 | 2981.829 | 3.120 | 2984.949 | 40.00 | 3.10 | .15 | 2985.10 | .00 | 1.76 | 4.84 | 5.000 | .000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
        | 2.177 | .0420 |          |          |          |          | .0005 | .00 | 3.12 | .34 | .93 | .013 | .00 | .00 | PIPE

```

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:37: 9

LAT1 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7

456789012345678901234567890123456789012345678901234567890123

*****																*****	
	Invert	Depth	Water	Q	Vel	Vel	Energy	Super	Critical	Flow Top	Height/	Base Wt		No Wth			
Station	Elev	(FT)	Elev	(CFS)	(FPS)	Head	Grd.El.	Elev	Depth	Width	Dia.-FT	or I.D.	ZL	Prs/Pip			
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch			
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
-1078.120	2981.920	3.017	2984.938	40.00	3.23	.16	2985.10	.00	1.76	4.89	5.000	.000	.00	0	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		

T1	LAT2 UPDATE1 CLIFF SHADOWS & HICKAM										0
T2	1	2	3	4	5	6	7	8	9		
T3	4567890123456789012345678901234567890123456789012345678901234567890										
SO	-1078.1202989.150	3									
WX	-1078.1202989.150	3									
R	-1031.8902993.770	2	.013					.000	00.000	0	
WE	-1031.8902993.770	3									
R	-1026.8902993.970	3	.013					.000	00.000	0	
SH	-1026.8902993.970	3									
										2997.270	
CD	1 3 0	.000	3.000	10.000	.000	.000	.00				
CD	2 4 0	.000	3.000	.000	.000	.000	.00				
CD	3 4 0	.000	5.000	.000	.000	.000	.00				
CD	4 3 0	.000	4.000	3.000	.000	.000	.00				
CD	5 4 0	.000	4.000	0.000	.000	.000	.00				
CD	6 3 0	.000	4.000	8.000	.000	.000	.00				
CD	8 3 0	.000	5.000	3.000	.000	.000	.00				
Q		40.000	.0								

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:37:38

LAT2 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt./I.D.	No ZL	Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
-1078.120	2989.150	1.052	2990.202	40.00	13.30	2.75	2992.95	.00	1.76	4.08	5.000	.000	.00	0 .0
WALL	EXIT													
-1078.120	2989.151	1.051	2990.202	40.00	18.12	5.10	2995.30	.00	2.06	2.86	3.000	.000	.00	0 .0
7.202	.0999					.0491	.35	1.05	3.64	.89	.013	.00	.00	PIPE
-1070.918	2989.870	1.083	2990.953	40.00	17.40	4.70	2995.65	.00	2.06	2.88	3.000	.000	.00	0 .0
6.882	.0999					.0435	.30	1.08	3.43	.89	.013	.00	.00	PIPE
-1064.036	2990.558	1.122	2991.680	40.00	16.59	4.27	2995.95	.00	2.06	2.90	3.000	.000	.00	0 .0
5.632	.0999					.0381	.21	1.12	3.21	.89	.013	.00	.00	PIPE
-1058.405	2991.121	1.162	2992.283	40.00	15.82	3.88	2996.17	.00	2.06	2.92	3.000	.000	.00	0 .0
4.679	.0999					.0335	.16	1.16	3.00	.89	.013	.00	.00	PIPE
-1053.726	2991.588	1.204	2992.792	40.00	15.08	3.53	2996.32	.00	2.06	2.94	3.000	.000	.00	0 .0
3.927	.0999					.0294	.12	1.20	2.80	.89	.013	.00	.00	PIPE
-1049.799	2991.981	1.248	2993.229	40.00	14.38	3.21	2996.44	.00	2.06	2.96	3.000	.000	.00	0 .0
3.318	.0999					.0258	.09	1.25	2.61	.89	.013	.00	.00	PIPE
-1046.481	2992.312	1.294	2993.606	40.00	13.71	2.92	2996.52	.00	2.06	2.97	3.000	.000	.00	0 .0
2.814	.0999					.0227	.06	1.29	2.44	.89	.013	.00	.00	PIPE
-1043.666	2992.594	1.342	2993.935	40.00	13.07	2.65	2996.59	.00	2.06	2.98	3.000	.000	.00	0 .0
2.389	.0999					.0199	.05	1.34	2.27	.89	.013	.00	.00	PIPE

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:37:38

LAT2 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
        | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem | Ch Slope |
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|
-1041.277 2992.832 1.392 2994.224 40.00 12.46 2.41 2996.64 .00 2.06 2.99 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        2.026 .0999 .0175 .04 1.39 2.12 .89 .013 .00 .00 PIPE
-1039.252 2993.035 1.444 2994.479 40.00 11.88 2.19 2996.67 .00 2.06 3.00 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        1.710 .0999 .0154 .03 1.44 1.98 .89 .013 .00 .00 PIPE
-1037.542 2993.206 1.499 2994.704 40.00 11.33 1.99 2996.70 .00 2.06 3.00 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        1.434 .0999 .0136 .02 1.50 1.84 .89 .013 .00 .00 PIPE
-1036.108 2993.349 1.556 2994.905 40.00 10.80 1.81 2996.72 .00 2.06 3.00 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        1.186 .0999 .0120 .01 1.56 1.71 .89 .013 .00 .00 PIPE
-1034.922 2993.467 1.617 2995.084 40.00 10.30 1.65 2996.73 .00 2.06 2.99 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        .966 .0999 .0106 .01 1.62 1.59 .89 .013 .00 .00 PIPE
-1033.956 2993.564 1.680 2995.244 40.00 9.82 1.50 2996.74 .00 2.06 2.98 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        .763 .0999 .0093 .01 1.68 1.48 .89 .013 .00 .00 PIPE
-1033.193 2993.640 1.747 2995.387 40.00 9.36 1.36 2996.75 .00 2.06 2.96 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        .578 .0999 .0082 .00 1.75 1.37 .89 .013 .00 .00 PIPE
-1032.615 2993.698 1.818 2995.515 40.00 8.93 1.24 2996.75 .00 2.06 2.93 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        .405 .0999 .0073 .00 1.82 1.27 .89 .013 .00 .00 PIPE
-1032.210 2993.738 1.893 2995.631 40.00 8.51 1.13 2996.76 .00 2.06 2.90 3.000 .000 .00 0 .0
        |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
        .240 .0999 .0065 .00 1.89 1.18 .89 .013 .00 .00 PIPE

```

Date: 6-10-2020 Time: 9:37:38

LAT2 UPDATE1 CLIFF SHADOWS & HICKAM

[illegible]

T1	LAT3 UPDATE1 CLIFF SHADOWS & HICKAM																			
T2	1		2		3		4		5		6		7		8		9			
T3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1		
SO	-1026.8903001.310	3																		
WX	-1026.8903001.310	2	3001.060																	
R	-1000.0003004.000	2															.013			
WE	-1000.0003004.000	4																		
R	-999.9903004.001	4															.013			
SH	-999.9903004.001	4															3007.301			
CD	1	3	0	.000	3.000	10.000	.000	.000	.00											
CD	2	4	0	.000	3.000	.000	.000	.000	.00											
CD	3	4	0	.000	5.000	.000	.000	.000	.00											
CD	4	1	0	.000	5.000	20.000	.250	.250	.00											
CD	5	4	0	.000	4.000	0.000	.000	.000	.00											
CD	6	3	0	.000	4.000	8.000	.000	.000	.00											
CD	8	3	0	.000	5.000	3.000	.000	.000	.00											
Q	40.000				.0															

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:38: 7

LAT3 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
L/Elem  | Ch Slope |          |          |          |          | SF Ave | HF   | SE Dpth | Froude N | Norm Dp | "N"   | X-Fall | ZR | Type Ch
***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | *****
-1026.890 3001.310 .921 3002.231 40.00 16.10 4.02 3006.25 .00 1.76 3.88 5.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
WALL EXIT
-1026.890 3001.310 1.159 3002.469 40.00 15.87 3.91 3006.38 .00 2.06 2.92 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
.409 .1000 .0358 .01 1.16 3.01 .89 .013 .00 .00 PIPE
         |          |          |          |          |          |          |          |          |          |          |          |          |          |
-1026.481 3001.351 1.162 3002.513 40.00 15.82 3.88 3006.40 .00 2.06 2.92 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
4.672 .1000 .0335 .16 1.16 3.00 .89 .013 .00 .00 PIPE
         |          |          |          |          |          |          |          |          |          |          |          |          |
-1021.809 3001.818 1.204 3003.022 40.00 15.08 3.53 3006.55 .00 2.06 2.94 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
3.922 .1000 .0294 .12 1.20 2.80 .89 .013 .00 .00 PIPE
         |          |          |          |          |          |          |          |          |          |          |          |          |
-1017.888 3002.211 1.248 3003.459 40.00 14.38 3.21 3006.67 .00 2.06 2.96 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
3.314 .1000 .0258 .09 1.25 2.61 .89 .013 .00 .00 PIPE
         |          |          |          |          |          |          |          |          |          |          |          |          |
-1014.574 3002.542 1.294 3003.836 40.00 13.71 2.92 3006.75 .00 2.06 2.97 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
2.811 .1000 .0227 .06 1.29 2.44 .89 .013 .00 .00 PIPE
         |          |          |          |          |          |          |          |          |          |          |          |          |
-1011.763 3002.823 1.342 3004.165 40.00 13.07 2.65 3006.82 .00 2.06 2.98 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
2.386 .1000 .0199 .05 1.34 2.27 .89 .013 .00 .00 PIPE
         |          |          |          |          |          |          |          |          |          |          |          |          |
-1009.377 3003.062 1.392 3004.454 40.00 12.46 2.41 3006.87 .00 2.06 2.99 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
2.023 .1000 .0175 .04 1.39 2.12 .89 .013 .00 .00 PIPE
         |          |          |          |          |          |          |          |          |          |          |          |          |
-1007.353 3003.265 1.444 3004.708 40.00 11.88 2.19 3006.90 .00 2.06 3.00 3.000 .000 .00 0 .0
         |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-   |-|-
1.708 .1000 .0154 .03 1.44 1.98 .89 .013 .00 .00 PIPE

```

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:38: 7

LAT3 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7
 456789012345678901234567890123456789012345678901234567890123

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	No ZL	Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
-1005.645	3003.436	1.499	3004.934	40.00	11.33	1.99	3006.93	.00	2.06	3.00	3.000	.000	.00	0 .0
	1.432	.1000				.0136	.02	1.50	1.84	.89	.013	.00	.00	PIPE
-1004.214	3003.579	1.556	3005.135	40.00	10.80	1.81	3006.95	.00	2.06	3.00	3.000	.000	.00	0 .0
	1.185	.1000				.0120	.01	1.56	1.71	.89	.013	.00	.00	PIPE
-1003.029	3003.697	1.617	3005.314	40.00	10.30	1.65	3006.96	.00	2.06	2.99	3.000	.000	.00	0 .0
	.965	.1000				.0106	.01	1.62	1.59	.89	.013	.00	.00	PIPE
-1002.064	3003.794	1.680	3005.474	40.00	9.82	1.50	3006.97	.00	2.06	2.98	3.000	.000	.00	0 .0
	.762	.1000				.0093	.01	1.68	1.48	.89	.013	.00	.00	PIPE
-1001.301	3003.870	1.747	3005.617	40.00	9.36	1.36	3006.98	.00	2.06	2.96	3.000	.000	.00	0 .0
	.577	.1000				.0082	.00	1.75	1.37	.89	.013	.00	.00	PIPE
-1000.724	3003.927	1.818	3005.745	40.00	8.93	1.24	3006.98	.00	2.06	2.93	3.000	.000	.00	0 .0
	.405	.1000				.0073	.00	1.82	1.27	.89	.013	.00	.00	PIPE
-1000.320	3003.968	1.893	3005.861	40.00	8.51	1.13	3006.99	.00	2.06	2.90	3.000	.000	.00	0 .0
	.239	.1000				.0065	.00	1.89	1.18	.89	.013	.00	.00	PIPE
-1000.081	3003.992	1.973	3005.965	40.00	8.12	1.02	3006.99	.00	2.06	2.85	3.000	.000	.00	0 .0
	.081	.1000				.0057	.00	1.97	1.09	.89	.013	.00	.00	PIPE
-1000.000	3004.000	2.059	3006.059	40.00	7.73	.93	3006.99	.00	2.06	2.78	3.000	.000	.00	0 .0

WALL ENTRANCE

Program Package Serial Number: 7204

WATER SURFACE PROFILE LISTING

Date: 6-10-2020 Time: 9:38: 7

LAT3 UPDATE1 CLIFF SHADOWS & HICKAM

0

1 2 3 4 5 6 7

456789012345678901234567890123456789012345678901234567890123

```

*****
| Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
Station | Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
L/Elem | Ch Slope | | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
| | | | | | | | | | | | | | | | |
-1000.000 3004.000 3.514 3007.514 40.00 .55 .00 3007.52 .00 .50 21.76 5.000 20.000 .25 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
.010 .0976 | | | | | | .0000 .00 3.51 .05 .18 .013 .00 .25 TRAP
| | | | | | | | | | | | | | | | |
-999.990 3004.001 3.513 3007.514 40.00 .55 .00 3007.52 .00 .50 21.76 5.000 20.000 .25 0 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-

```

EXCERPTS CLIFF SHADOWS & HICKAM TDS

TECHNICAL DRAINAGE STUDY

FOR

Cliff Shadows & Hickam

City of Las Vegas, Nevada

Prepared for:

DR Horton

1081 Whitney Ranch Drive, #141

Henderson, NV 89014

Office: (702)635-3600 - Fax: (702)538.0735

Prepared by:

Triton Engineering

6757 W. Charleston Blvd., Suite B

Las Vegas, NV 89146

Office: (702) 254-1480 - Fax: (702) 254-3062

APN 137-01-301-024

April 2020

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: May 20, 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:
	Cliff Shadows & Hickam		Triton Engineering
Cross Streets:	Cliff Shadows Pkwy and Hickam Ave		DR Horton
File Number:	F:\Depot\DSMemos\DS5270A.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-01-301-024		
Zoning Action:	TMP-78025; SDR-78024		
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	4/16/2020 & 5/20/2020	5/12/2020 & 5/20/2020	See Comments Below	\$400.00	3821275: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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.

1. Label Document Number or Book and Page Number for all existing easements on the grading plan.
2. Revise the riprap sections called out on the Grading Plans. The d50 shall reflect the minimum sizes as calculated. Also provide the required thicknesses.
3. Provide adequate bedding for the rip-rap channel as outlined in Section 705.4.3 of the CCRFCD's Hydrologic Criteria and Drainage Design Manual.
4. Landscape areas are not allowed to drain over the sidewalk. Provide flow lines with grades and sidewalk under drains for all landscape areas draining to the street (e.g. Common Element B). Revise all pertinent details accordingly.
5. 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.
6. Reflect the existing wall on Section Detail L/4.
7. Reference CCAUSD Drawing 425.S1 for fences along public drainage easements. Revise callout and details accordingly.

In an effort to increase administrative efficiency, for all original and re-submittal packages including updates and the addenda, the City of Las Vegas Public Works Department requires both a hardcopy and a digital copy (PDF) on CD for the drainage study.

A letter sealed and signed by a Nevada registered civil engineer must be included in every submittal certifying documents on the electronic CD matches 100% of the hardcopy submittal. The new submittal requirement is effective on May 1, 2019. If there are any questions regarding these new requirements, please contact Albert Sung in the City Flood Control Section at (702) 229-6541.



