

DS #: 05277

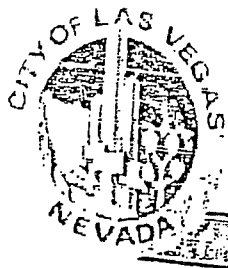
APN: 125-27-22-012

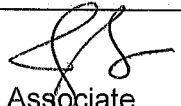
PROJECT: Lee's Discount Liquor

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		May 18, 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:
	Lee's Discount Liquor	JPL Engineering
Cross Streets:	SWQ of Azure Drive and Tenaya Way	Lee's Discount Liquor
File Number:	F:\Depot\DSMemos\DS5277A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-27-22-012	
Zoning Action:		
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	5/5/2020	5/18/2020	See Comments Below	\$400.00	3842946: \$400
TOTAL FEES (LDDRS):				\$400.00	----

REMARKS:

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

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

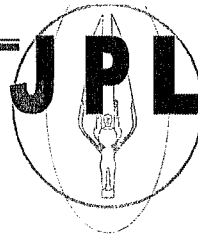
1. Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. Flood Control will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the City Council). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
2. This site accepts offsite flows from the western parcel and conveys them through the site. Provide a "Public Drainage Easement to be Privately Maintained" and show the easement on the grading plan. Public drainage easements must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.
3. The grading plan indicates offsite grading and inter-parcel drainage to the property to the east of the subject site. Secure a notarized letter of permission from the property owner allowing the offsite grading and discharge, or provide documentation that the inter-parcel drainage is allowed (e.g. Parcel Map language, etc.). This letter/documentation is required prior to final acceptance of the drainage study.
4. It appears that the onsite flows discharge to the property to the east. If that is the case, revise the Drainage Basin Exhibit to reflect this flow pattern and provide the necessary documentation as listed in Comment 3.
5. Resolve the grading on the east side of the building at the middle parking median. The grading suggests a low point at which water will pond.

6. The overall parking lot improvement area is larger than 1 acre. Per Section 1500 of the Clark County Regional Flood Control District's Hydrologic Criteria and Drainage Design Manual, the subject improvements must provide for Low Impact Development (LID) measures. Review and address the issue in the next submittal.
7. Landscape areas are not allowed to drain over the sidewalk. Provide flow lines with grades to direct discharge to sidewalk under drains for all landscape areas draining to the street. Revise all pertinent details accordingly.
8. Show existing storm drain facilities including drop inlets in Azure Way and label with CLV Drawing Number.
9. Revise the proposed finish floor elevation shown in all Section Details to match the finish floor elevation shown on the Grading Plan.
10. Resolve overlapping text at the western driveway.

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

END OF REMARKS
JKS

T/R/S: T19S/R60E/27
AREA G-27



ENGINEERING • ENVIRONMENTAL • SURVEY

DESIGN • BUILD • CONSTRUCTION

Date: May 5, 2020

Job Number: TDS Lees Liquor Azure

JPL job#20-003

To: Oh Sang Kwon
Engineering Project Manager
Public Works | City Engineering
333 N. Rancho Drive, 7th Floor
Las Vegas NV 89106

From: James Lopez
JPL Engineering, Inc.
6725 S Eastern Ave., Ste. 5
Las Vegas, NV 89119

Transmitted:

- ☒ Herewith
☐ Via Carrier
☐ Signature

For:

- | | |
|--|---|
| ☐ Approval | ☐ Information |
| ☐ Checking | ☐ Return after Use |
| ☒ Your Use | ☐ As Requested |

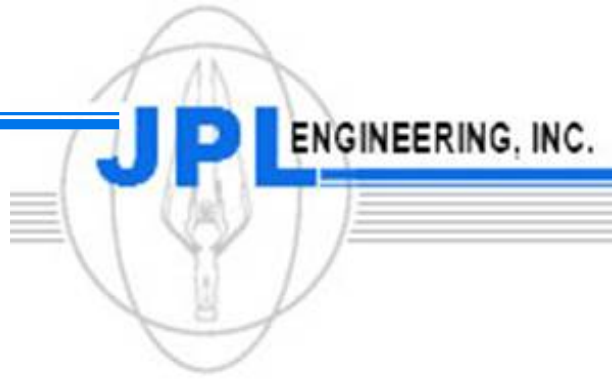
The Following:

- (1) TDS Submitta "Lees Liquor Azure
- (2) Wet Sealed GP-DT
- (3) COLV TDS Submittal Form
- (4) CD-PDF TDS and GP-DT

Comments:

If you have any questions, please call our office at (702) 898-6269.

Received by (print name) : _____ Date: _____



TECHNICAL DRAINAGE STUDY

FOR

**LEE'S DISCOUNT LIQUOR – AZURE DRIVE
(APN: 125-27-22-012)**

@

NEAR THE CORNER OF AZURE DRIVE AND TENAYA WAY

JPL Job No. 20-003

Prepared for:

Lee's Discount Liquor
4427 East Sunset Road
Henderson, Nevada 89104
Fax: 702-451-4522

Prepared by:

JPL Engineering, Inc.
6725 South Eastern Ave., Ste. 5
Las Vegas, Nevada 89119
Phone: 702-898-6269
Fax: 877-557-8292

April, 2020

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Technical Drainage Study for Lee's Discount Liquor - Azure Drive Date: 4/30/2020

Location of Development: a) Descriptive (Cross Streets) North/South: Tenaya Way

East/West: Azure Drive

b) Section: 27 Township: 19 South Range: 60 East

c) APN : 125-27-222-012

Name of Owner: Lee's Discount Liquor

Telephone No.: 702-451-4522 Fax No.: _____ E-Mail Address: _____

Address: 4427 East Sunset Road Henderson, NV 89104

Contact Person-Name: James Lopez Telephone No.: (702) 898-6269

* E-Mail Address: james@jplengineeringinc.com Fax No.: _____

Firm: JPL Engineering, Inc.

Address: 6725 S. Eastern Ave, Ste 5, Las Vegas, NV, 89119

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: 1.6 AC +/- Being Developed/Disturbed: 1.6 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

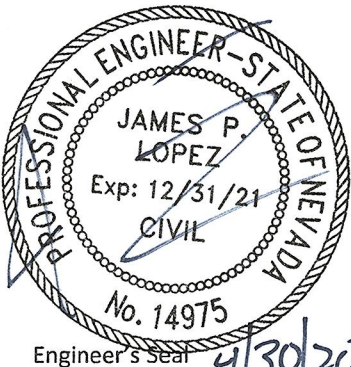
4. Proposed type of development (Residential, Commercial, Etc.): Commercial

5. Approximate upstream land area which drains to the subject site: See Plans

6. Has the site drainage been evaluated in the past? ☐ YES ☒ NO If yes, please identify documentation: _____

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

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



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

*New Required Field

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

	Revision	Date
Local Entity File No. _____		

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Lee's Discount Liquor - Azure Drive

Map ID:

Firm Name: JPL Engineering, Inc

Engineer: James Lopez

Address: 6725 S. Eastern Ave

City: Las Vegas

State: NV

Zip: 89119

Phone Number: (702) 898-6269

Fax Number:

Property Owner: Lee's Discount Liquor

Address: 4427 East Sunset Road

City: Henderson

State: NV

Zip: 89104

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.