Sample Letter to
certify CD.pdf

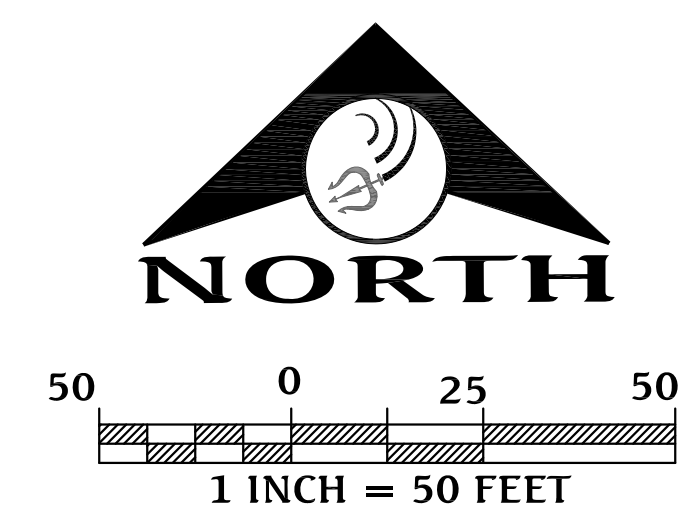
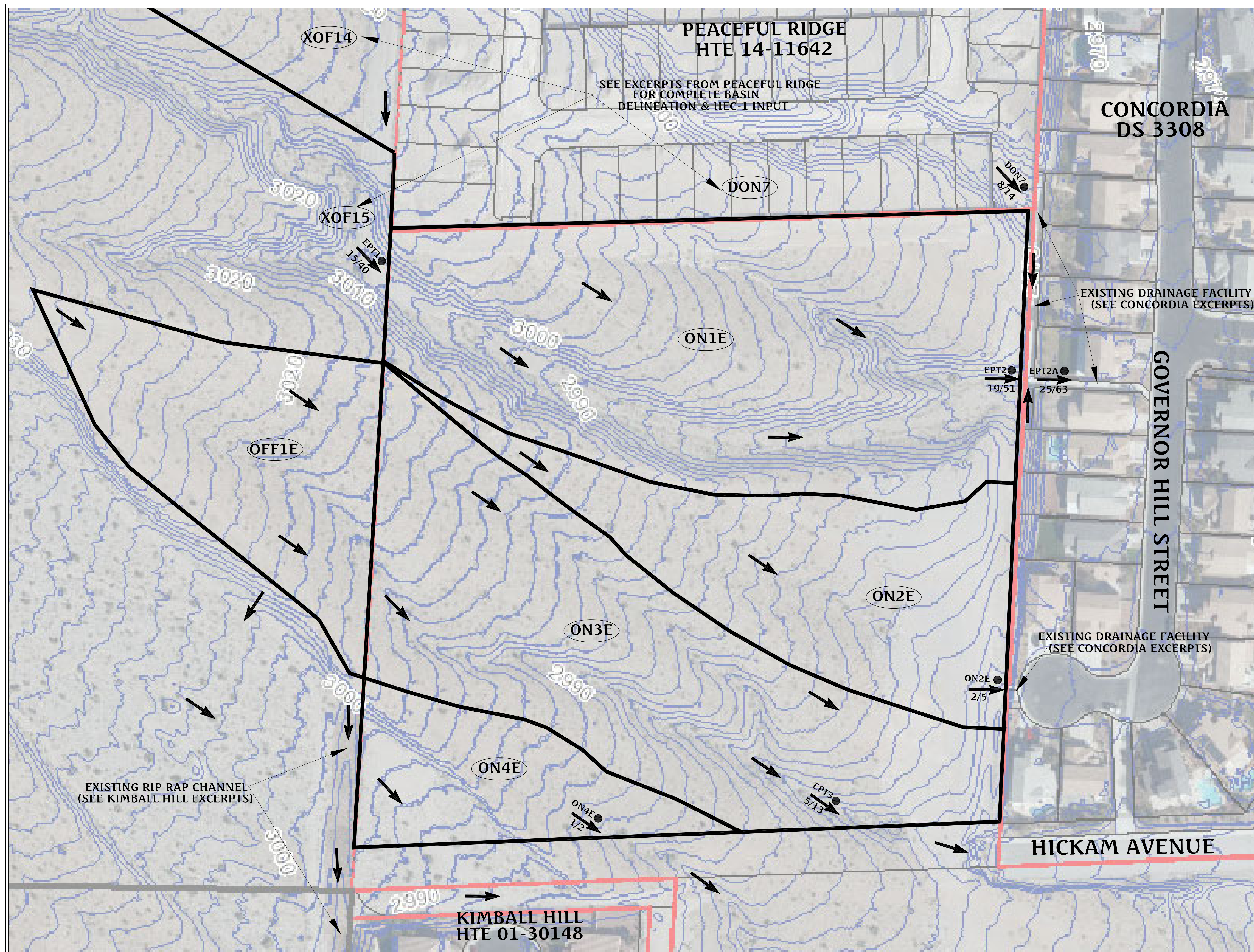
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the City of Las Vegas Flood Control Section. Additionally, conditional 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: T20S/R59E/01
AREA K-01



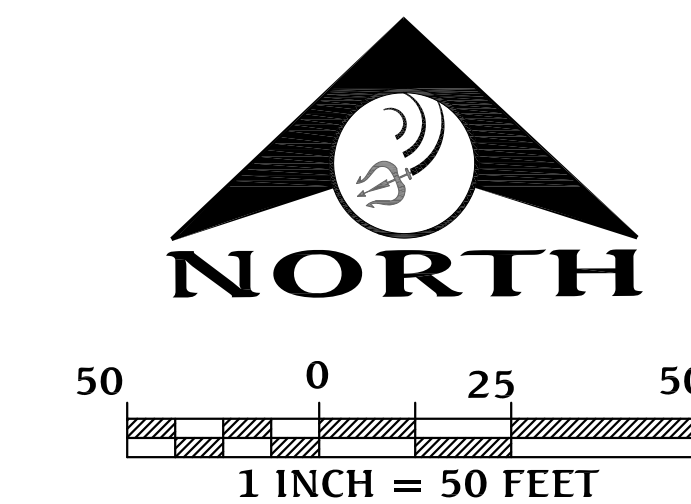
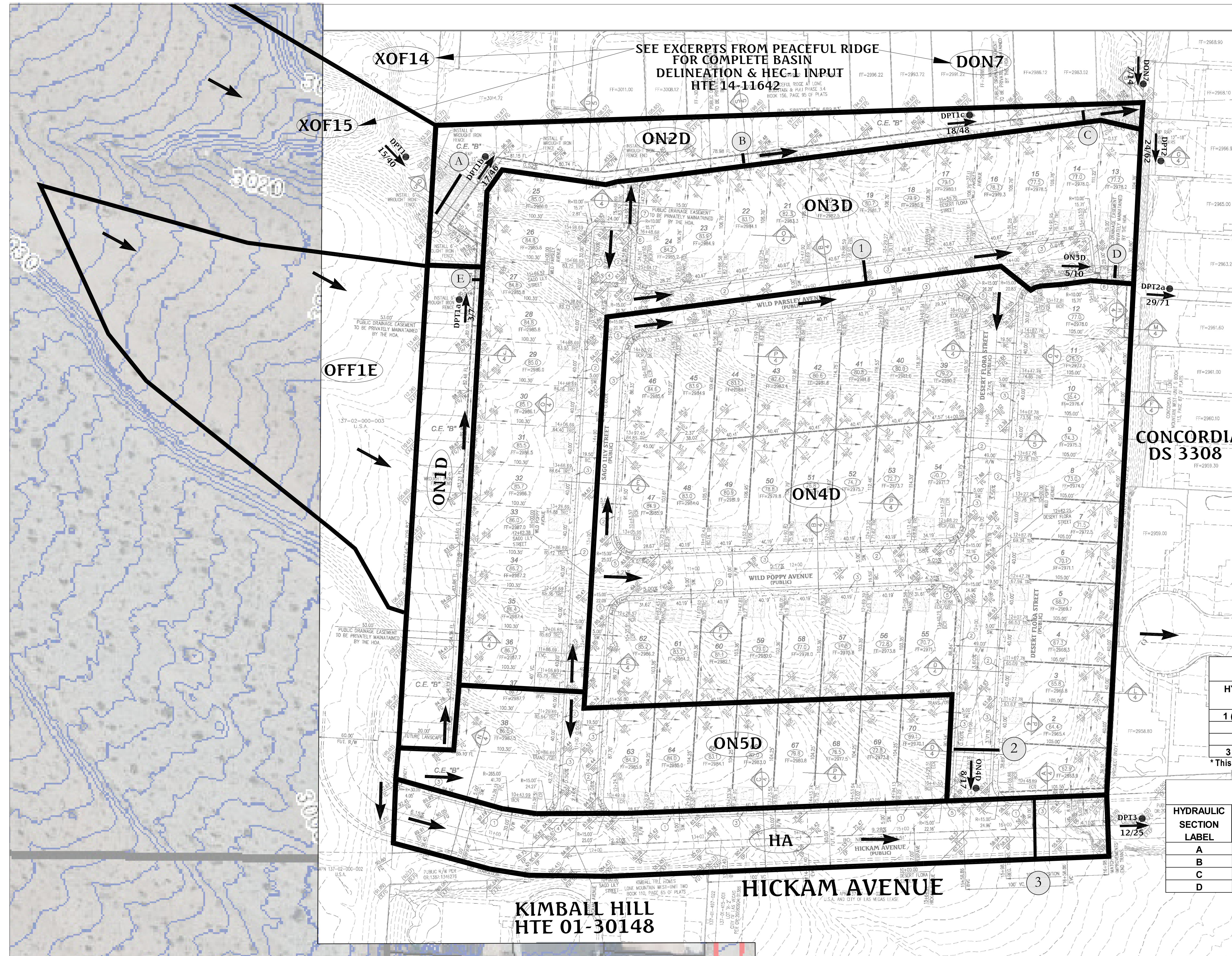
DRAINAGE LEGEND	
XT32	BASIN IDENTIFICATION
	BASIN BOUNDARY
CPT4	CONCENTRATION POINT
	FLOW PATH
	HYDRAULIC CROSS SECTION
XX/XX	10YR/100YR RUNOFF CFS

PEAK FLOW RATES FOR EXISTING CONDITIONS CLIFF SHADOWS & HICKAM				
CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS		NOTES
XOF14		3	8	1
XOF15		12	33	1
EPT1		15	40	XOF14+XOF15
ON1E	4.09	4	11	
EPT2		19	51	EPT1+ON1E
DON7		7	14	1
EPT2A		25	63	EPT2+DON7
ON2E	1.85	2	5	
OFF1E	1.67	2	5	
ON3E	3.20	3	9	
EPT3		5	13	OFF1E+ON3E
ON4E	0.85	1	2	

1. See Excerpts from Peaceful Ridge

CONCEPTUAL DRAINAGE STUDY FOR CLIFF SHADOWS & HICKIAM
EXISTING CONDITIONS DRAINAGE MAP

FIGURE 3



DRAINAGE LEGEND	
XT32	BASIN IDENTIFICATION
	BASIN BOUNDARY
	CONCENTRATION POINT
	FLOW PATH
	HYDRAULIC CROSS SECTION
XX/XX	10YR/100YR RUNOFF CFS

PEAK FLOW RATES FOR DEVELOPED CONDITIONS TDS CLIFF SHADOWS & HICKAM				
CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS		NOTES
10-YR	100-YR			
XOF14		3	8	1
XOF15		12	33	1
DPT1		15	40	
OFF1E	1.67	2	5	
ON1D	0.58	1	2	
DPT1a		3	7	
DPT1b		17	46	
ON2D	0.75	1	3	
DPT1c		18	48	
DON7		7	14	1
DPT2		24	62	
ON3D	3.01	5	10	
DPT2a		29	71	
ON4D	5.07	8	17	
ON5D	1.22	2	4	
HA	0.98	2	4	
DPT3		12	25	

1. See Excerpts from Peaceful Ridge

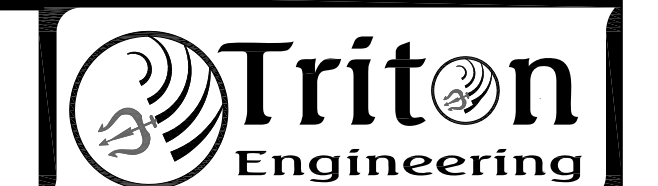
STREET CAPACITY CALCULATIONS TDS CLIFF SHADOWS & HICKAM DEVELOPED CONDITIONS						
HYDRAULIC SECTION	SLOPE, %	RUNOFF BASIN/POINT	Q ₁₀ / Q ₁₀₀ CFS	D ₁₀ / D ₁₀₀ , FEET	V ₁₀ / V ₁₀₀ , FPS	V ₁₀ * D ₁₀ / V ₁₀₀ * D ₁₀₀
1 (Half Street Capacity)	1.95	*	na / 10	na / 0.38	na / 3.59	na / 1.36
2	2.74 (min)	ON4D	8 / 17	0.28 / 0.34	3.25 / 3.89	0.91 / 1.32
2	5.17 (max)	ON4D	8 / 17	0.26 / 0.32	4.15 / 4.96	1.07 / 1.58
3 (Hickam Half Street)	4.15	DPT3	12 / 25	0.43 / 0.55	5.28 / 5.40	2.27 / 2.97

* This section was analyzed to estimate the half street capacity only

NORMAL DEPTH CALCULATIONS FOR EASEMENTS, CHANNELS, & SWALES DEVELOPED CONDITIONS						
HYDRAULIC SECTION LABEL	DESCRIPTION	SLOPE, PERCENT	Q ₁₀₀ CFS	D ₁₀₀ NORMAL FEET	V ₁₀₀ NORMAL FEET/SEC	WEIR DEPTH FEET
A	Rip Rap Channel	18	40	0.26	7.57	0.89
B	10-ft Concrete Easement	1.5	48	0.67	8.83	1.21
C	Rip Rap Channel (varying width)	7.3	48	0.72	8.08	1.02
D	15-ft Concrete Easement	1.33	10	0.24	3.98	0.25

TECHNICAL DRAINAGE STUDY FOR CLIFF SHADOWS & HICKAM
DEVELOPED CONDITIONS DRAINAGE MAP

FIGURE 5



PLANS & DETAILS

LAND USE TABULATION

LAND USE DESIGNATION:	U/(PF)
EXISTING CLV ZONING	
PROPOSED CLV ZONING	MEDIUM - LOW DENSITY
MINIMUM LOT SIZE	4,000 SF
SITE SUMMARY:	
TOTAL UNITS	70 UNITS
GROSS ACREAGE	11.18 ACRES
GROSS DENSITY	6.26 UNITS/ACRE
NET ACREAGE	10.44 ACRES
NET DENSITY	6.70 UNITS/ACRE
OPEN SPACE REQUIRED (330 SF PER DWELLING UNIT)	25,740 SF
OPEN SPACE PROVIDED (PAYMENT TO BE MADE TO CLV IN LIEU OF OPEN SPACE)	0 SF
COMMON ELEMENTS:	5,884 SF
PARKING ANALYSIS:	
TOTAL LOTS	70 LOTS
REQUIRED SPACES	154 SPACES
(2 PER HOUSE PLUS 1 FOR EVERY 5 HOUSES)	
PROVIDED SPACES:	210
(3 SPACES PER LOT; 2-CAR GARAGE AND 20' DRIVEWAY)	

CLIFF SHADOWS AND HICKAM

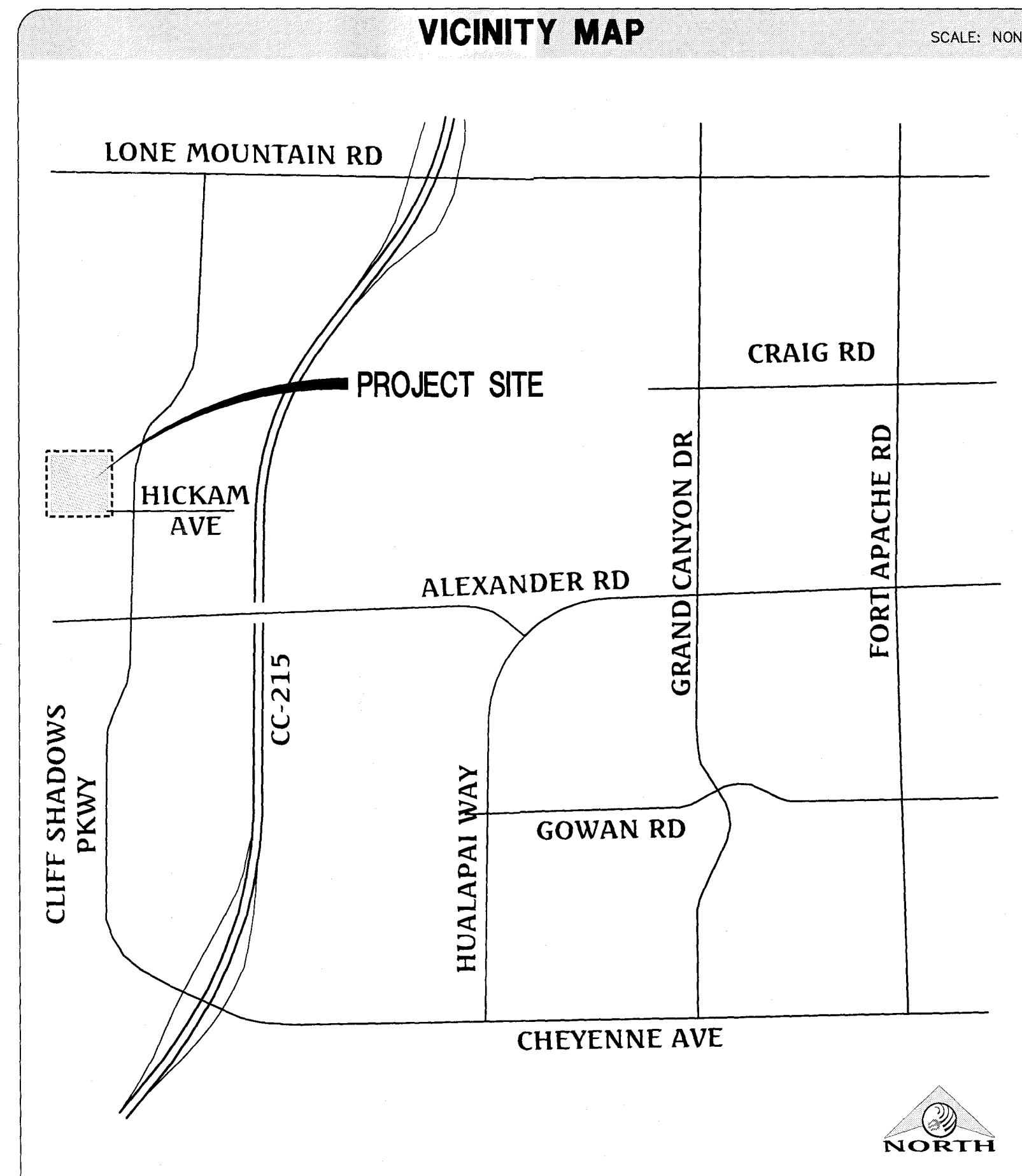
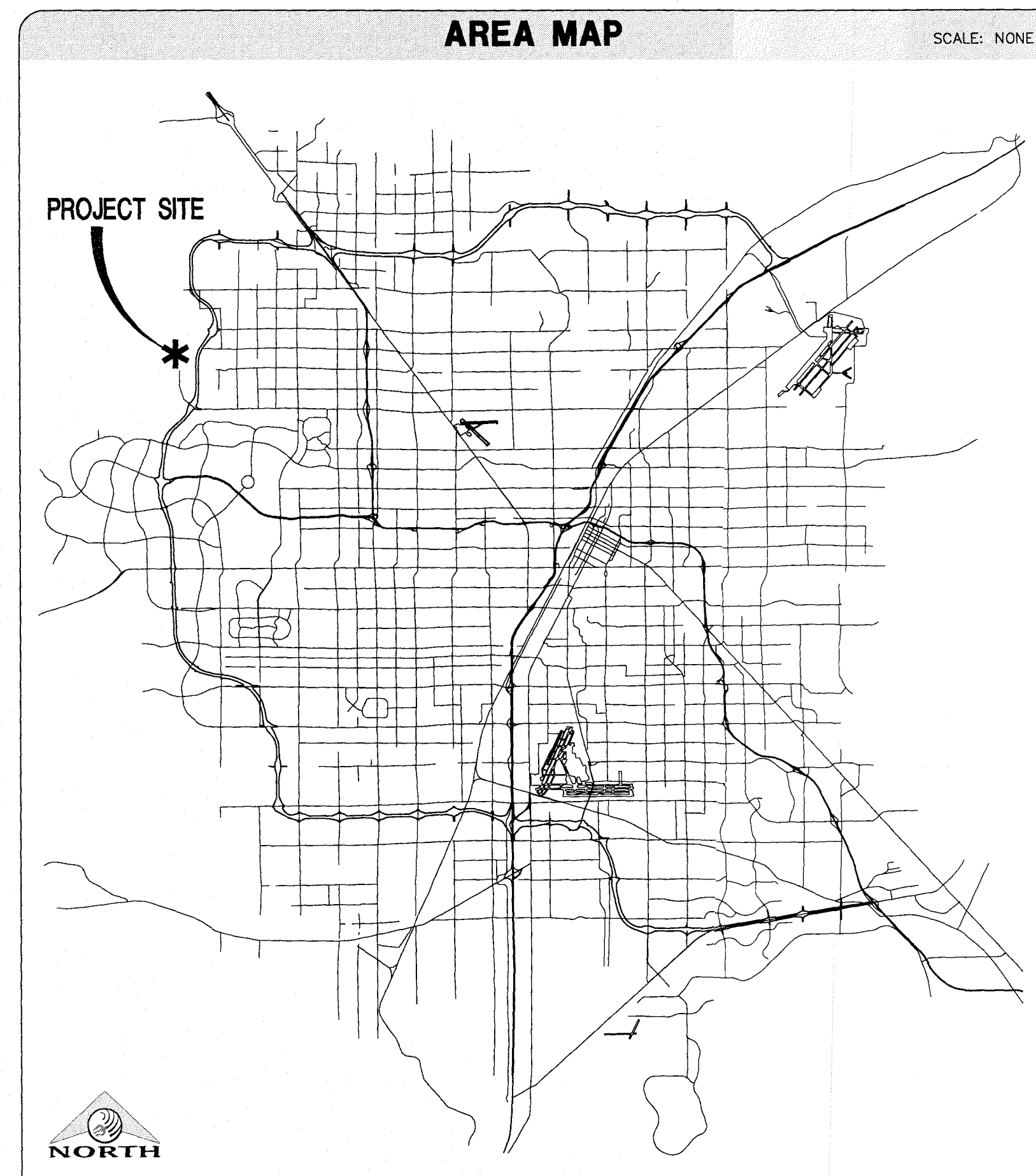
APN: 137-01-301-024, 70 UNITS

UPDATE #1

TECHNICAL DRAINAGE STUDY

A RESIDENTIAL SUBDIVISION

CITY OF LAS VEGAS, NEVADA



LEGAL DESCRIPTION

THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 1, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.B. & M., CLARK COUNTY, NEVADA.