☒

☐

Design Manual **Standard Form 4**.

☒

☐

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

☐

☒

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

II. MAPS AND EXHIBITS

Yes No

☒

☐

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

☒

☐

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

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

III. DRAINAGE PLAN

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
<u> </u>	<u> </u>	N/A Streets with off-set crowns.
<u> x </u>	<u> </u>	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
<u> x </u>	<u> </u>	Property lines.
<u> x </u>	<u> </u>	Right-of-way lines and widths, existing and proposed.
<u> x </u>	<u> </u>	Existing improvements and their elevations.
<u> x </u>	<u> </u>	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
<u> x </u>	<u> </u>	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
<u> x </u>	<u> </u>	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
<u> x </u>	<u> </u>	Location and cross-section of street capacity calculations.
<u> </u>	<u> </u>	N/A Cross-sectional detail for channels, including cutoff wall locations.
<u> x </u>	<u> </u>	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.
<u> x </u>	<u> </u>	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
<u> </u>	<u> </u>	N/A Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
<u> </u>	<u> </u>	N/A Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
<u> </u>	<u> </u>	N/A Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
<u> x </u>	<u> </u>	Building and/or lot numbers.
<u> x </u>	<u> </u>	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
<u> x </u>	<u> </u>	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	
☐	<u>N/A</u>	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.
☐	<u>N/A</u>	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.
☐	<u>N/A</u>	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
☒	☐	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes	No	
☒	☐	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.
☐	<u>N/A</u>	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

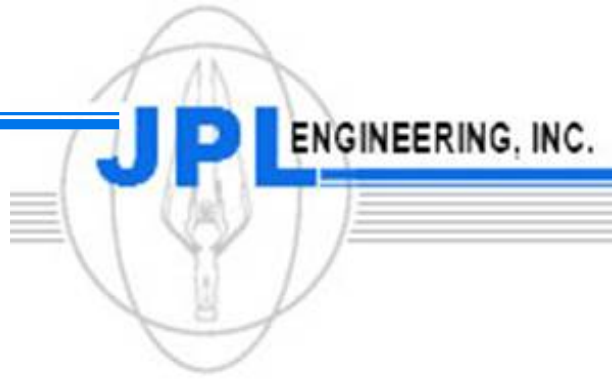
DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
☐	<u>N/A</u>	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
<u>x</u>	☐	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
<u>x</u>	☐	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.
☐	<u>N/A</u>	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
☐	<u>N/A</u>	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.
<u>x</u>	☐	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.
☐	<u>N/A</u>	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
☐	<u>N/A</u>	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
☐	<u>N/A</u>	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.
<u>x</u>	☐	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
☐	<u>N/A</u>	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2



TECHNICAL DRAINAGE STUDY

FOR

**LEE'S DISCOUNT LIQUOR – AZURE DRIVE
(APN: 125-27-22-012)**

@

NEAR THE CORNER OF AZURE DRIVE AND TENAYA WAY

JPL Job No. 20-003

Prepared for:

Lee's Discount Liquor
4427 East Sunset Road
Henderson, Nevada 89104
Fax: 702-451-4522

Prepared by:

JPL Engineering, Inc.
6725 South Eastern Ave., Ste. 5
Las Vegas, Nevada 89119
Phone: 702-898-6269
Fax: 877-557-8292

April, 2020

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APPENDICES

Appendix A	Hydrologic Parameters
Appendix B	Hydraulic Calculations
Appendix C	HEC-1
Appendix D	Reference Material

LIST OF FIGURES

Vicinity Map

Assessor's Parcel Map

FEMA Flood Insurance Rate Map

2018 Clark County Regional Flood Control District - Master Plan Figure F-11

2018 Clark County Regional Flood Control District - Master Plan Figure W-2B

Existing Condition Drainage Basin Exhibit

Future Developed Condition Drainage Basin Exhibit

1.0 INTRODUCTION

1.1 Scope

This report has been prepared as a *Technical Drainage Study for Lee's Liquor Azure (APN: 125-27-222-012)*. The purpose of this report is to provide general hydrologic and hydraulic analysis for the proposed improvements. The criteria set forth in the Clark County Regional Flood Control District's (CCRFCD) Hydrologic Criteria and Drainage Design Manual (HC&DDM) have been used as the technical basis for this study.

This study will evaluate the offsite and onsite runoff impacting the property in existing conditions as well as evaluate and mitigate as necessary the runoff impacting the property and surrounding properties under developed conditions.

1.2 Location

The property is located approximately 650 feet west of Tenaya Way and south of Azure Drive, Section 27, Township 19 South, Range 60 East M.D.M in City of Las Vegas, Nevada (see Vicinity Map and Assessor's Parcel Map at the back of the text), Assessor's Parcel Number 125-27-222-012.

1.3 Description of Project

The project consists of a proposed commercial center with 1 building on a 1.60-acre (+/-) parcel. Onsite improvements will include curb and gutter, drop inlet, and paved parking. Note that Azure Drive is fully improved and thus no offsite improvements are proposed with this project. Property immediately north of the subject site consists of Azure Drive. Property immediately south of the subject site consists of existing single-family residential. Property immediately west of the subject site consists of an existing commercial development (Discount Tire). Property immediately east of the subject site consists of vacant land (zoned for commercial).

1.4 Master Planning Information

The site is shown on:

2018 Clark County Regional Flood Control District - Master Plan Figure F-17

2018 Clark County Regional Flood Control District - Master Plan Figure W-2B

Please refer to the figures at the back of text.

1.5 Floodplain Information

The subject site is located within FEMA Zone X. FEMA Zone X is determined to be outside the 0.2% annual chance floodplain as shown on F.I.R.M. Community-Panel Number 32003C1745E, effective September 27, 2002. Zone X is defined by FEMA as being outside the 500 year floodplain. The FEMA flood map is included at the back of the text.

1.6 Reference Materials

The references were used to define the existing and developed conditions offsite drainage flow rates and hydraulic analysis.

Reference: “*Technical Drainage Study for Discount Tire*” approved by City of Las Vegas, June 9, 2004 COLV DS-3564B was used for this study. The reference study was used to determine the 10-year and the 100-year flows in Azure Drive. The study was also used to determine onsite drainage patterns from the parcel to the west of the site.

1.7 BMP

The parking lot size is less than 1 acre so the development falls into the medium category. The BMP design requirement for a parking lot of this size requires disconnect of at least 75% of parking lot and contributing building area. The parking lot will drain to depressed landscape buffers and depressed medians to meet the requirement per Hydrologic Criteria and Drainage Design Manual, Section 1500 – Structural Best Management Practices, Adopted September 2014.

2.0 Storm Water Runoff Analysis

2.1 Hydrologic Parameters

The SCS unit hydrograph method was used to model the runoff from the site. The NRCS soil survey website classifies the onsite as 192 and 305. The weighted curve number for the onsite existing condition basin is calculated to be 71.0 using the runoff curve number for an undeveloped area. The weighted curve number for the onsite developed condition basin is calculated to be 90.8 using the runoff curve number for an urban commercial lot. The composite curve number calculations can be seen in Appendix A.

Precipitation The site is within the McCarran Rainfall Area. The depth durations values were taken from the CCRFCD HCDDM Figure 513. No adjustments required of the McCarran Airport Rainfall Area.

The HEC-1 multi-ratio option (HEC 1990) was used to model the 10-year and 100-year design storms in the HEC-1 input file. The HEC-1 JR card was used to specify the precipitation by which to multiply the 100-year precipitation values (point rainfall). The 10-year and 100-year ratios are 0.57 and 1.00, respectively (see calculation for 10-year ratio included in Appendix A).

A storm distribution number 3 (SDN3) for areas less than 8 square miles was used. Calculations are presented in the appendix.

Time of Concentration and Lag Time Lag times were calculated per the following equations per HCDDM:

For drainage basins with less than one square mile, the time of concentration is calculated as follows:

$$T_c = T_i + T_t$$

Where:

T_c = Time of concentration (minutes)

T_i = Initial, inlet or overland flow time (minutes)

T_t = Travel time in the ditch, gutter, etc. (minutes)

The Lag time for basins less than one square mile is calculated as follows:

$$T_{lag} = 0.6T_c \text{ (hours)}$$

Initial flow time is calculated as follows:

$$T_i = 1.8(1.1 - K)L_o^{1/2}/S^{1/3}$$

Where:

T_i =	Initial overland flow time (minutes)
K =	$0.0132 * CN - 0.39$
CN =	Curve Number
L_o =	Length of overland flow (max. 500 ft)
S =	Average basin slope (percent)

Travel time is calculated as follows:

$$T_t = 500/(60 V_1) + (L_t - 500)/(60 V_2)$$

Where:

T_t =	Travel time in the ditch, gutter, etc. (minutes)
L_t =	Travel Length (feet)
V_1 =	Average velocity of flow for the first 500 feet of travel distance (ft/s)
V_2 =	Average velocity of flow for the remaining travel distance (ft/s)

V_1 and V_2 are calculated as follows:

$$V_1 = C_1 * (S/100)^{1/2}$$
$$V_2 = C_2 * (S/100)^{1/2}$$

Where:

C_1 =	20.2 for developed areas and 14.8 for undeveloped areas
C_2 =	30.6 for developed areas and 29.4 for undeveloped areas
S =	Average slope for the flow path (percent)

In urbanized areas, the time of concentration calculated above should not exceed the time of concentration calculated by the following equation:

$$t_c = (L / 180) + 10$$

Where:

t_c =	Time of concentration at the first design point in an urban watershed (min)
L =	Watershed length (ft)
The smaller of the two calculations for time of concentration will control.	
Minimum T_c for any watershed is limited to 5 minutes.	

Channel flow calculations of velocities for estimating travel time for surface flow were used to develop a Time of Concentration. Slopes are based on average slopes across the entire drainage basin. Calculations for the channel flow velocities are included in Appendix C. Initial flow time is calculated by the following equation:

$$T_i = 1.8(1.1K)L_o^{1/2}/S^{1/3}$$

Standard Form 4 for existing and developed conditions is presented in Appendix C.

2.2 Existing Condition

Offsite Drainage Condition Historic offsite drainage patterns in the area of the subject site are typically from west to east.

The area west of the subject site is developed (Discount Tire) and was approved by the City of Las Vegas on June 9, 2004 per DS3564B. A small portion of the discount tire site drains to the subject site. Basin DEON2 from the reference site is 0.15 acres and generates a 10-year/100-year flow of <1cfs/<1cfs. Basin DEON2 drains east via a valley gutter onto the subject site. Also, the reference study was reviewed to obtain the 10-year/100-year flow in Azure Drive. The reference study shows a flow of 44cfs/94cfs in Azure Drive. The flow referenced flow in Azure Drive is referred to as AZRF.

See Existing Conditions Drainage Exhibit at rear of the text.

Onsite Drainage Condition Historic onsite drainage patterns in the area of the subject site are typically drained from southwest to northeast.

The onsite area currently has no constructed building. One basin has been delineated for the subject site (ONX1). ONX1 generates a 10 year/100 year flow of <1cfs/1cfs. Basin ONX1 generally drains northeast where it discharges to Azure Drive and combines with the reference flow in Azure Drive at CP1. The total 10-year/100-year flow in Azure Drive at CP1 is 45cfs/97cfs. A summary of the existing condition flows is given below. See the Existing Conditions Drainage Basin Exhibit provided at the rear of the text.

Please refer to Existing Condition Drainage Basin Exhibit located at the rear of this text. A summary of the existing condition flows is given below.

Drainage Basin	Area (Acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
*DEON2	-	<1	<1
*AZRF	-	44	95
ONX1	1.61	<1	1
**CP1	-	45	97

*Referenced from "TDS for Discount Tire" COLV DS-3564B

**CP1=DEON2+AZRF+ONX1

2.3 Developed Conditions

Offsite Drainage Condition The offsite basins and drainage patterns are the same as in the existing conditions See table below for values.

The reference 10-year/100-year flow in Azure Drive per the approved study is 44cfs/94cfs. This flow accounts for the area of the subject site. However, as a conservative assumption, the onsite 10-year/100-year flow (2cfs/5cfs) was added to the reference flow at combination point CP1 in Azure Drive for a total 10-year/100-year flow of 46cfs/99cfs. .

Onsite Drainage Condition The site is now fully developed and the grading will force runoff to drain onto Azure Drive away from the site. The site is still only one drainage basin referenced as OND1 with a runoff of 2/4-cfs (Q10/Q100).

Please refer to the Developed Condition Drainage Basin Exhibit. A summary of the developed condition flows is given below.