BASIS OF BEARING

NORTH 87°47'02" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 1, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER IN FILE 88, PAGE 08 OF SURVEYS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK SLV09 1SW6
RIVET & PLATE IN TOP OF CURB AT NE CORNER OF CLIFF SHADOWS & HICKAM.
ELEVATION=897.87 Meters (NAVD'88 v.2003)
ELEVATION=2945.76 US Survey Feet (NAVD'88 v.2003)

NOTES

- ALL INTERIOR STREETS ARE PUBLIC WITH SIDEWALK ON BOTH SIDES OF THE STREET.
- UTILITY SERVICES TO BE PROVIDED BY:
SEWER: CITY OF LAS VEGAS
WATER: LAS VEGAS VALLEY WATER DISTRICT
WASTE DISPOSAL: REPUBLIC SERVICES
GAS: SOUTHWEST GAS COMPANY
ELECTRIC: NV ENERGY
TELEPHONE: CENTURYLINK TELEPHONE
- A HOME OWNERS ASSOCIATION WILL BE ESTABLISHED, (AND WILL MAINTAIN LANDSCAPING AND PRIVATE STREETS), THEREFORE, CC&R'S WILL BE REQUIRED.
- THERE ARE NO OBSERVABLE FAULTS OR FISSURES LOCATED ON THIS SITE.
- AS PROPOSED, DEVELOPMENT IS CONSIDERED FEASIBLE FROM A GEOTECHNICAL STANDPOINT.
- GROUNDWATER WAS NOT OBSERVED DURING EXCAVATIONS AND IS NOT SHOWN ON MAPS OF KNOWN GROUNDWATER ELEVATIONS IN THE AREA TO BE WITHIN 20 FEET OF THE KNOWN GROUND ELEVATION.
- THIS SITE IS LOCATED IN ZONE X PER FEMA MAP #3200302150A. ZONE X IS DETERMINED TO BE OUTSIDE THE 100-YEAR FLOODPLAIN.
- THE POINTS OF CONNECTION FOR WATER ARE:
1) WET TAP INTO THE EXISTING 24" WATER MAIN (RUNNING NORTH/SOUTH) LOCATED ON THE EAST SIDE OF CLIFF SHADOWS PARKWAY/HICKAM AVENUE INTERSECTION.
2) WET TAP INTO THE EXISTING 8" WATER STUB (RUNNING EAST/WEST) LOCATED ON THE NORTH SIDE OF CLIFF SHADOWS PARKWAY/HICKAM AVENUE INTERSECTION.
- THE POINT OF CONNECTION FOR SEWER IS LOCATED AT THE EXISTING SEWER STUB LOCATED ON HICKAM AVENUE AT THE SOUTHEAST END OF THE PROJECT SITE.

DEVIATIONS NOTE

NO DEVIATIONS

PROPOSED RESIDENTIAL DRIVEWAY SLOPES SHALL NOT EXCEED TWELVE PERCENT (12%).

APN'S / OWNERS

137-01-301-024
USA

DEVELOPER

DR HORTON
1081 WHITNEY RANCH DRIVE, SUITE #141
HENDERSON, NEVADA 89014
PHONE: (702) 635-3600
CONTACT: JOE GENOVESE

ENGINEER

TRITON ENGINEERING
6757 WEST CHARLESTON BOULEVARD, SUITE B
LAS VEGAS, NV 89146
OFFICE: (702) 254-1480
FAX: (702) 254-3062
CONTACT: KENNETH YAMADA

SURVEYOR

TRI-CORE SURVEYING
6755 W. CHARLESTON BLVD STE A
LAS VEGAS, NV 89146
OFFICE: (702) 524-4085

SHEET INDEX

SHEET NUMBER	DESCRIPTION
1	COVER SHEET
2	GENERAL NOTES AND LEGEND
3	GRADING PLAN
4	GRADING DETAIL SHEET
5	GRADING DETAIL SHEET
6	STORM DRAIN PLAN AND PROFILE

FOR

DR HORTON

1081 WHITNEY RANCH DRIVE, SUITE #141
HENDERSON, NV 89014
PHONE: (702) 635-3600
ATTN: JOE GENOVESE

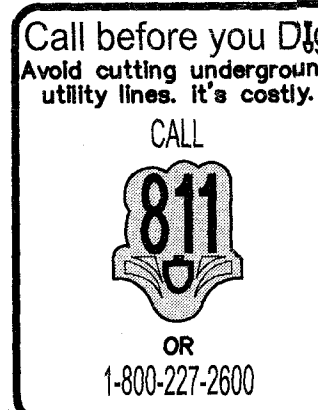
BY



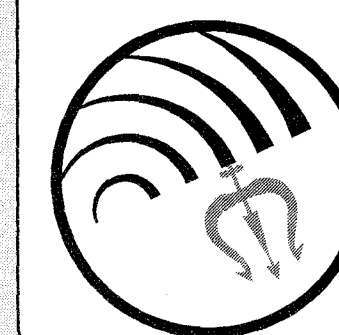
Triton Engineering

6757 W. Charleston Boulevard
Suite B
Las Vegas, Nevada 89146

Office: (702) 254-1480
Fax: (702) 254-3062
www.tritoneng.com

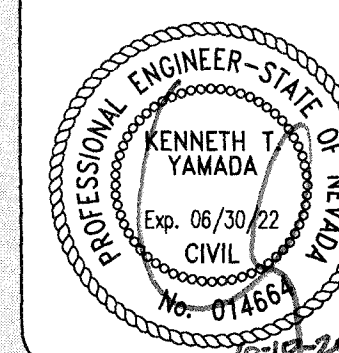


Triton Engineering



DR HORTON
CLIFF SHADOWS AND HICKAM

COVER SHEET



SHEET

1

OF 6

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA. LATEST EDITION; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA, LATEST EDITION; THE "CLARK COUNTY AREA NEVADA" STANDARD SPECIFICATIONS, THE "UNIFORM BUILDING CODE", AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".

2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS, EXISTING UTILITIES AS SHOWN FROM 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 INTERFERENCE WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND 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. AVOID DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORILY 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 PSI MINIMUM AND 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE START OF THE PROJECT.

6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.

7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.

8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE UP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.

9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.

10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.

11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN CONSTRUCTION PHASES. THE CONTRACTOR SHALL PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEARBY 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 THE (COMPANY, REPORT #, DATE) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.

13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES 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 & 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 RELATIONSHIP, 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. AFTER HAUNCHING AND PRIOR TO BACKFILL OPERATIONS WHICH WOULD COVER SANITARY SEWER AND STORM DRAIN FACILITIES, CONTRACTOR IS REQUIRED TO RE-SCHEDULE CLV PLAN-THEIR UTILITY SURVEY INSPECTION FOR DETERMINATION OF FINAL LOCATION COORDINATES. FACILITIES TO BE LOCATED BY CLV SHALL INCLUDE AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, AND TRANSITION STRUCTURES. STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORK OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINITIES 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).

OR

(MAY BE USED ONLY ON PROJECTS ASSOCIATED WITH A TENTATIVE MAP CONTAINING 5 LOTS OR MORE)

SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORK OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINITIES 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.

ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND HYDRANT INSTALLATION SPECIFICATIONS.

2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S - APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.

3. A PERMIT IS REQUIRED FOR LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. [FC § 105.6.15]

4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CITY OF LAS VEGAS FIRE DEPARTMENT'S REQUIREMENTS. COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION, ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [FC § 3310, § 3312]

5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE PAINT MARK AND FIRE CODE ORDRANCE #6631 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.

6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [FC 106.3]

7. ALL ON-SITE WATER SUPPLY WATER MAINS AND MATERIALS SHALL BE U.S. LISTED. A WATER MAIN AND FIRE HYDRANT SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [FC § 507.2.1, NFPA 24]

8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [FC § 507]

9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [FC § 507.5.1.1]

10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [FC § 507]

11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [FC § C102.2]

- RESIDENTIAL - 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
- COMMERCIAL - 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.

12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED, FIRE HYDRANTS SHALL BE PROVIDED TO PROTECT THE STREETS. AT THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FIVE (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [FC § C102.8]

13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.

14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [FC § C102.10]

15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [FC § C102.10]

16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [FC § C102.7]

17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [FC § C102.6]

18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHEN THERE IS 4 OR MORE FIRE HYDRANTS SPRINKLERED OR UNSPRINKLERED. ONE FIRE LINE AND ONE 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 LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. FOR SYSTEMS PERMITTED TO HAVE ONLY ONE (1) WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. [FC § C104]

19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [FC § 503.2.3]

20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% AND THE DEGREE OF CURVE OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE, ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [FC § 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. [FC § 503.2.4]

22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13'6 IN. [FC § 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. THE TURNING RADIUS OF THE CURB SHALL BE 100 FT OR MORE MEASURED TO FACE OF CURB. NOT LESS THAN 24 FT WIDE WITH NO PARKING ON EITHER SIDE MEASURED TO FACE OF CURB. FIRE LINES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [FC § 503.2.1.1]

24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXISTING ROAD OR FIRE DEPARTMENT ACCESS ROAD IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. [FC § 503.1.1]

25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 200 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH 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 AND END OF THE STATIONED FIRE DEPARTMENT ACCESS ROAD. SIGNS AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. 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 LOWER THAN 4 FT TO 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. [FC § 503.3]

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

29. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS, OR HAVING FOUR OR MORE TRAVEL LANES AND A TRAFFIC COUNT OF MORE THAN 30,000 VEHICLES PER DAY, ALL HYDRANTS TO BE LOCATED 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 4, 2019

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 PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWMO STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PVC PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

ABN - ABANDON
 AC - ASPHALTIC CONCRETE
 AGOR - AGGREGATE
 & - AND
 APN - ASSESSOR PARCEL NUMBER
 APPROX - APPROXIMATE
 ASSY - ASSEMBLY
 AVE - AVENUE

 BC - BACK OF CURB
 BOR - BACK OF CURB RETURN
 BK - BOOK/BACK
 BLK - BLOCK
 BLK - BLOCK
 BLVD - BUREAU OF LAND MANAGEMENT
 BLM - BOULEVARD
 BM - BENCHMARK