Drainage Basin	Area (Acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
*DEON2	-	<1	<1
*AZRF	-	44	94
OND1	1.61	2	4
CP1	-	47	99

*Referenced from "TDS for Discount Tire" COLV DS-3564B

**CP1= DEON2+AZRF+OND1

3.0 DRAINAGE FACILITIES

3.1 Street Flow Calculations

The Full Street cross section calculations for Azure Lane for developed future conditions are included below.

Street Section	ROW (ft)	Q ₁₀ cfs	D ₁₀ ft	Q ₁₀₀ cfs	D ₁₀₀ ft	V ₁₀₀ fps	DxV	10-yr Dry Lane?
Azure Lane	110	47	0.61	99	0.74	4.23	3.13	Yes

The finished floor elevation is set at 2364.00'. The depth of low in Azure Lane is 0.74'. The finished floor elevation is more than 2X the depth of flow in Azure Lane.

Azure Lane meets the requirement for a 10-year dry lane on both sides of the street centerline by having more than 12' on both sides.

4.0 CONCLUSIONS

4.1 Compliance with regulations

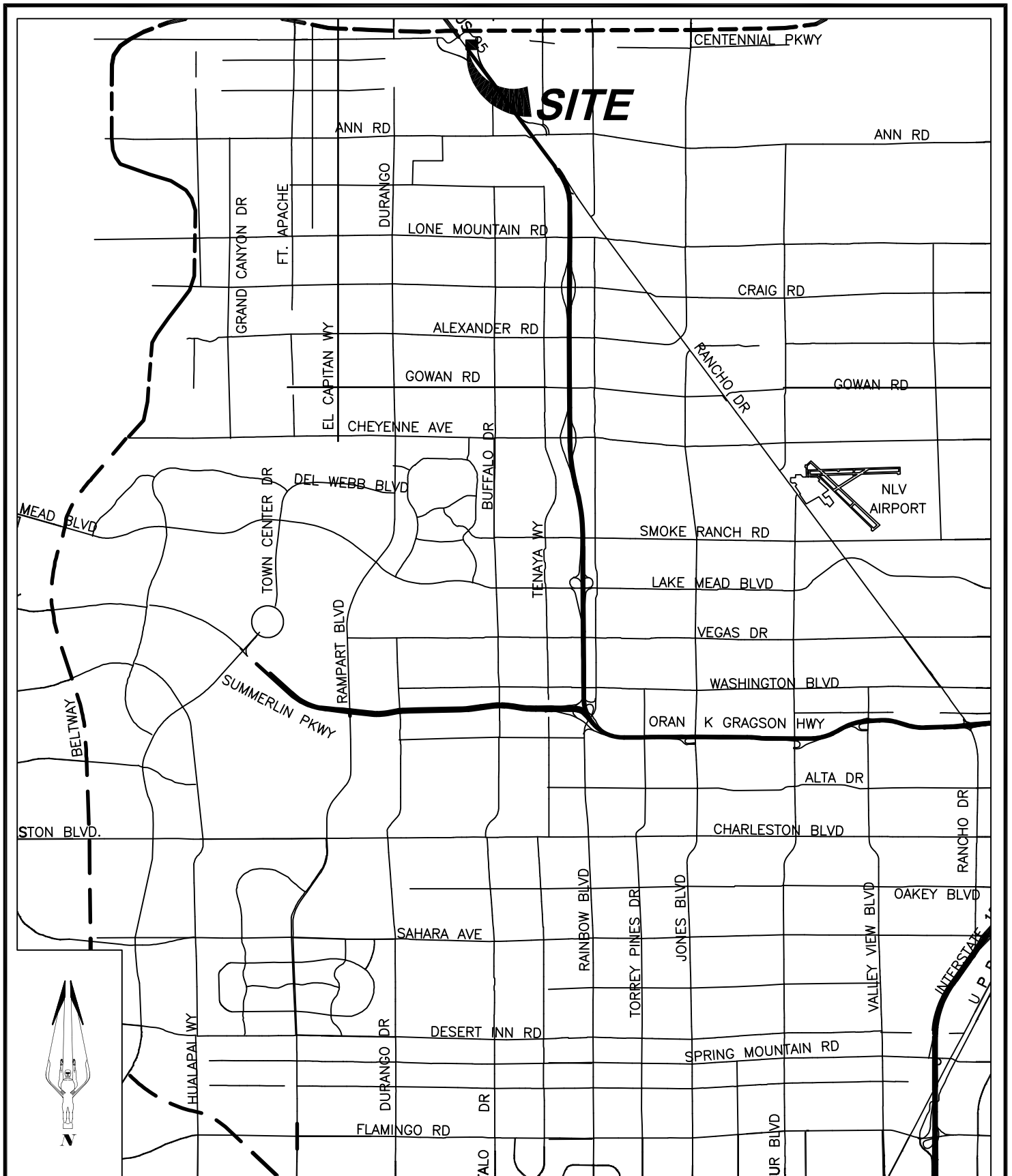
Development of the subject property will not have an adverse impact to downstream properties. The site development complies with all applicable FEMA Zone regulations.

The development of this site is in compliance with the CCRFCD Flood Control Master Plan Update, and the drainage design criteria set forth in the Hydrologic Criteria & Drainage Design Manual.

The site will be flood protected to a minimum of 2x time the depth of flow.

5.0 REFERENCES

1. Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, October 1996, WRC Engineering, Inc.
2. Federal Emergency Management Agency Flood Insurance Rate Map Clark County, Nevada and Incorporated Areas Map Number 32003C2569F, effective November 16, 2011.
3. Web Soil Service Natural Resource Conservation Service United States Department of Agriculture, Soil Conservation Service.
4. FlowMaster Version 6, Haestad Methods, Inc. 1994-1995.
5. HEC-1 Flood Hydrograph Package Version 4.0. U.S. Army Corps of Engineers, Hydrologic Engineering Center, September 1991.
6. *Technical Drainage Study for Discount Tire*, (DS 3564) prepared by Tetra Tech, Inc., June 9, 2004



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Lee's Discount
Liquor Azure
LAS VEGAS