 BO - BLOW OFF ASSEMBLY
 BOT - BACK OF TRUCK
 BOT - BOTTOM
 BOW - BACK OF CURB
 BRG - BEGIN
 BWC - BEGIN VERTICAL CURVE
 BW - BACK OF WALK
 BWB - BACK WATER VALVE

 C/C - CENTER TO CENTER
 C&G - CURB & GUTTER
 CC - CLARK COUNTY
 CE - COMMON ELEMENT
 CI - CAST IRON
 CIP - CAST IRON PIPE / CAST IN PLACE
 CL - CL
 CL OR C - CENTERLINE
 CLV - CITY OF LAS VEGAS
 CLNY - CITY OF NORTH LAS VEGAS
 CO - COUNTY
 CO - CITY OF HENDERSON
 CONC - CONCRETE
 CON - CONDUIT
 COORD - COORDINATE
 CTR - CENTER
 CV - CONTROL VALVE

 Δ - DELTA ANGLE
 D/W OR DWY - DRIVEWAY
 DEPT - DEPARTMENT
 DET - DETAIL
 DEV - DEVELOPMENT
 DG - DESIGN GRADE
 DI - DROP INLET/DUCTILE IRON
 DIA OR Ø - DIAMETER
 DIM - DIMENSION
 DIP - DUCTILE IRON PIPE
 DIR - DIRECTION
 DIST - DISTANCE
 DMH - DROP MANHOLE
 DN - DOWN
 DR - DRAIN
 DWG - DRAWING
 E - EAST/EAST
 EA - EACH
 EG - EXISTING GROUND
 ELEV - ELEVATION
 EOP - EDGE OF PAVEMENT
 EOS - EDGE OF SHOULDER
 EQ - EQUAL OR EQUIVALENT
 EQ SP - EQUALLY SPACED
 ESMT - EASEMENT
 EST - ESTIMATE
 EVG - END OF VERTICAL CURVE
 EW - EACH WAY
 EXIST - EXISTING

 F/F - FACE TO FACE
 FC - FACE OF CURB
 FT - FINISHED FLOOR
 FG - FINISHED GRADE
 FH - FIRE HYDRANT
 FL - FLOOR
 FLR - FLOOR
 FLR - FLOOR
 FND - FOUND
 FOC - FACE OF CURB
 FOW - FACE OF WALL
 FPM - FEET PER MINUTE
 FPS - FEET PER SECOND
 FT - FOOT OR FEET
 FUT - FOOTING
 FUT - FUTURE

 G/B - GRADE BREAK
 GALV - GALVANIZED
 GB - GRADE BREAK
 GND - GROUND
 GPD - GALLONS PER DAY
 GPH - GALLONS PER HOUR
 GPM - GALLONS PER MINUTE
 GRD - GRADE
 GRT - GRATE
 GV - GATE VALVE

 HORIZ - HORIZONTAL
 HP - HIGH POINT
 HPG - HIGH PRESSURE GAS
 HT - HEIGHT
 HWY - HIGHWAY

 IN - INCH
 INST - INSTALL
 INT - INTERIOR
 INV - INVERT
 IRR - IRRIGATION

 LB OR # - POUND
 LEN OR L - LENGTH OF CURVATURE
 LF - LINEAL FOOT
 LG - LONG
 LN - LANE
 LT - LEFT/LIGHT
 LVMD - LAS VEGAS VALLEY
 LW - WATER DISTRICT
 LWR - METER

 M - METER
 MATL - MATERIAL
 MAX - MAXIMUM
 MECH - MECHANICAL
 MFR - MANUFACTURER
 MG - MILLION GALLONS
 MGD - MILLION GALLONS PER DAY
 MH - MANHOLE
 MIN - MINIMUM
 MISC - MISCELLANEOUS
 MJ - MECHANICAL JOINT
 MKR - MARKER
 ML - MORTAR LINED
 MLC - MORTAR LINED & COATED
 MVC - MIDDLE OF VERTICAL CURVE

 N - NORTH
 NA - NOT APPLICABLE
 NA - NOT A PART
 NDOT - NEVADA DEPARTMENT OF TRANSPORTATION
 NE - NEVADA ENERGY
 NE - NORTHEAST
 NF - NORTH FACE
 NG - NATURAL GROUND
 NO OR # - NUMBER
 NTS - NOT TO SCALE
 NRS - NEVADA REVISED STATUTES
 NC - NEVADA ADMINISTRATIVE CODE
 NW - NORTHWEST

 O/O - OUT TO OUT
 OC - ON CENTER
 OD - OUTSIDE DIAMETER
 OF - OFF SIDE
 OHP - OVER HEAD POWER
 OHTEL - OVER HEAD TELEPHONE
 ORIG - ORIGINAL
 OVR - OVERFLOW

 PL OR P - PROPERTY LINE
 PAVMT - PAVEMENT
 PB - PULL BOX
 PC - POINT OF CURVE
 PCC - POINT OF COMPOUND CURVE
 PE - POLYETHYLENE
 PED - PEDESTAL
 PERM - PERMANENT
 PERP - PERPENDICULAR
 PH - PHASE
 PI - POINT OF INTERSECTION
 PKG - PACKAGE
 PKWY - PARKWAY
 PL - PLATE/PLATE/PARCEL LINE
 PLT - PLATE (PARROW)
 POLY - POLYETHYLENE
 PP - POWER POLE
 PR - PAR
 PRC - POINT OF REVERSE CURVE/
 PRECAST REINFORCED CONCRETE
 PRELIM - PRELIMINARY
 PROP - PROPOSED
 PRV - PRESSURE REGULATING VALVE
 PS - PUMP STATION
 PSL - POUNDS PER SQUARE FOOT
 PSL - POUNDS PER SQUARE INCH
 PT - POINT/POINT OF TANGENT
 PUE - PUBLIC UTILITY EASEMENT
 PVE - POINT OF VERTICAL INTERSECTION
 PVC - POLYVINYL CHLORIDE PIPE

 QTR - QUARTER
 QTY - QUANTITY

 R - RADIUS
 (R) - RADIAL
 R/W - RIGHT OF WAY
 RC - REINFORCED CONCRETE BOX
 RCP - REINFORCED CONCRETE PIPE
 RD - ROAD
 RED - REDUCER
 REDD - REDUCED
 RET - RETURN
 REV - REVISION OR REVERSE
 ROW - RIGHT OF WAY
 RPPA - REDUCED PRESSURE PRINCIPLE ASSEMBLY
 RR - RAILROAD
 RT - RIGHT

 S - SOUTH/SOUTH
 S/C - SAW CUT
 SSC - STEEL CYLINDER CONCRETE PIPE
 SOH - SCHEDULE
 SO - STORM DRAIN
 SDMH - STORM DRAIN MANHOLE
 SDWK - SIDEWALK
 SE - SOUTHEAST
 SO YD - SQUARE YARD
 SEC - SECTION/SECOND
 SEG - SEGMENT
 SHLD - SHOULDER
 SHL - SHED
 SPI - SPECIAL IMPROVEMENT DISTRICT
 SIG - SIGNAL
 SL - SLOPE
 SLV - SLEEVE
 SNWA - SOUTHERN NEVADA WATER AUTHORITY
 SPEC(S) - SPECIFICATION(S)
 SQ - SQUARE
 SQ FT - SQUARE FOOT/FEET
 SQ YD - SQUARE YARD
 SS - SANITARY SEWER
 ST - STREET
 STA - STATION
 STD - STANDARD
 STL - STEEL
 STLT - STREET LIGHT
 SYM - SYMBOL
 SYS - SYSTEM

 T&B - TOP & BOTTOM
 TAP - TANGENT
 TMP - TEMPORARY BENCH MARK
 TO - TOP OF CURB
 TD - TRENCH DRAIN
 TO - TEMPORARY
 THK - THICKNESS
 THR BLK - THRUST BLOCK
 TH - TOP OF MANHOLE
 TO - TOP OF FOOTING
 TOGR - TOP OF GRADE
 TO - TOP OF PIPE
 TO - TOP OF RM
 TOS - TOP OF SLAB
 TOSW - TOP OF SIDEWALK
 TOW - TOTAL
 TOW - TOP OF WALL
 (TYP) - TYPICAL

 UN - UNLESS NOTED OTHERWISE
 UPRR - UNITED PACIFIC RAILROAD
 US - UNITED STATES GEODETTIC SURVEY
 UTIL - UTILITY

 V - VOLT OR VALVE
 VAR - VARIES
 VB - VALVE BOX
 VO - VITREOUS
 VC - VERTICAL CURVE
 VEL - VELOCITY
 VERT - VERTICAL
 VV - VALLEY GUTTER
 VOL - VOLUME
 VPI - VERTICAL POINT OF INTERSECTION

 W/ - WITH
 W - WEST/WATER
 W/O - WITH OUT
 WD - WIDTH
 WD - WIDTH
 WDN - WASTE DRAIN
 MI - WROUGHT IRON
 ML - WASTE LINE
 WF - WORK POINT/WEATHER PROOF
 WS - WATER SURFACE
 WTR - WATER
 WTR - WATER
 WW - WELDED WIRE FABRIC
 WWM - WELDED WIRE MESH

 XFRM - TRANSFORMER
 XFR - TRANSFER
 XSEC - CROSS SECTION

 YD - YARD
 YLD - YIELD

	UNIT BOUNDARY
	PROPOSED 1' GRADE CONTOUR
	PROPOSED 5' GRADE CONTOUR
	EXISTING 1' GRADE CONTOUR
	EXISTING 5' GRADE CONTOUR
	PROPOSED PROPERTY LINE
	PROPOSED SETBACK LINE
	PROPOSED HINGE LINE
	PROPOSED SWALE
	EXISTING CURB AND GUTTER
	PROPOSED CURB AND GUTTER
	RETAINING WALL
	GARDEN WALL WITH SOLID GROUT
	8\"/>
	EXISTING FENCE
	EXISTING EDGE OF PAVEMENT
	PROPOSED EDGE OF PAVEMENT
	PROPOSED STREETLIGHT CONDUIT
	PROPOSED NO. 3 1/2 CONCRETE PULL BOX w/ METAL COVER
	EXISTING GAS
	EXISTING SEWER MAIN
	EXISTING SEWER MAIN
	PROPOSED SEWER LATERAL
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	EXISTING WATER MAIN
	PROPOSED WATER MAIN
	PROPOSED FIRE HYDRANT
	LOT NUMBER
	PROPOSED FINISH FLOOR
	PROPOSED PAD ELEVATION
	EXISTING STREET LIGHT
	PROPOSED 100w HPS STREET LIGHT
	PROPOSED 150w HPS STREET LIGHT
	PROPOSED 200w HPS STREET LIGHT
	PROPOSED 250w HPS STREET LIGHT
	PROPOSED 400w HPS STREET LIGHT
	PROPOSED HANDICAP RAMP
	PROPOSED CONCRETE DRIVEWAY
	0\"/>
	2:1 SCARP
	COURSES OF 8\"/>
	CUL-DE-SAC BACK OF CURB STATION
	KNUCKLE BACK OF CURB STATION
	SIGHT VISIBILITY ZONE
	PROPOSED RATE & FLOW DIRECTION
	PROPOSED ELEVATION WITH DESCRIPTION
	EXISTING ELEVATION WITH DESCRIPTION

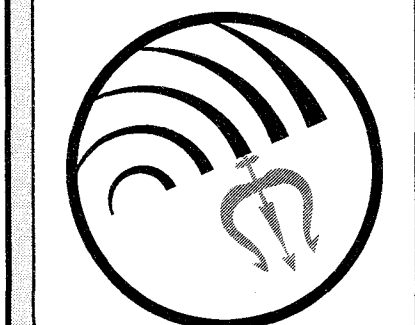
[illegible]

Triton

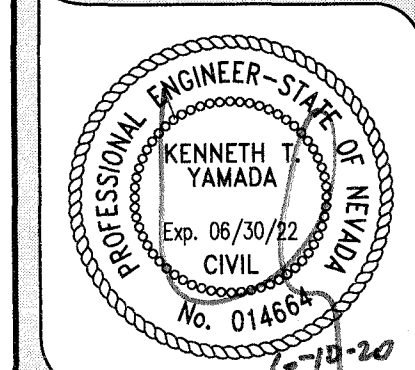
Engineering

6757 West Charleston Boulevard
Suite B
Las Vegas, Nevada 89116

Office: (702) 254-1480
Fax: (702) 254-3062
www.tritoneng.com



DR HORTON
CLIFF SHADOWS AND HICKAM
GENERAL NOTES AND LEGEND



SHEET
2
OF 6

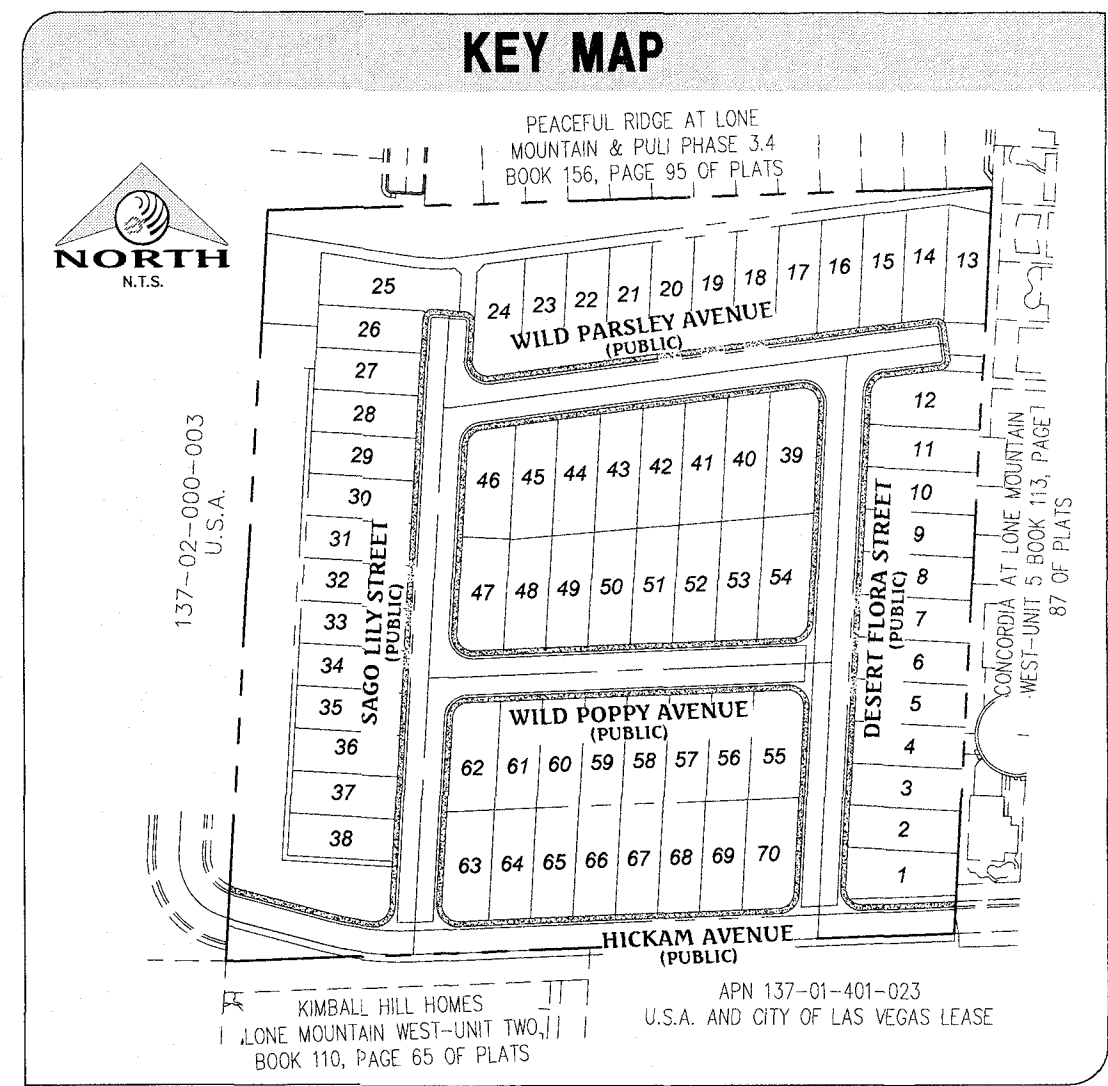
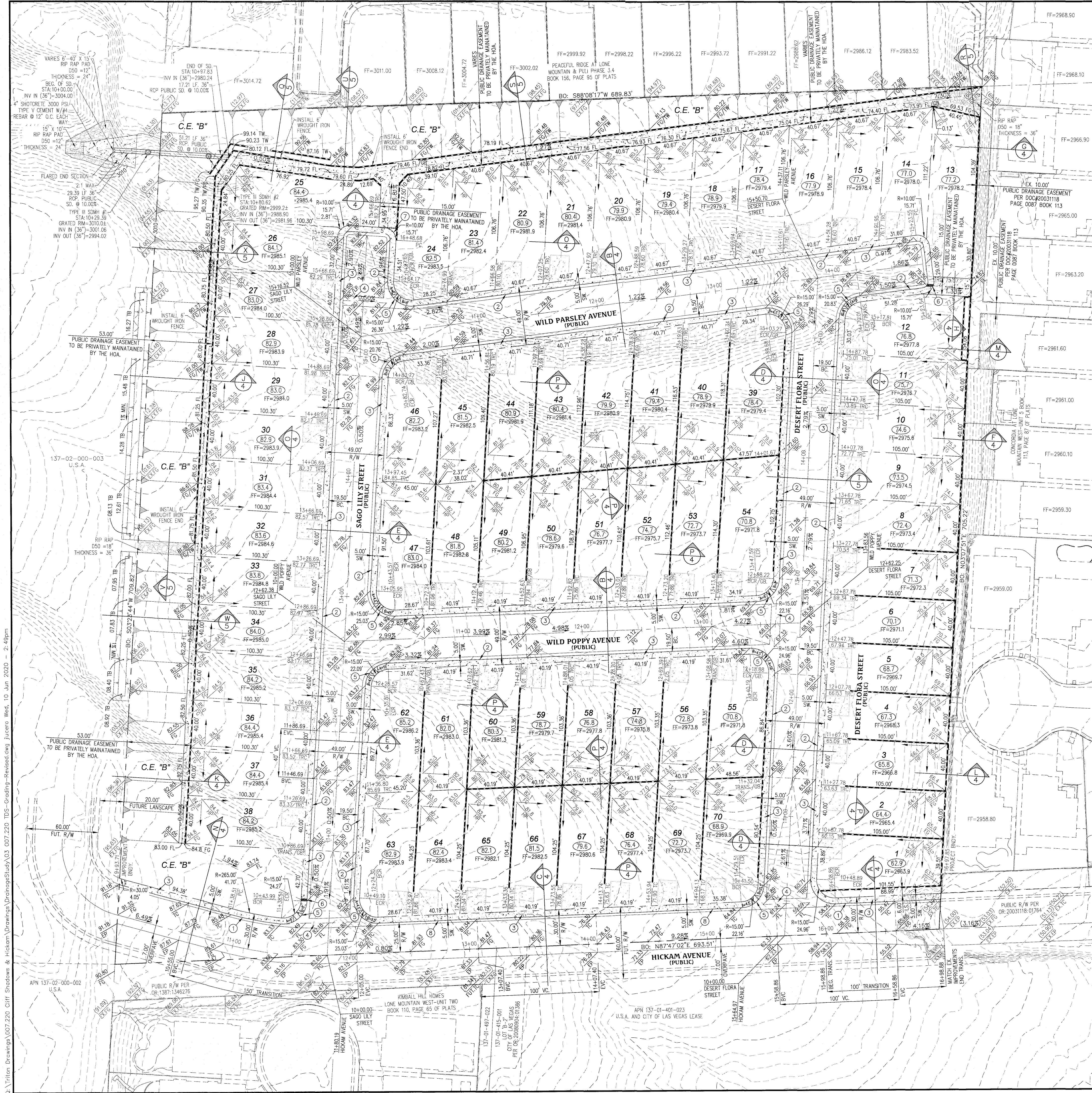


Avoid overhead power
line contact. It's costly.

Call
before you
Overhead
1-702-227-2929

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

CALL
811
OR
1-800-227-2600



ESTIMATE OF QUANTITIES

	PUBLIC	PRIVATE
DRAINAGE IMPROVEMENTS:		
WROUGHT IRON FENCE	9,412 SF	
TYPE II GRAVEL	175 CY	
RIP RAP D50 = 8"	480 SF	
RIP RAP D50 = 12"	150 SF	
RIP RAP D50 = 18"	940 SF	
4" SHOTCRETE 3000 PSI	838 SF	
TYPE V CEMENT W/ #4 REBAR		
Ø 12" O.C. EACH WAY		

NOTE TO CONTRACTOR:
QUANTITIES SHOWN ARE APPROXIMATIONS ONLY AND ARE INTENDED TO ILLUSTRATE SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT QUANTITIES INVOLVED.

CONSTRUCTION NOTES

- CONSTRUCT "L" TYPE CURB AND GUTTER, PER CCAUSD No. 216
- CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER, PER CCAUSD No. 217.1
- CONSTRUCT 5' WIDE SIDEWALK, PER CCAUSD No. 234
- CONSTRUCT 8" WIDE CROSS GUTTER, PER CCAUSD No. 228
- CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD #235, CASE
- CONSTRUCT 2" SIDEWALK UNDERDRAIN
- INSTALL WROUGHT FENCE WITH ACCESS GATES PER CCAUSD No. 217.3.51

GRADING LEGEND

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- BOUNDARY LINE
- RIGHT-OF-WAY LINE
- STREET CENTERLINE
- EDGE OF PAVEMENT
- EXISTING CURB, GUTTER, & SIDEWALK
- PROPOSED CURB, GUTTER, & SIDEWALK
- PROPOSED AC PAVING
- EXISTING AC PAVING
- EX. FENCE
- EX. BLOCK WALL
- PROPOSED RETAINING WALL
- TOP OF FOOTING
- APPROX. WALL LENGTH
- TOP OF RETAINING WALL
- PROPOSED SCARP

BASIS OF BEARING

NORTH 87°47'02" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 1, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN BY MAP THEREOF ON FILE IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER IN FILE 88, PAGE 08 OF SURVEYS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK 5LV03 15W6
RIVET & PLATE IN TOP OF CURB AT NE CORNER OF CLIFF SHADOWS & HICKAM.
ELEVATION=897.87 Meters (NAV80/88 v.2003)
ELEVATION=2945.76 US Survey Feet (NAV80 v.2003)

FLOOD ZONE NOTE

THE PROJECT SITE IS LOCATED ON FEMA FLOOD INSURANCE RATE MAP #32003C2150E. THE SITE IS LOCATED WITHIN DESIGNATED FLOOD HAZARD ZONE X BEING AN AREA DETERMINED TO BE OUTSIDE THE 100 YEAR FLOOD PLAIN.

GRADING NOTES

- ALL PROPOSED PAD ELEVATIONS AND SWALE ELEVATIONS ARE ROUGH GRADES. ALL OTHER PROPOSED ELEVATIONS ARE FINISHED GRADES.
- THE GRADING PLANS SHALL BE AT THE PROJECT SITE THROUGHOUT THE COURSE OF CONSTRUCTION.
- ALL GRADING SHALL BE PERFORMED IN CONFORMANCE WITH THE LINES, GRADES AND DETAILS AS SHOWN ON THESE PLANS. ANY DEVIATION FROM THESE PLANS WILL ONLY BE PERMITTED UPON WRITTEN APPROVAL FROM THE ENGINEER.
- ALL PADS ARE TO BE GRADED WITHIN ±0.3' OF THE ELEVATIONS AS SHOWN ON THE PLANS. GRADING IS NOT COMPLETE UNTIL THE ENGINEER HAS CERTIFIED THAT THE PADS HAVE BEEN GRADED IN SUBSTANTIAL CONFORMANCE TO THE PLANS.
- ALL PLACEMENT OF OVERSIZED MATERIALS AND/OR FILL MATERIALS SHALL BE PER THE SOILS REPORT REFERENCED ON THIS PLAN.
- ADD 2200 TO ALL SPOT GRADES AND TOP OF CURB, FLOW LINE AND FINISH GRADE ELEVATIONS.
- ANY CURVED CURB LESS THAN 1/2" MUST BE WATER TESTED BY CONTRACTOR AS REQUIRED BY CITY INSPECTOR.