VICINITY-MAP
 NOT TO SCALE

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANRB		ANN ROAD CHANNEL WEST - RAINBOW						
0000	E	9' X 6' RCB	167	817	CNW2B5-C	WEST3	0.99	0.30
0028	E	11' X 5' RCB	1140	817	CNW2B5-C	WEST3	0.99	0.23
0050	E	10' X 3' RCB	1240	517	CNW2A3-C	WEST3	0.63	0.35
ANWE		ANN ROAD CHANNEL WEST						
0290	E	8' X 8' RCB	2050	817	2CNW2B5C	CWEST3	0.99	0.70
0327	E	6' X 6' RCB	2360	135	RCHODB	WEST3	4.61	0.87
0371	E	6' X 6' RCB	760	135	RCHODB	WEST3	4.61	0.34
0385	E	54" RCP	1950	135	RCHODB	WEST3	4.61	1.17
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0195	E	CONC CHNL 36"W 9"D 0:1 SS	1130	3771	CNW3B3-C	WEST3	5.64	0.60
0200	E	CONC CHNL 36"W 9"D 0:1 SS	1340	3523	CNW2D4-C	WEST3	5.14	1.00
0226	E	2: 18" X 8.5" RCBC @ RIO VISTA	100	3523	CNW2D4-C	WEST3	5.14	0.51
0241	E	CONC CHNL 36"W 9.5"D 0:1 SS	405	3523	CNW2D4-C	WEST3	5.14	0.51
0251	E	CONC CHNL 36"W 9"D 0:1 SS	575	3234	CNW2D3-C	WEST3	4.64	0.51
0271	E	CONC CHNL 32"W 10"D 0:1 SS	229	3234	CNW2D3-C	WEST3	4.64	0.51
0274	E	32' X 10' RCBC @ TENAYA	142	3234	CNW2D3-C	WEST3	4.64	0.51
0277	E	CONC CHNL 32"W 9"D 0:1 SS	579	3234	CNW2D3-C	WEST3	4.64	0.64
0287	E	CONC CHNL 32"W 8"D 0:1 SS	865	2992	CNW2B2-C	WEST3	3.83	1.59
0301	E	2: 15' X 7' RCB	1738	2992	CNW2B2-C	WEST3	3.83	1.30
0304	E	22' X 7' RCB	3410	2992	CNW2B2-C	WEST3	3.83	1.85
GO95		GOWAN OUTFALL - U.S. 95 CHANNEL						
0000	P	CONC CHNL 12"W 4"D 2:1 SS	2640	318	GD17BG-C	GOW3A	0.36	0.30
0050	P	CONC CHNL 12"W 4"D 2:1 SS	2450	318	GD17BG-C	GOW3A	0.36	0.30
GOAL		GOWAN OUTFALL - ALEXANDER ROAD FACILITIES						
0168	P	10' X 7' RCB	4200	829	CPT2B2	GOW3A	2.32	0.50
0247	P	CONC CHNL 12"W 5.5"D 2:1 SS	2640	574	CGD20BMC	GOW3A	2.02	0.30
GOBU		GOWAN NORTH - BUFFALO BRANCH						
0000	E	2: 12' X 6' RCB	1705	421	CGD14CBC	GOW3A	2.52	0.20
0032	E	2: 12' X 5' RCB	1248	343	CGD14AAC	GOW3A	2.29	0.25
0058	E	2: 11' X 4' RCB	1398	301	CGD17AAC	GOW3A	1.87	0.25
0085	E	11' X 5' RCB	1356	241	CGD17ABC	GOW3A	1.49	0.25
0112	E	8' X 5' RCB	1380	180	CGD20ACC	GOW3A	1.12	0.65
0136	E	5' X 5' RCB	2740	72	GD24AA-C	GOW3A	0.44	0.50
GOBW		GOWAN BELTWAY WEST						
0000	E	48" RCP	2527	115	LMBWDB	GOW4A	10.81	4.37
0048	E	72" RCP	131	115	LMBWDB	GOW4A	10.81	2.21
0051	E	72" RCP OUTLET	1522	115	LMBWDB	GOW4A	10.81	0.30
0052	E	588 AC-FT LONE MOUNTAIN-BELTWAY DETENTION BASIN		5316	CLMBW1	GOW3B	3.64	
0082	E	17,100 CFS PMF SPILLWAY		17100	CLMBW1	GOW3B	3.64	
0097	E	60" RCP	375	660	UVB1-1	GOW3A	0.37	8.06
0100	E	ENERGY DISSIPATOR	162	660	UVB1-1	GOW3A	0.37	50.00
0103	E	42" RCP	92	660	UVB1-1	GOW3A	0.37	7.00
0106	E	8' X 8' RCB CONNECTOR PIPE UNDER LONE MOUNTAIN	699				0.25	
0128	E	20' X 10' RCB	100	3589	CWRBW1	GOW3B	2.41	25.00
0132	E	14' X 9' RCB	648	3156	CHLBW1-C	GOW3A	5.83	1.27
0156	E	14' X 9' RCB	1182	3156	CHLBW1-C	GOW3A	5.83	2.89
0183	E	14' X 9' RCB	3414	3156	CHLBW1-C	GOW3A	5.83	1.77
0227	E	10' X 8' RCB	739	1823	CEFPOA2	GOW3A	4.94	2.78
GOBX		GOWAN BOX CANYON						
0000	E	66" RCP	258	696	LWBW1	GOW3A	0.47	10.00
0005	E	ENERGY DISSIPATOR	206	696	LWBW1	GOW3A	0.47	39.00
0009	E	6' X 4' RCB	95	696	LWBW1	GOW3A	0.47	4.72
0015	P	66" RCP	6783	39	BOXDET	GOW3A	3.41	6.55
GODU		GOWAN NORTH - DURANGO BRANCH						
0000	E	12' X 6' RCB	2629	905	CLV14-C	GOW3A	1.40	0.91
0050	E	9' X 6' RCB	865	681	CLV20-C	GOW3A	0.98	1.50
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0000	E	10' X 8' RCB	1436	474	CWRJS-C*	GOW3A	1.95	1.07
0026	E	10' X 7' RCB	1330	474	CWRJS-C	GOW3A	1.95	0.82
0051	E	10' X 7' RCB	1290	439	CHLFR-C	GOW3A	1.69	1.06
0076	E	10' X 7' RCB	1335	392	CARFR-C	GOW3A	1.45	0.54
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0100	P	10' X 6' RCB	1320	321	CEAFR-C	GOW3A	1.21	0.76
0126	P	10' X 7' RCB	1320	290	CTRFR-C	GOW3A	0.96	0.38
0152	P	7' X 6' RCB	1320	238	CARFP-C	GOW3A	0.70	0.77
0176	P	78" RCP	1320	190	CCPFR-C	GOW3A	0.46	1.15
GOL2		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 2						
0000	E	5' X 4' RCB	150	359	CRBW	GOW3A	0.36	14.60
0003	E	66" RCP	607	359	CRBW	GOW3A	0.36	1.97
0014	E	84" RCP @ ALEXANDER	125	359	CRBW	GOW3A	0.36	4.00
GOL3		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
0000	E	2: 10' X 10' RCBC @ BELTWAY	500	3713	CLMT5	GOW3A	7.83	3.39
0010	E	CONC CHNL 20"W 10"D 0:1 SS	3037	3277	CRCLMT1R	GOW3A	7.31	2.78
GOL5		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 5						
0000	E	6' X 5' RCB	309	421	UVB2	GOW3A	0.33	7.69
0006	E	CONC CHNL 6"W 5"D 0:1 SS	740	421	UVB2	GOW3A	0.33	3.85