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

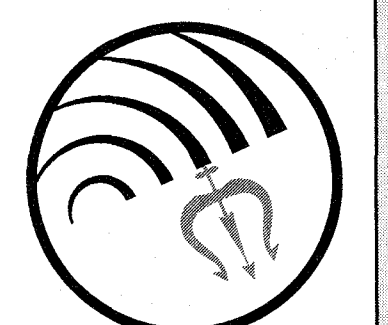
KENNETH T. YAMADA, PE No. 014664 DATE

Call before you Overhead
1-702-227-2929

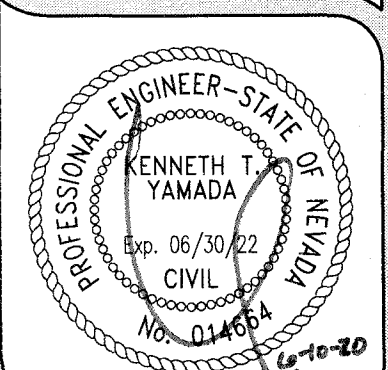
Call before you Dig
Avoid cutting underground utility lines. It's costly.
811
OR
1-800-227-2600

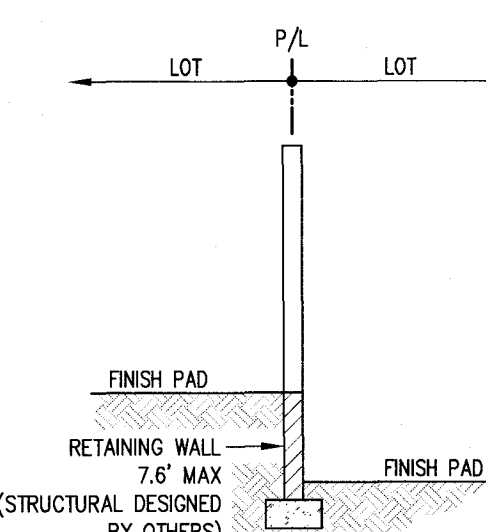
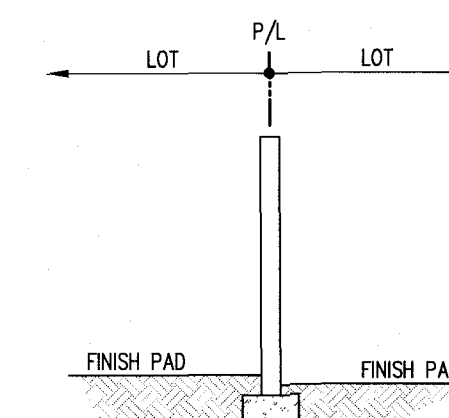
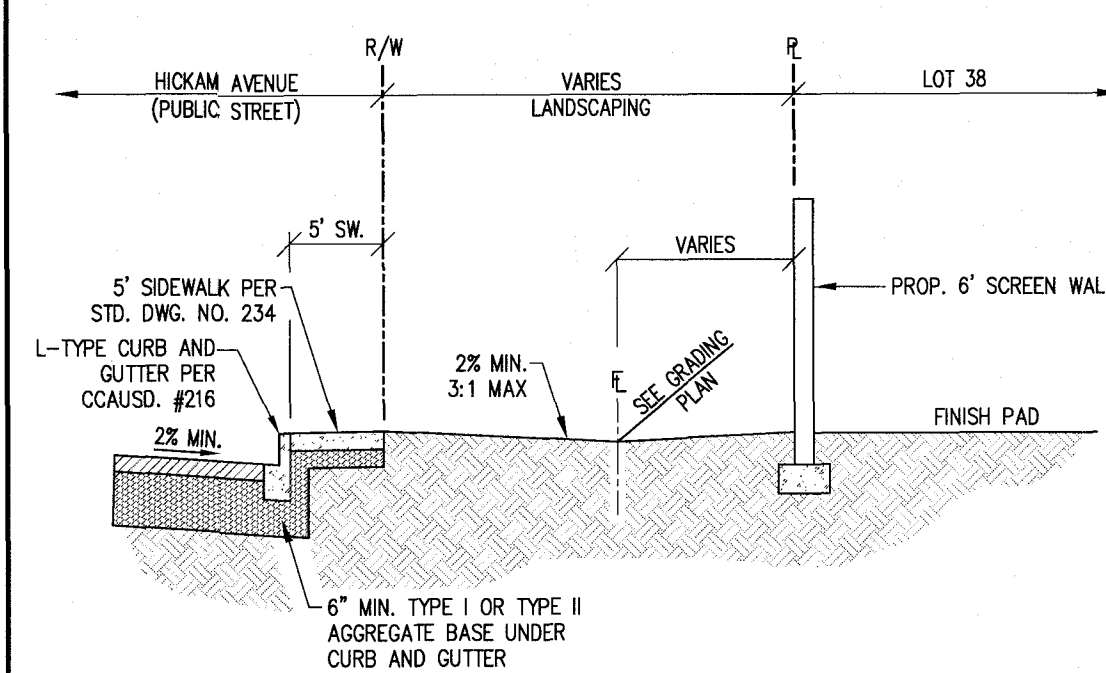
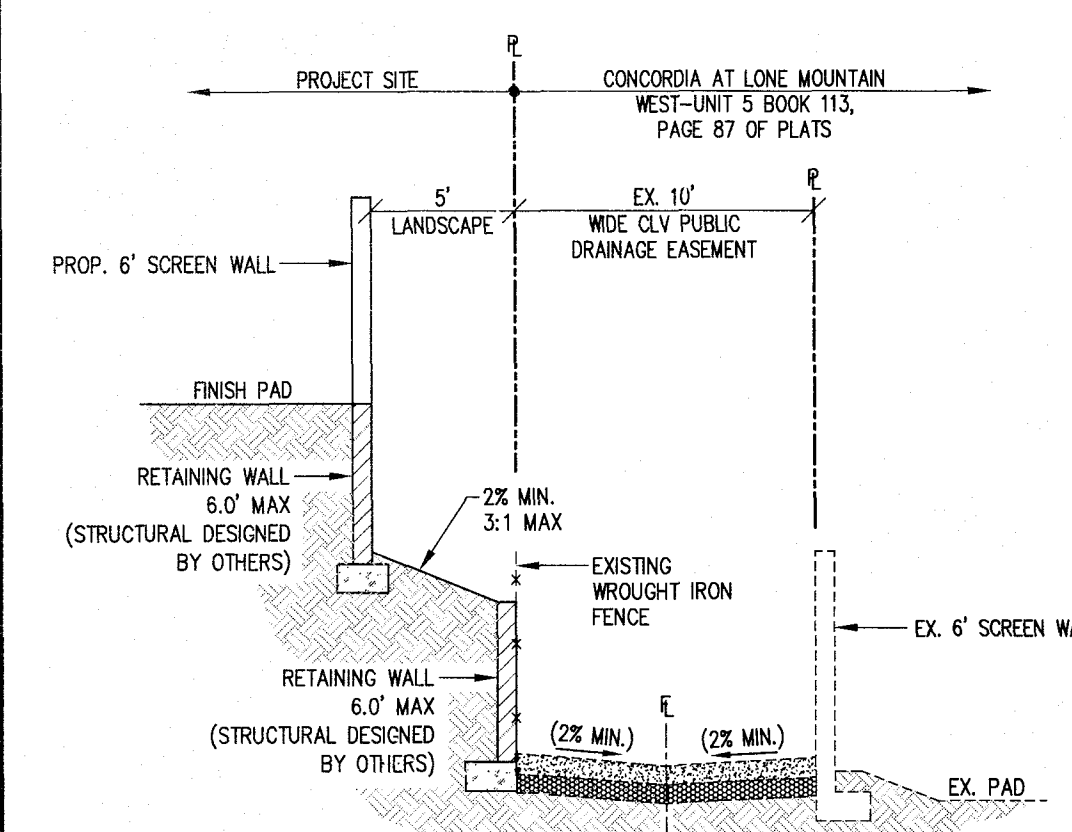
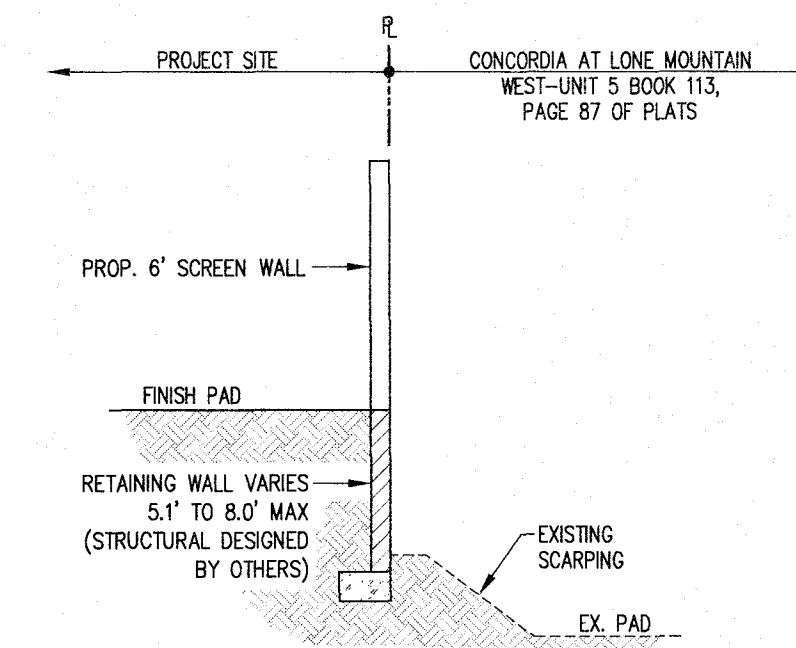
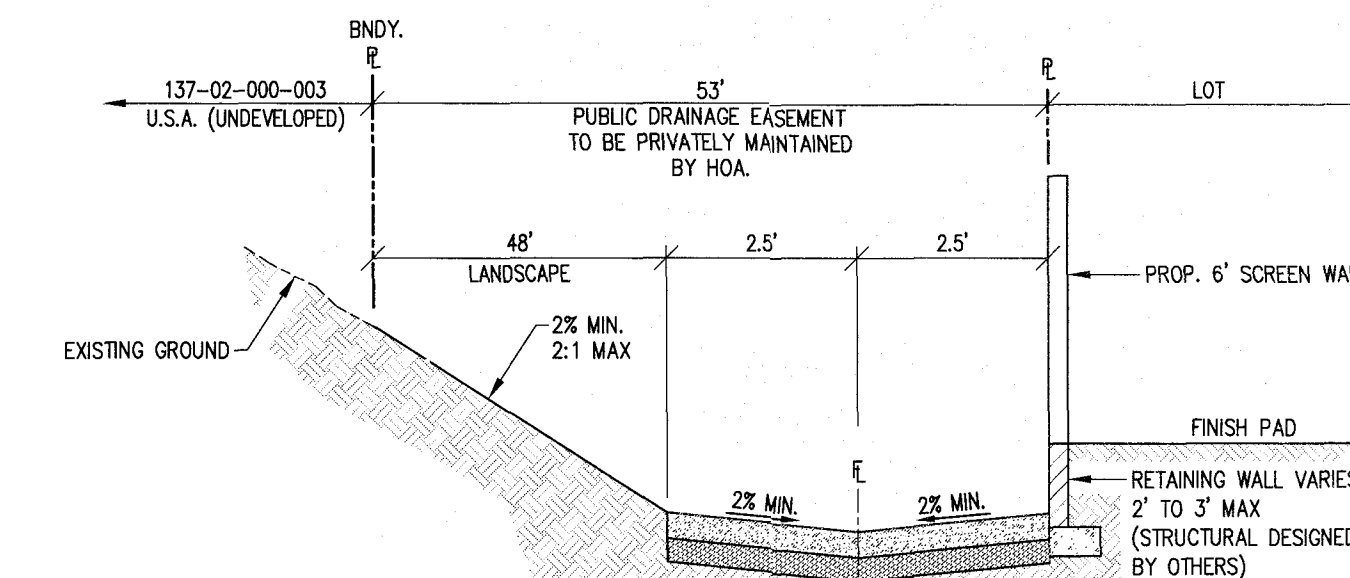
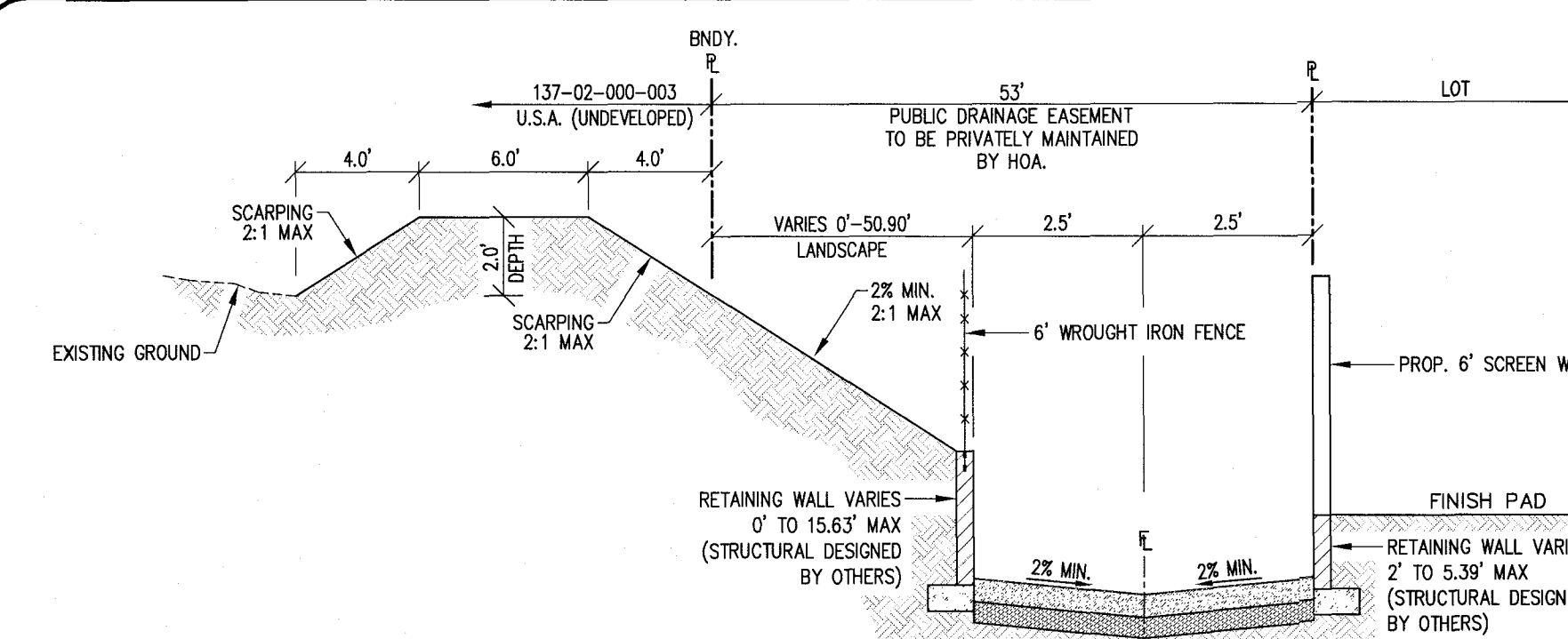
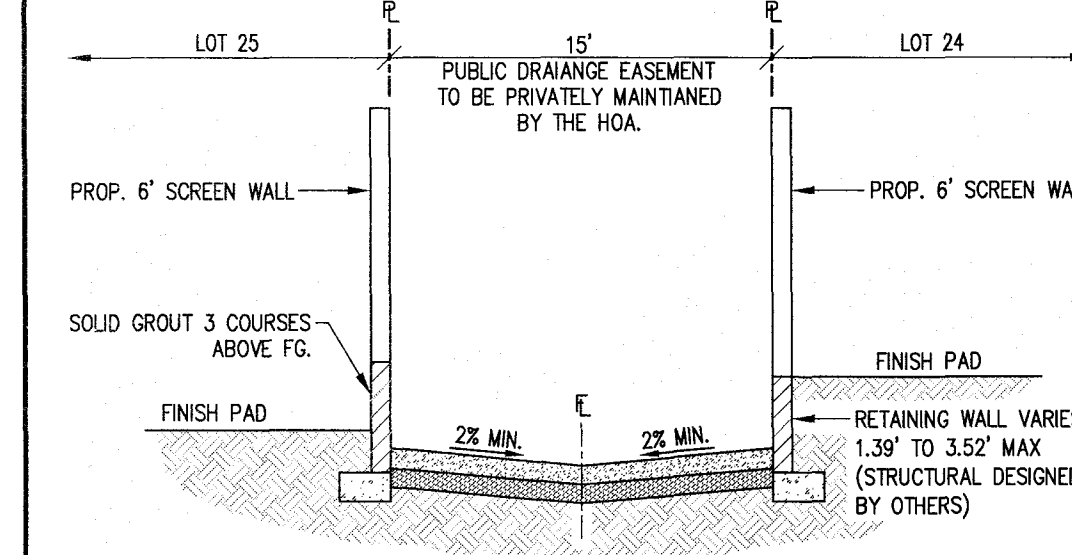
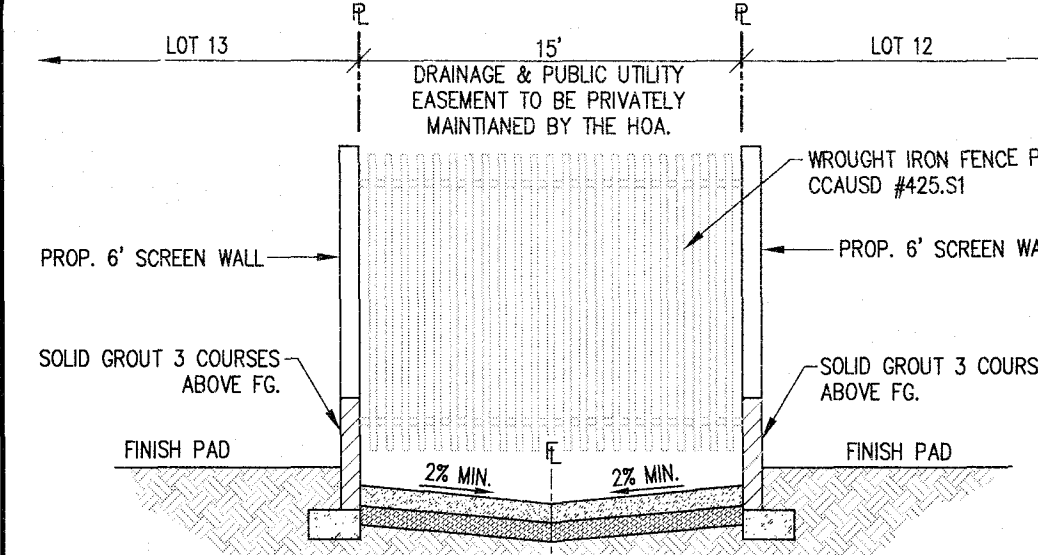
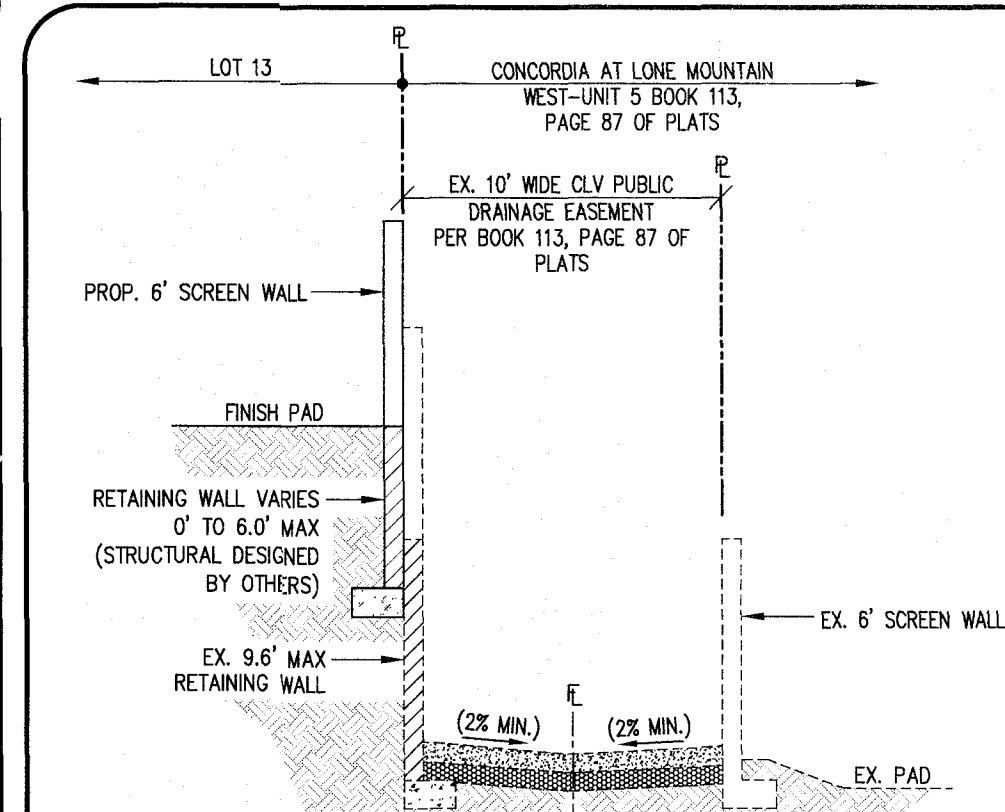
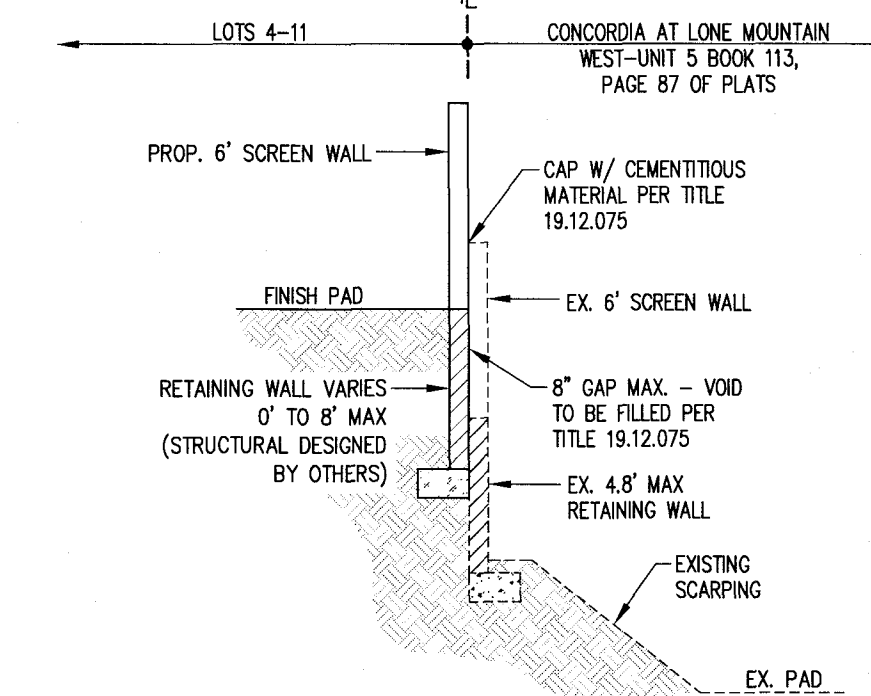
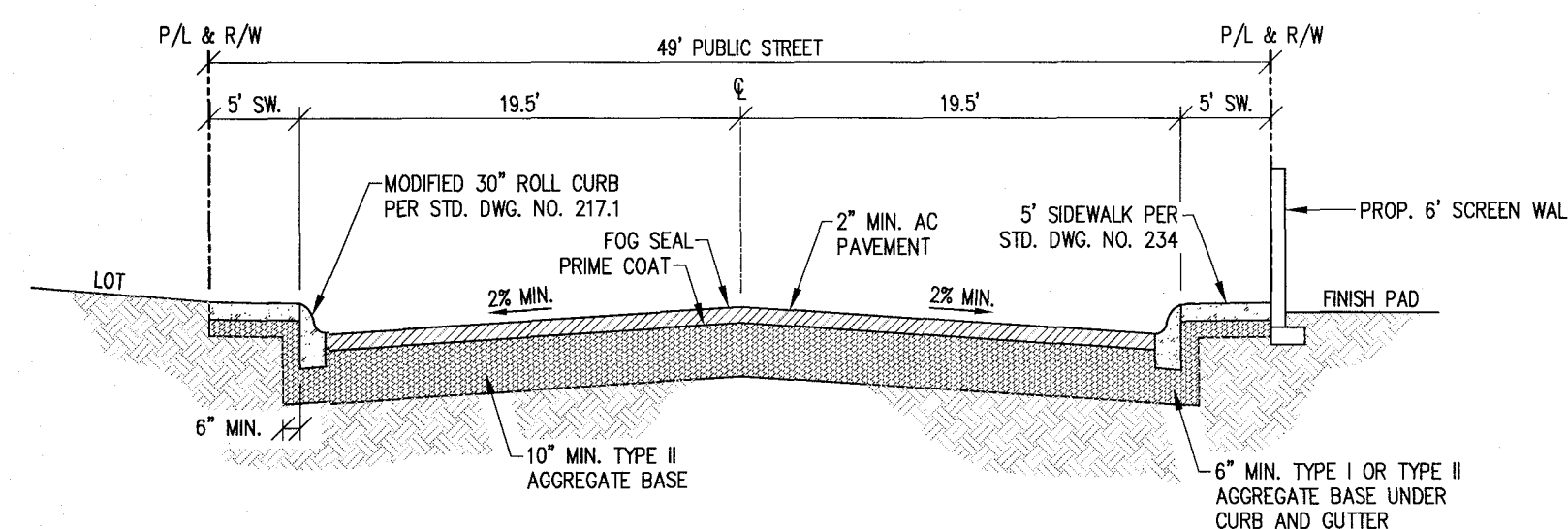
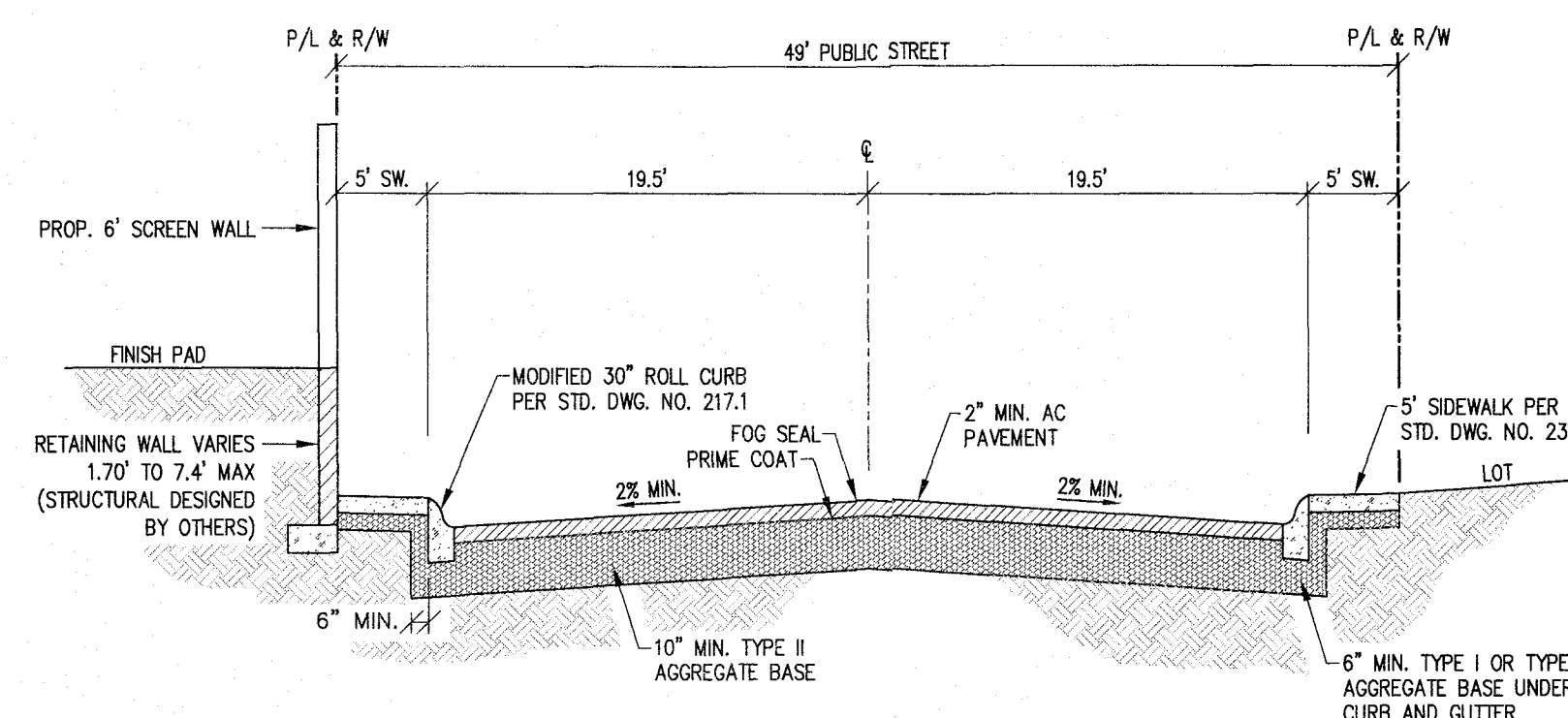
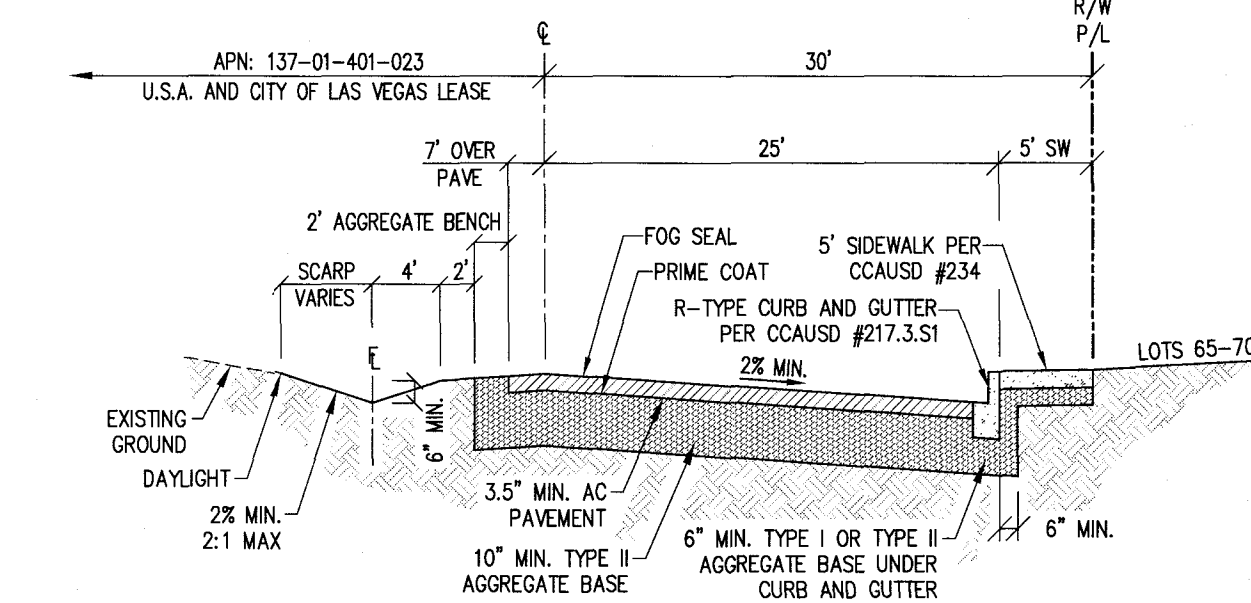
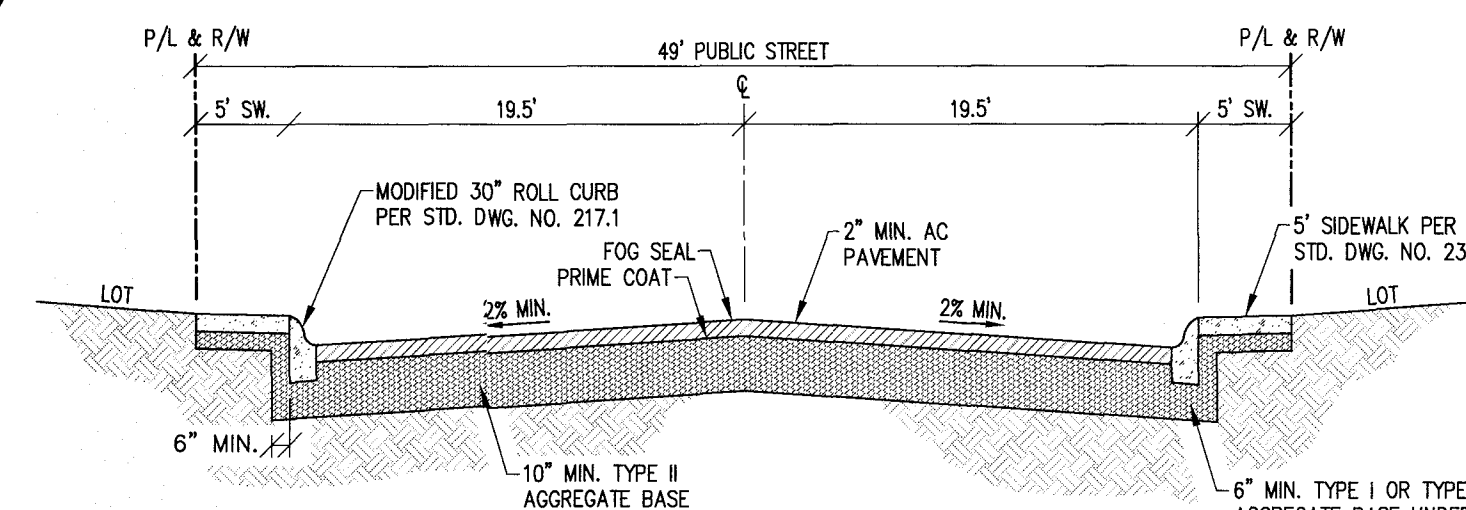
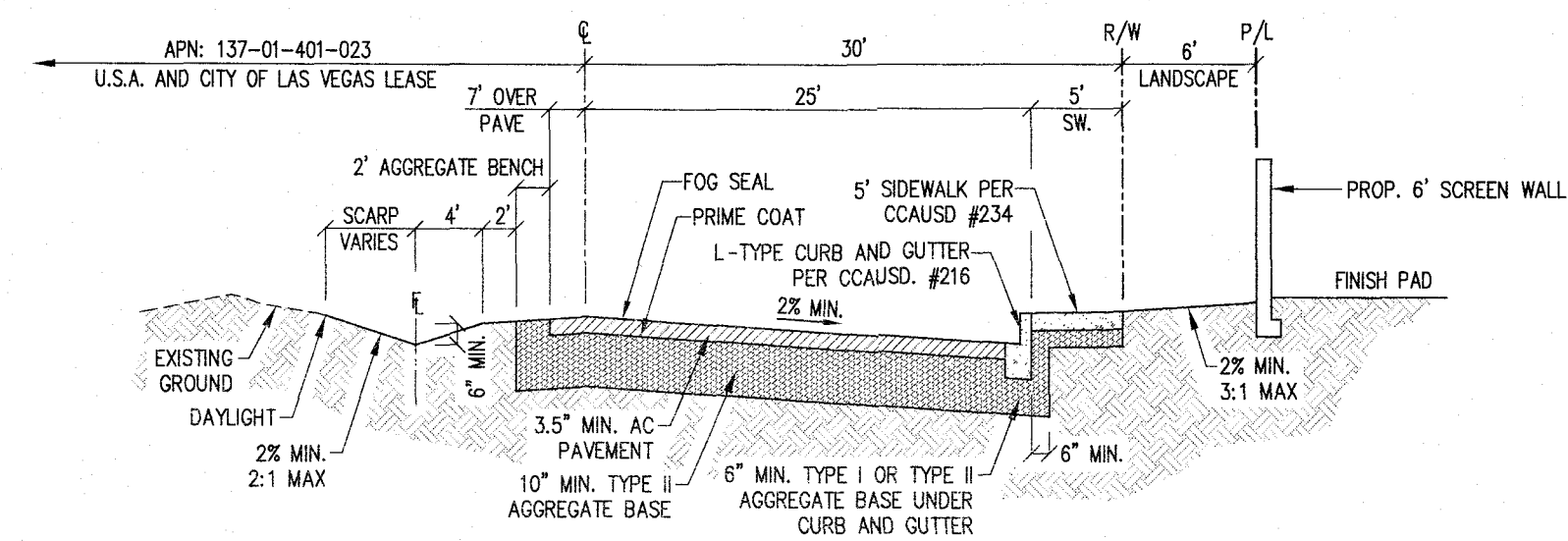
FAST
Call before you Underground
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Triton Engineering
Office: (702) 254-1480
Fax: (702) 254-3062
www.tritoneng.com



DR HORTON
CLIFF SHADOWS AND HICKAM
GRADING PLANS



[illegible]

DATE :	03/27/20
PM :	K. YAMADA
DRAWN BY :	T.E.