0020	E	6' X 5' RCBC @ ALEXANDER RD	615	421	UVB2	GOW3A	0.33	2.08
0032	E	CONC CHNL 6"W 5"D 0:1 SS	1756	421	UVB2	GOW3A	0.33	1.67
GOLM		GOWAN LONE MOUNTAIN SYSTEM						
0000	E	78" RCP	2590	278	CLV15-C	GOW4A	11.09	1.80
0049	E	6' X 5' RCB	585	278	CLV15-C	GOW4A	11.09	1.87
0060	E	66" RCP	817	278	CLV15-C	GOW4A	11.09	2.40
0075	E	60" RCP	1385	278	CLV15-C	GOW4A	11.09	2.55
0101	E	54" RCP	700	184	LMTNDB	GOW4A	10.74	1.74
0115	E	48" RCP	1799	184	LMTNDB	GOW4A	10.74	3.08
0140	E	42" RCP	438	184	LMTNDB	GOW4A	10.74	1.60
0142	E	48" RCP	348	184	LMTNDB	GOW4A	10.74	2.14
0144	E	66" RCP	196	184	LMTNDB	GOW4A	10.74	5.44
0145	E	66" RCP OUTLET	378	184	LMTNDB	GOW4A	10.74	0.90
0146	E	888 AC-FT LONE MOUNTAIN DETENTION BASIN		6518	LMTNIN	GOW3B	6.43	
0147	E	36,000 CFS PMF SPILLWAY		36000	LMTNIN	GOW3B	6.43	
0150	E	DROP STRUCTURE	481	5731	CGABW	GOW3B	5.49	
0162	E	28' X 8' RCBC @ HUALAPAI	625	5731	CGABW	GOW3B	5.49	1.86
0174	E	CONC CHNL 28"W 8"D 0:1 SS	2715	5532	CCLMT5	GOW3B	5.19	3.20
0226	E	10' X 10' RCBC @ BELTWAY	246	2246	CUVB2	GOW3A	1.67	2.50
0230	E	10' X 10' RCB	290	1931	CLMT3	GOW3A	1.34	2.50
0236	E	CONC CHNL 15"W 8"D 0:1 SS	869	1931	CLMT3	GOW3A	1.34	3.69
GOLO		GOWAN OUTFALL - LONE MTN. ROAD BRANCH						
0275	E	8' X 6' RCB	3000	580	CPT3AA2	GOW3A	1.17	1.04
0332	E	8' X 6' RCB	150	492	C33AA1	GOW3A	1.02	1.90
GONO		GOWAN NORTH SYSTEM						
0000	E	8' X 8' RCB OUTLET	184	523	GWNNDB	GOW5A	68.55	0.51
0001	E	8' X 8' RCB OUTLET	156	523	GWNNDB	GOW5A	68.55	0.63
0006	E	30,780 CFS PMF SPILLWAY		30780	CCLV43-C*	GOW4B	11.91	
0008	E	921 AC-FT GOWAN NORTH DETENTION BASIN		2599	CCLV43-C*	GOW4B	11.91	
0009	E	3: 13' X 8' RCB	1662	2281	CLV43-C	GOW4B	11.22	0.62
0012	E	CONC CHNL 30"W 8'5" 8.5"D 0:1 SS	2665	2131	CCLV36-C	GOW4B	8.53	1.18
0062	E	BRIDGE 30'W 8.5'D @ CIMARRON	80	1912	CCLV15-C	GOW4B	8.02	0.30
0063	E	CONC CHNL 30"W 8.5'-10'D 0:1 SS	2302	1912	CCLV15-C	GOW4B	8.02	1.00
0110	E	2: 12' X 8' RCAC @ ALEXANDER	547	1392	CHAFR2-C	GOW3B	6.26	1.00
0117	E	2: 12' X 8' RCAP	424	1392	CHAFR2-C	GOW3B	6.26	1.10
0124	E	CONC CHNL 24"W 9"D 0:1 SS	887	1392	CHAFR2-C	GOW3B	6.26	1.36
0141	E	CONC CHNL 24"W 9'-10.5'D 0:1 SS	2064	1367	CCRSFR-C	GOW3B	6.12	0.59
0181	E	BRIDGE 30'W 7'D @ CRAIG	142	1367	CCRSFR-C	GOW3B	6.12	0.65
0183	E	CONC CHNL 22"W 8'-10.6'D 0:1 SS	2193	1185	CCRSFR-C	GOW3B	5.19	0.72
0225	E	CONC CHNL WIDTH VARIES DEPTH VARIES 0:1 SS	508	1144	CCLWFR-E	GOW3B	4.54	1.05
0230	E	13' X 5' RCB	256	766	CLWFR-W	GOW3B	2.46	2.78
0234	E	12' X 6' RCB	2010	766	CLWFR-W	GOW3B	2.46	1.67
0272	E	10' X 6' RCB	2797	766	CLWFR-W	GOW3B	2.46	3.15
0325	E	15' X 7' RCB	291	749	CWWRHW-C	GOW3B	2.34	4.20
0335	E	15' X 7' RCB	529	749	CWWRHW-C	GOW3A	2.34	0.40
0350	P	10' X 6' RCB	3473	749	CWRHW-C	GOW3A	2.34	0.88
0411	P	10' X 6' RCB	1320	679	CARHW-C	GOW3A	1.84	0.76
GONO		GOWAN NORTH SYSTEM						
0436	P	8' X 6' RCB	1320	607	CEAHW-C	GOW3A	1.50	1.14
0461	P	8' X 7' RCB	1320	508	CTRHW-C	GOW3A	1.21	0.38
0486	P	7' X 5' RCB	1320	400	CADHW-C	GOW3A	0.90	0.76
0511	P	6' X 5' RCB	1320	326	CCPHW-C	GOW3A	0.60	1.14
GOOF		GOWAN OUTFALL FACILITIES						
0511	E	8' X 5' RCB	8390	740	CPT6B-C	GOW3B	1.08	0.50
0531	E	8' X 5' RCB	1300	523	GWNNDB	GOW5A	68.55	0.50
0551	E	72" RCP	524	523	GWNNDB	GOW5A	68.55	0.62
0773	E	60" RCP	803	255	LV30-C	GOW3A	0.42	1.40
0775	E	60" RCP	1300	255	LV30-C	GOW3A	0.42	1.00
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0140	E	CONC CHNL 10"W 5"D 0:1 SS	2155	475	CDMNA1	WEST3	0.43	1.65
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0000	E	2: 12' X 8.5' RCAP	1700	1766	CNW1C-W*	WEST3	3.91	0.63
0034	E	CONC CHNL 21"W 8"D 0:1 SS	1000	1766	CNW1C-W	WEST3	3.91	1.19
0053	E	2: 12' X 8' RCBC @ SOUTH RAMP CONNECTOR	85	1465	CDW1C1-C	WEST3	3.55	1.40
0054	E	CONC CHNL 21"W 8"D 0:1 SS	432	1465	CDW1C1-C	WEST3	3.55	1.51
0062	E	TRANSITION STRUCTURE	130	1465	CDW1C1-C	WEST3	3.55	1.51
0065	E	24' X 7' RCB	480	1465	CDW1C1-C	WEST3	3.55	0.30
0074	E	24' X 6' RCB	50	1414	CNWB6C-C	WEST3	3.41	0.30
0075	E	20' X 6' RCBC @ BELTWAY	428	1414	CNWB6C-C	WEST3	3.41	2.81
0083	P	20' X 4' RCB	950	1414	CNWB6C-C	WEST3	3.41	2.49
0101	P	CONC CHNL 20"W 5"D 0:1 SS	980	1414	CNWB6C-C	WEST3	3.41	2.38
0120	E	20' X 6' RCBC @ GRAND MONTECITO	120	1414	CNWB6C-C	WEST3	3.41	1.00
0122	P	CONC CHNL 16'-20'W 6"D 0:1 SS	350	1414	CNWB6C-C	WEST3	3.41	1.84
RCHO		RANCHO ROAD SYSTEM						
0000	E	60" RCP W/ 36" ORIFICE PLATE	1183	135	RCHODB	WEST3	4.61	0.74
0025	E	321 AC-FT RANCHO ROAD DETENTION BASIN		2057	RCHOIN			



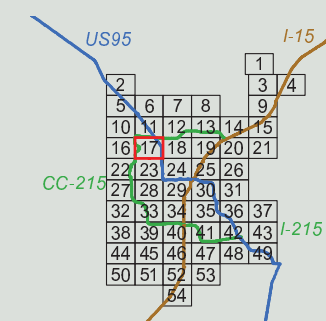
LEGEND

- Remove & Replace/Parallel Facilities**
- | Category A | Category B |
|--|--|
|  Channel |  Channel |
|  Stormdrain |  Stormdrain |
|  Crossing |  Crossing |



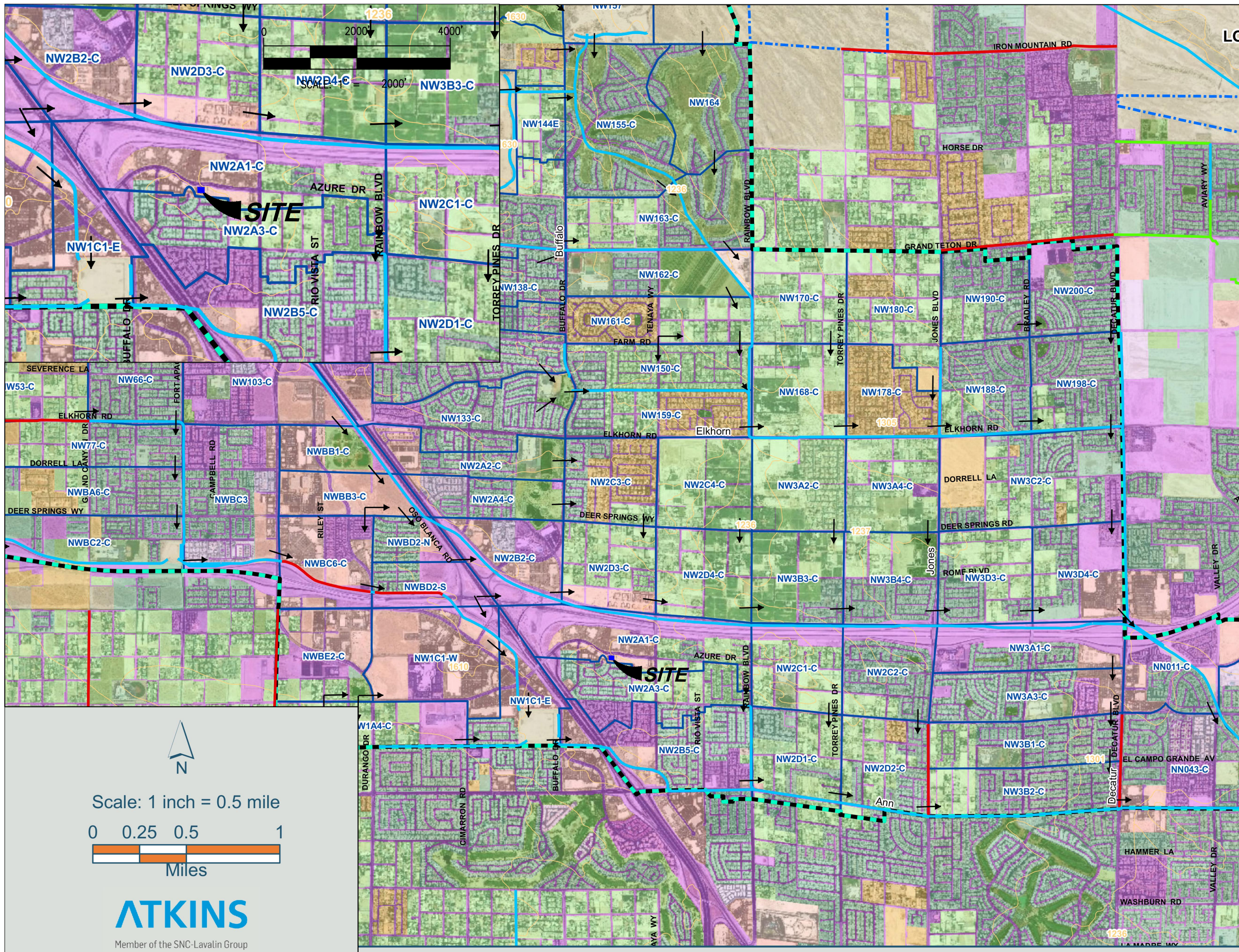
Scale: 1 inch = 2,000 feet

AerialSource:Esri World Imagery 2017



ATKINS
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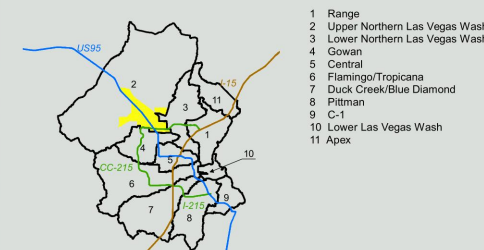