DESIGNED BY :	T.E.
CHECKED BY :	T.E.
ADA CHECKED :	T.E.
JOB NO. :	007.220
SCALE :	AS NOTED

Triton

Engineering

6757 West Charleston Boulevard
Suite B
Las Vegas, Nevada 89146

Office: (702) 254-1480
Fax: (702) 254-3062
www.tritoneng.com

DR HORTON

CLIFF SHADOWS AND HICKAM

DETAIL SHEET

SHEET
4
OF 6

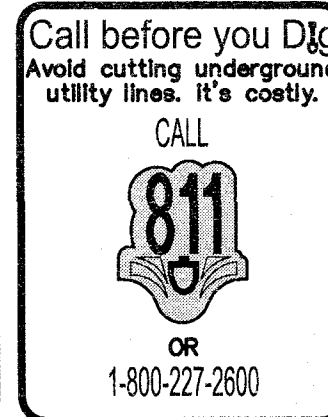
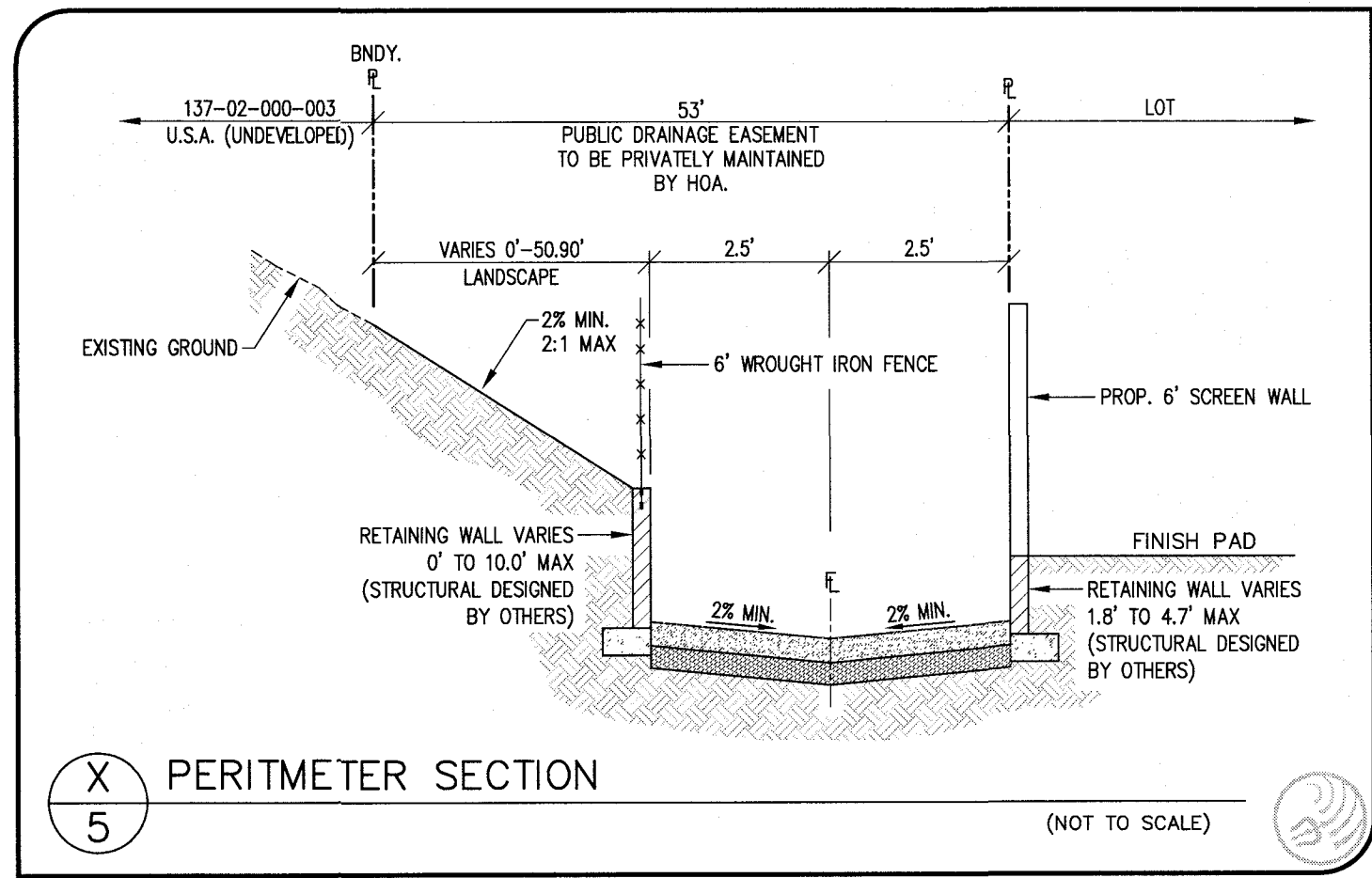
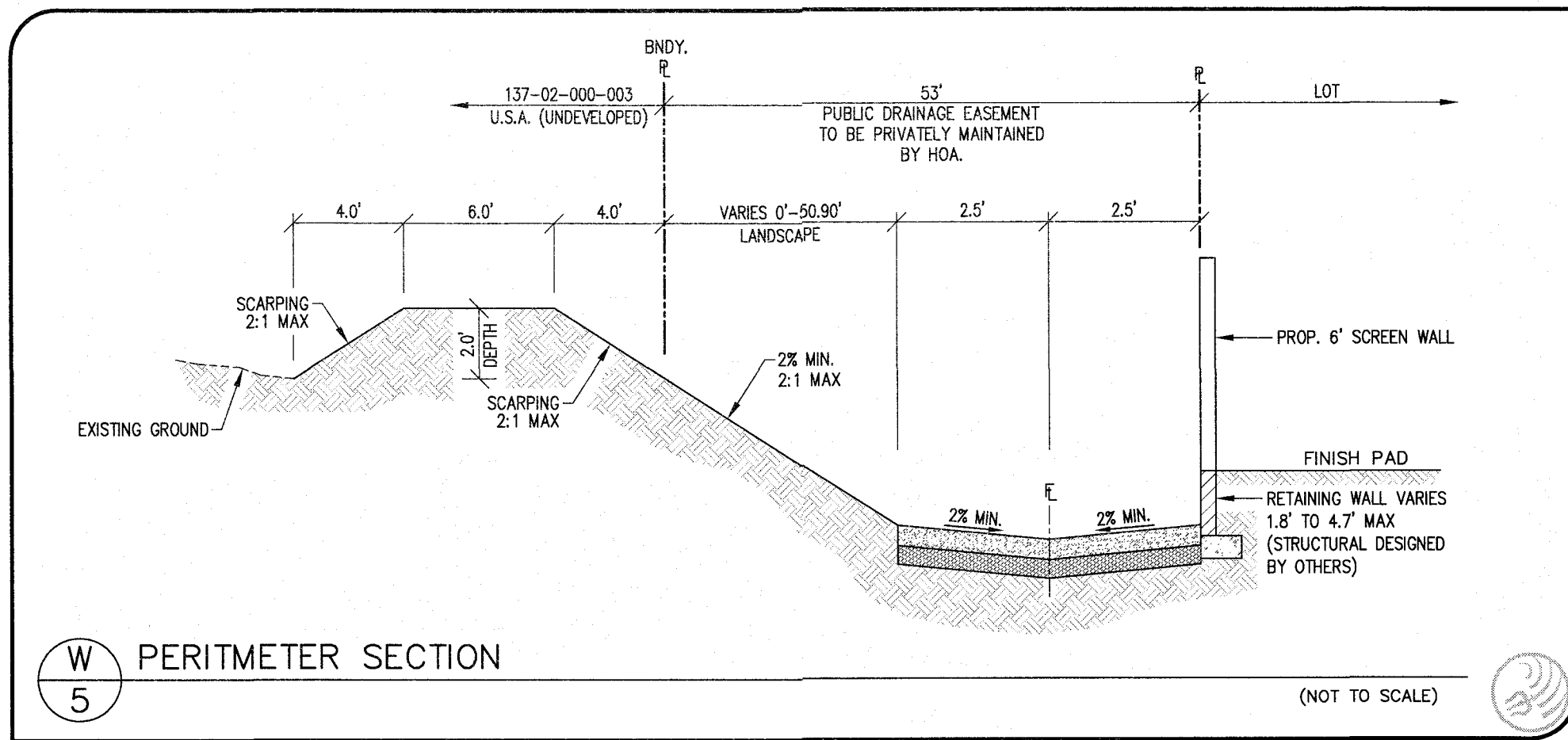
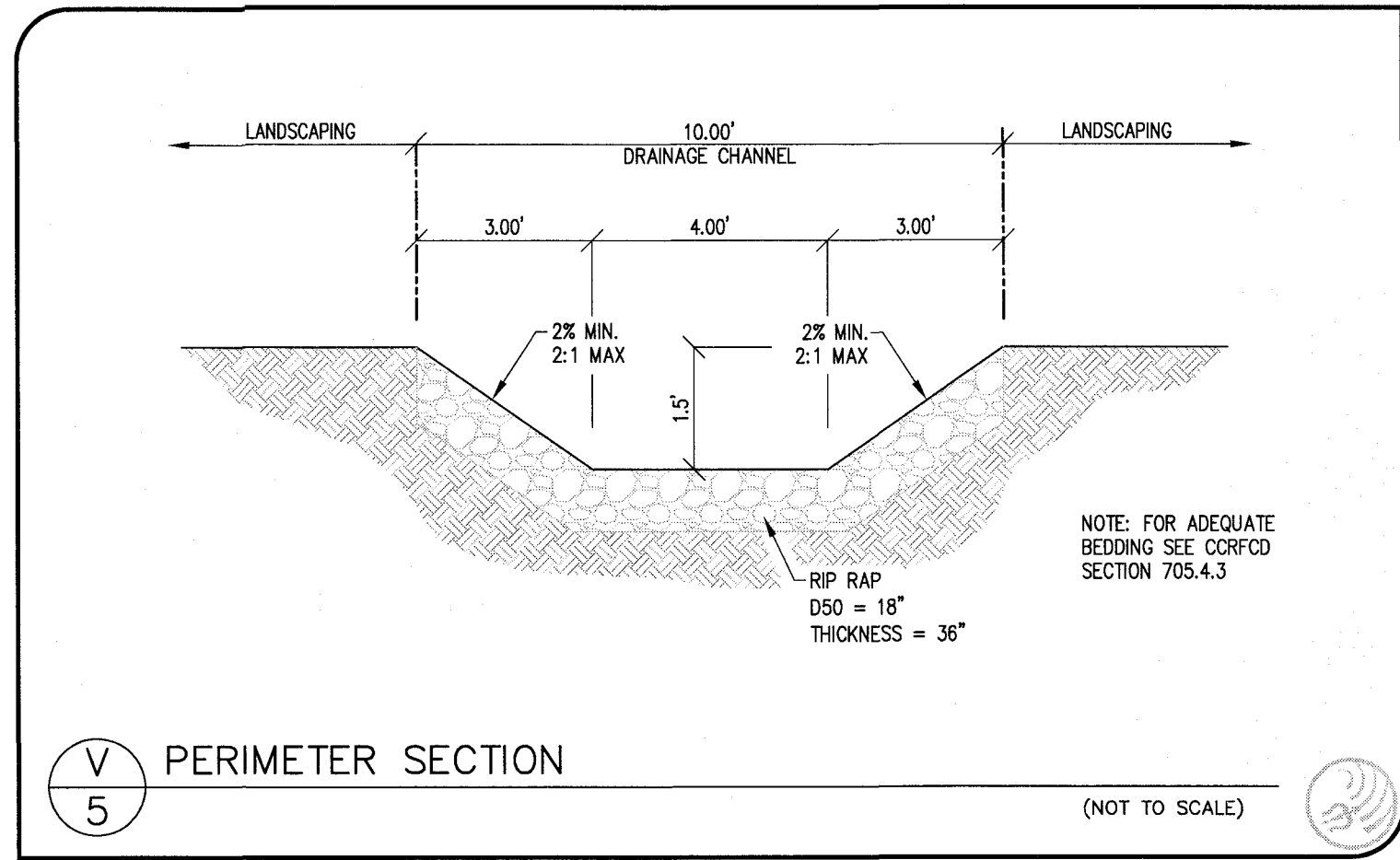
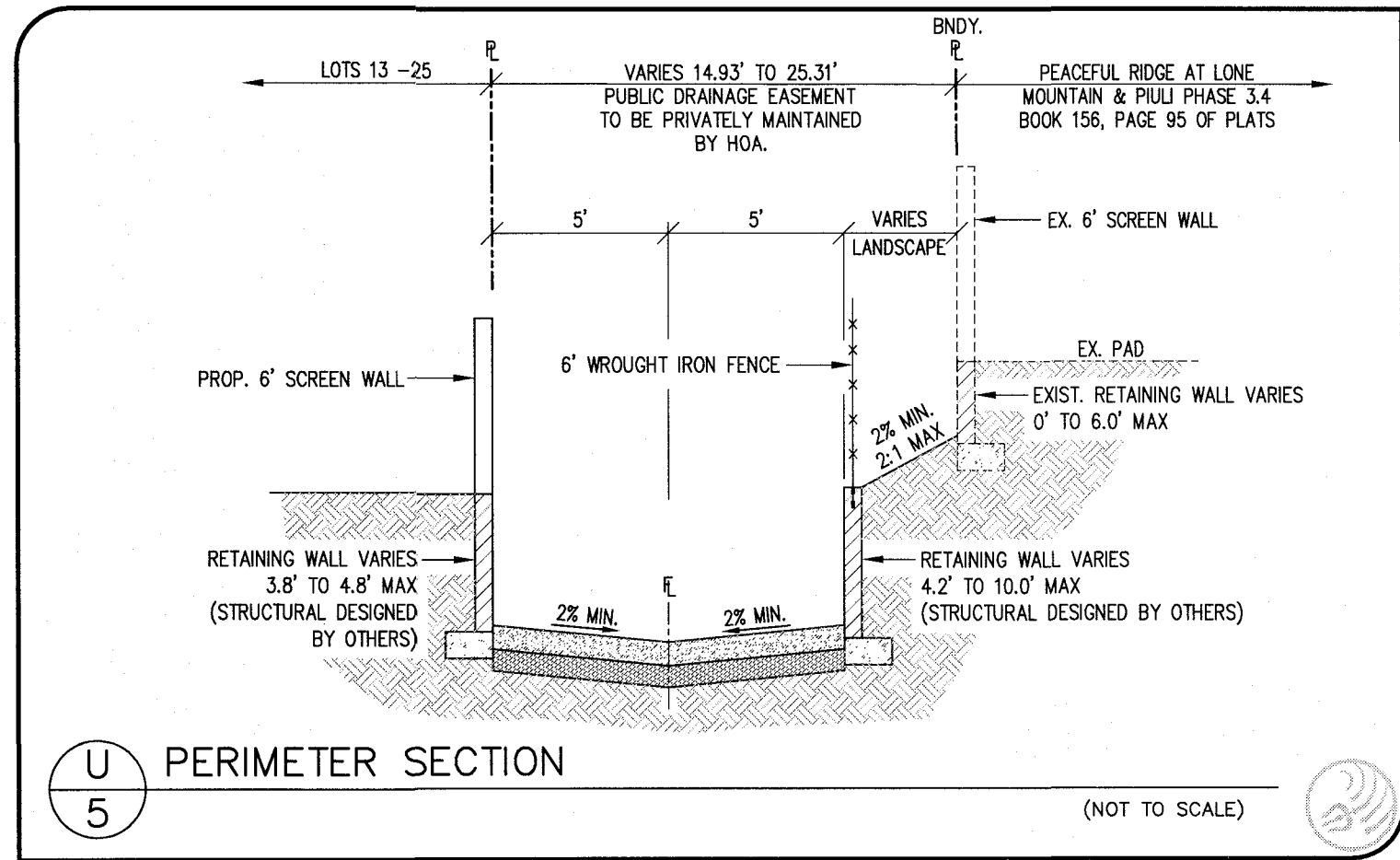
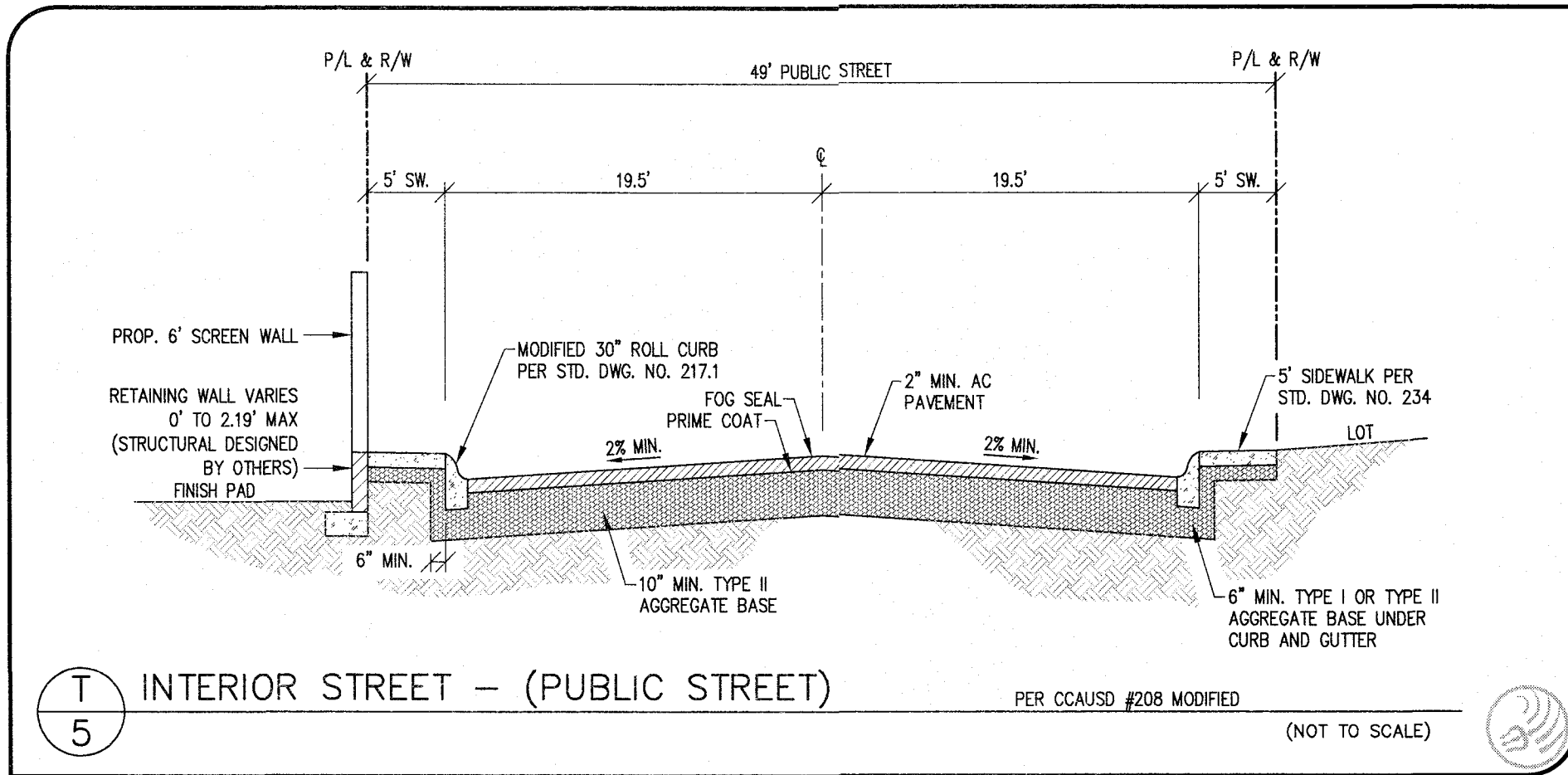
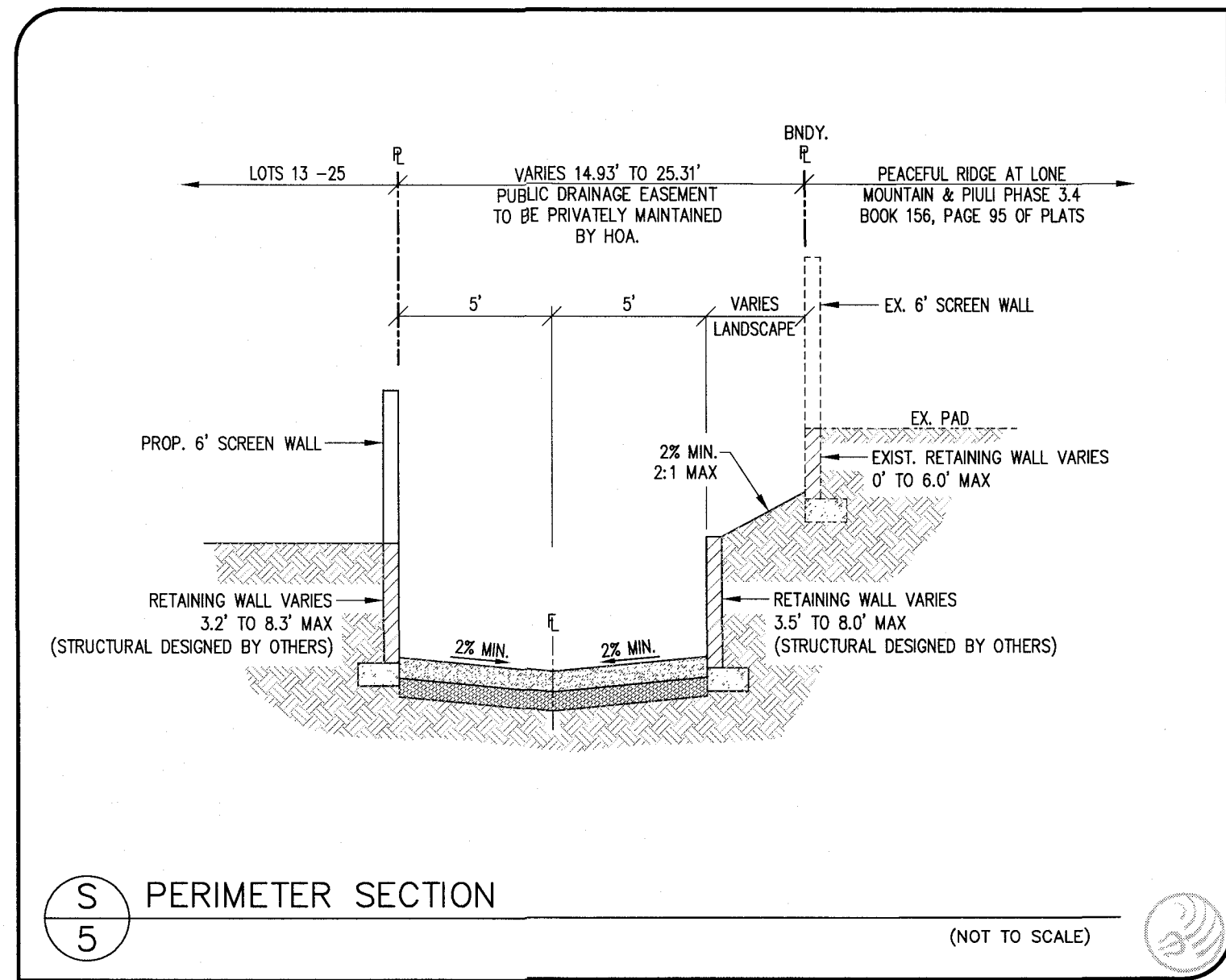
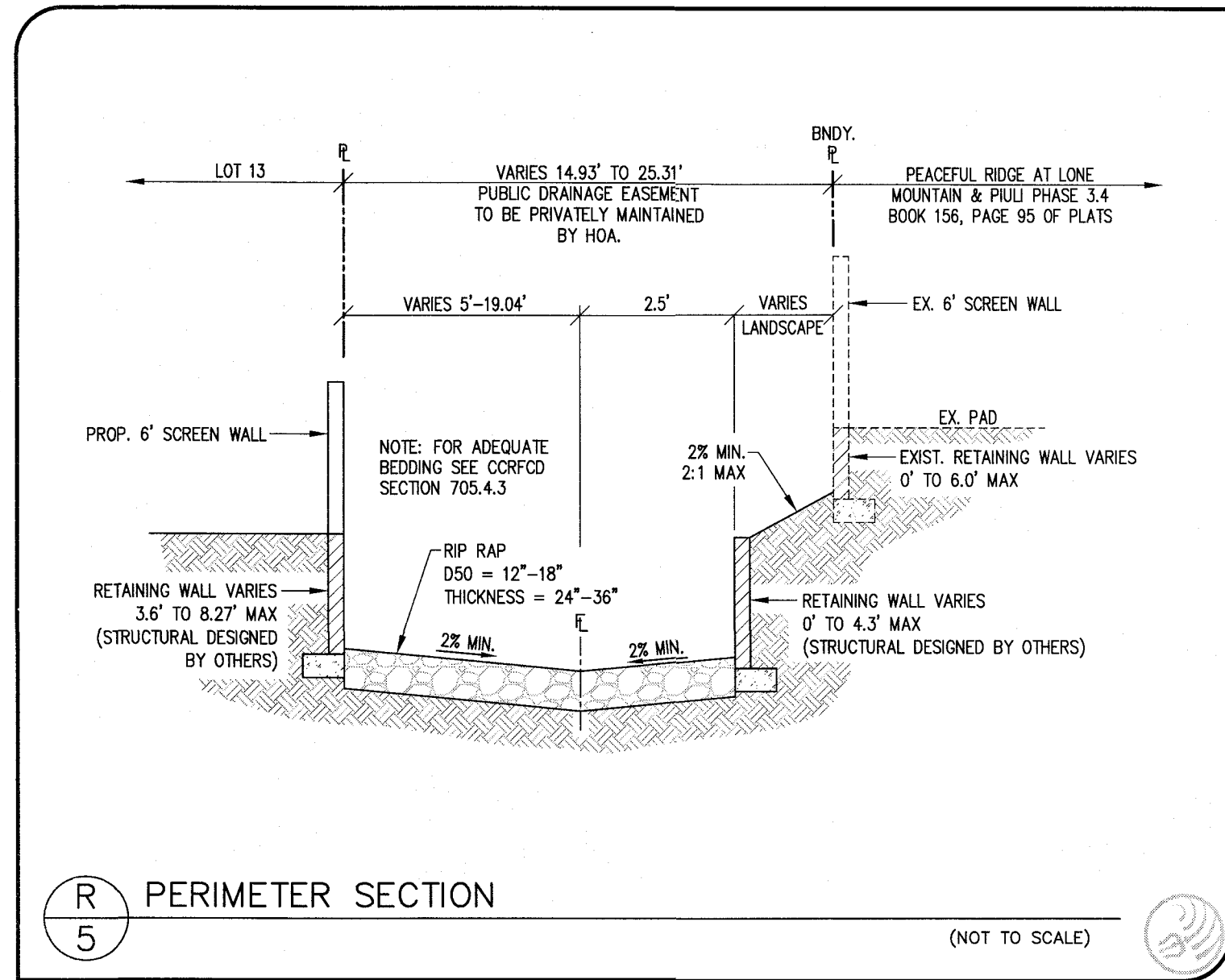
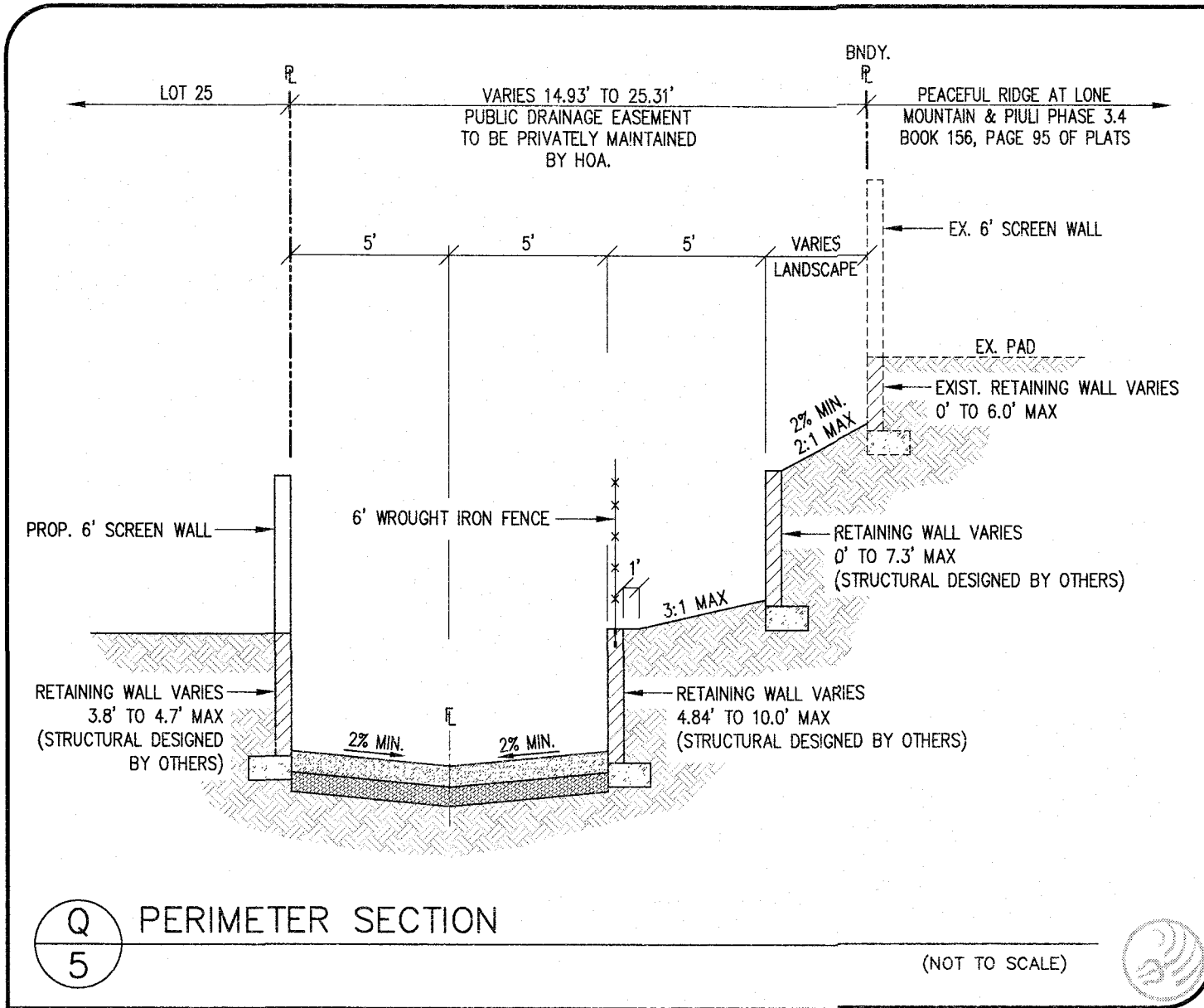
FAST
Call before you
Underground
1-702-432-5300
FREEMAY & AERIAL
SYSTEM OF TRANSPORTATION

Avoid overhead power line contact. It's costly.

Call
before you
Overhead
1-702-227-2929

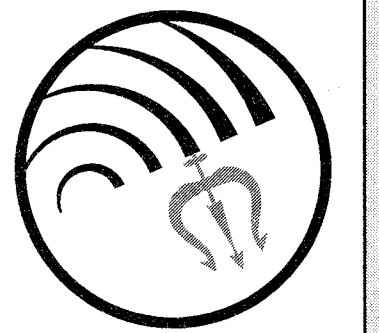
Call before you Dig
Avoid cutting underground
utility lines. It's costly.

CALL
811
OR
1-800-227-2600

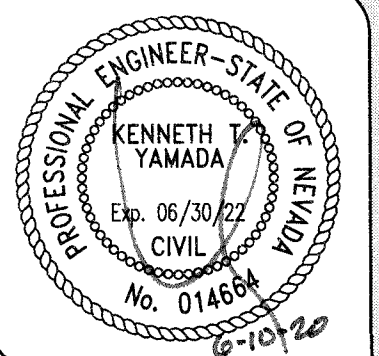


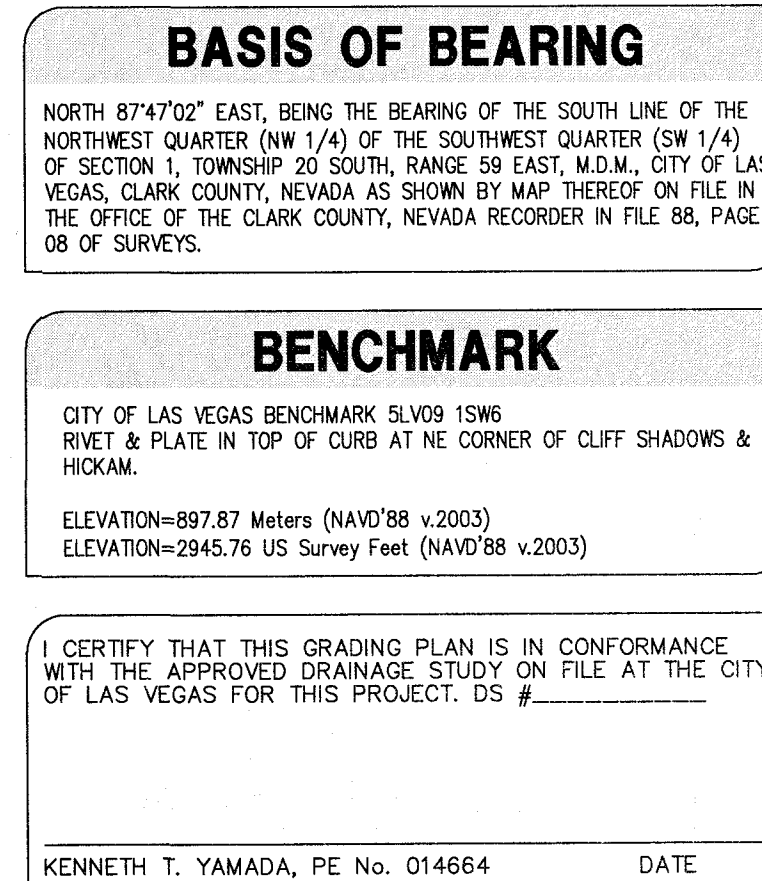
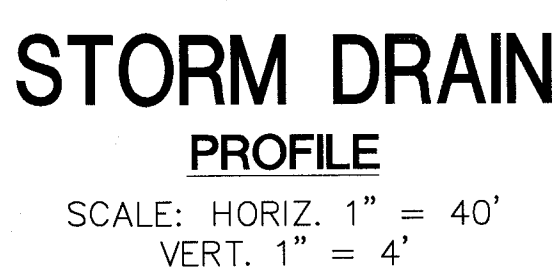
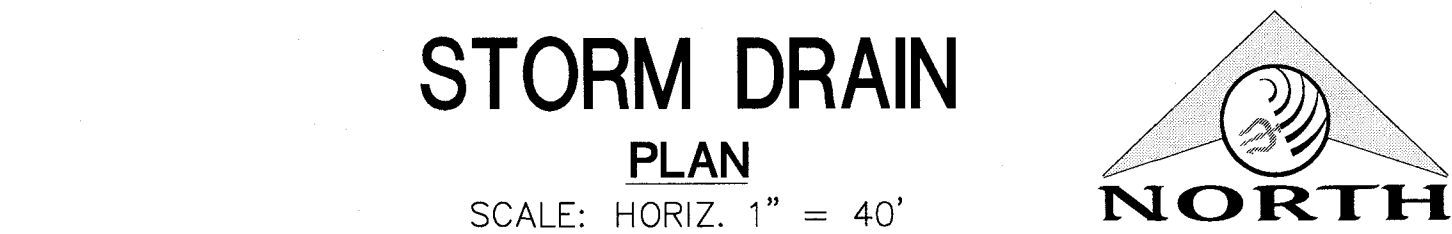
DATE :	03/27/20
PN :	K. YAMADA
DRAWN BY :	T.E.
DESIGNED BY :	T.E.
CHECKED BY :	T.E.
ADA CHECKED :	T.E.
JOB NO. :	007,220
SCALE :	AS NOTED

Triton Engineering
 Office: (702) 254-1480
 Fax: (702) 254-3062
 6757 West Charleston Boulevard
 Suite B
 Las Vegas, Nevada 89146
 www.tritoneng.com



DR. HORTON
 CLIFF SHADOWS AND HICKAM
 DETAIL SHEET





FAST
Call before you
Underground
1-702-432-5300
FREEWAY AND ARTERIAL
SYSTEM OF TRANSPORTATION