2018 Las Vegas Valley Master Plan Update

Figure W-2B
Upper Northern Las Vegas Wash Watershed

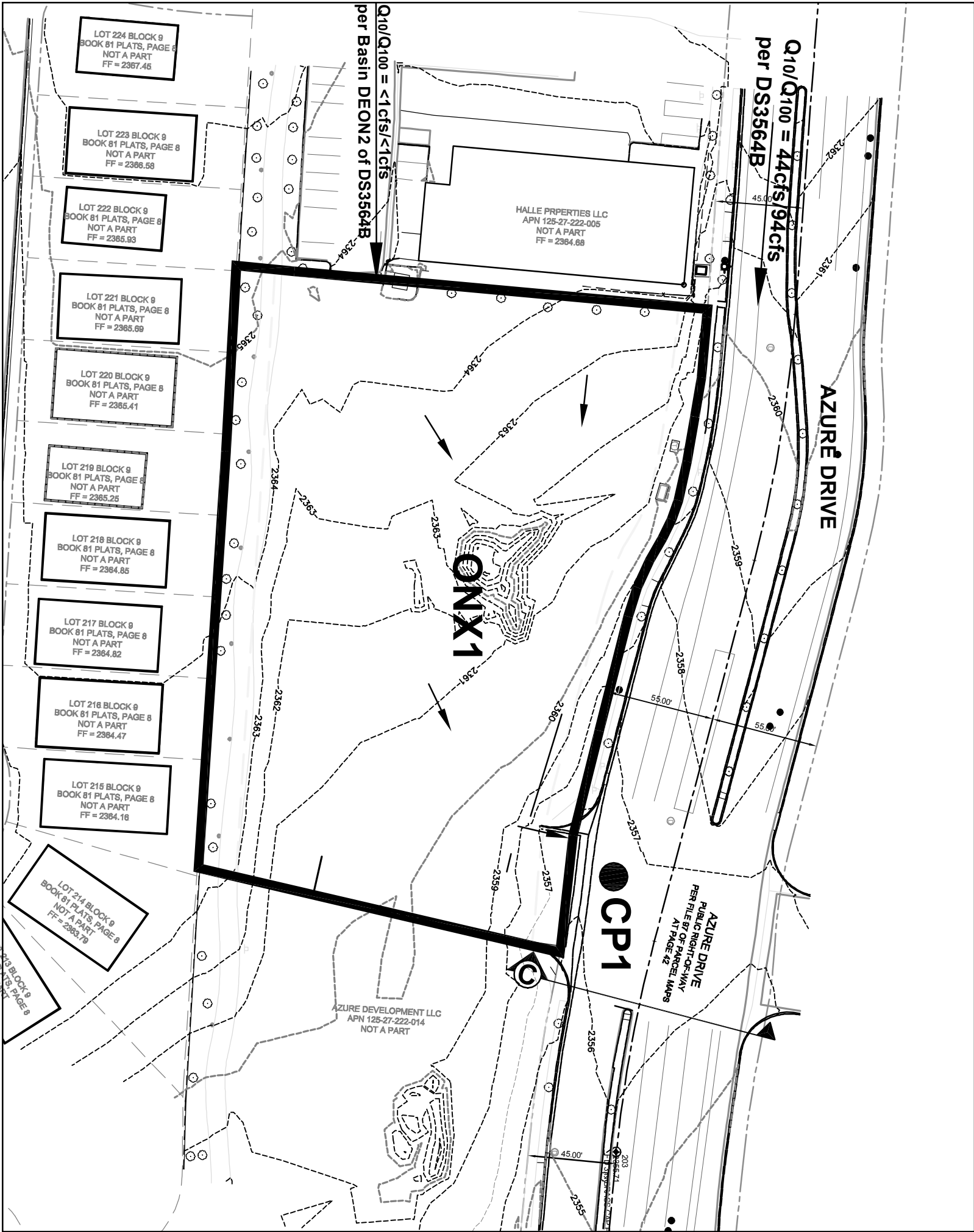
Legend

- Flow Arrows
- Concentration Points (NodeID flow(cfs))
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- BasinID
- Subbasins
- MUSYM
- Soils
- 1: Undeveloped Land, Open desert
- 2: Parks, Golf Courses
- 3: Rural, 0.5-1 units per acre (uses 1 unit/acre)
- 4: Low-Density Residential, 1-2 units per acre (uses 2 units/acre)
- 5: Medium-Density Residential, 2-4 units per acre (uses 3 units/acre)
- 6: High-Density Residential, 4-8 units per acre (uses 6 units/acre)
- 7: Public Facility and Residential, 8-12 units/acre
- 8: Very High-Density Residential, 12 units/acre or more
- 9: Commercial, Retail, Casino, High Rise Condominiums
- 10: Light Industrial
- 11: Heavy Industrial
- 12: Schools
- 13: Lakes



ATKINS

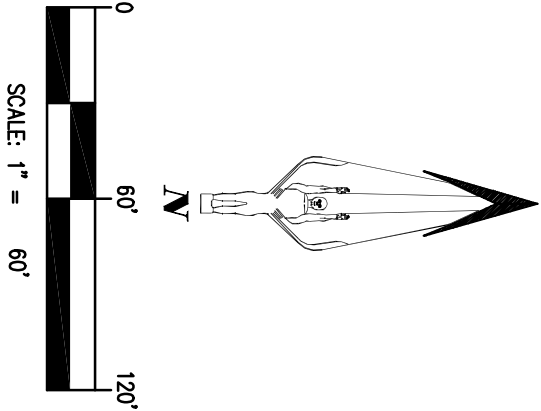
Member of the SNC-Lavalin Group



DRAINAGE BASINS

BASIN NAME/ CONCENTRATION POINT	AREA (ARCES)	Q_{10}/Q_{100} (CFS)
*DEON2	-	<1/<1
*AZRF	-	44/94
ONX1	1.61	<1/1
**CP1	-	45/97

• Reference from TDS for Discount Tre[®]
COLV D8-3564B
• CP1 • DEON2 + • AZRF + ONX1



LEGEND

ON1X Basin Name

→ Flow Arrow

— Basin Boundary

NOTE:
-SEE GRADING PLAN SHEETS
FOR DETAILED CONTOURS
AND PRECISE GRADING

LEE'S DISCOUNT LIQUOR AZURE
OFFSITE AND ONSITE EXISTING CONDITION
DRAINAGE BASIN EXHIBIT

APRIL, 2020

JPL ENGINEERING INC.

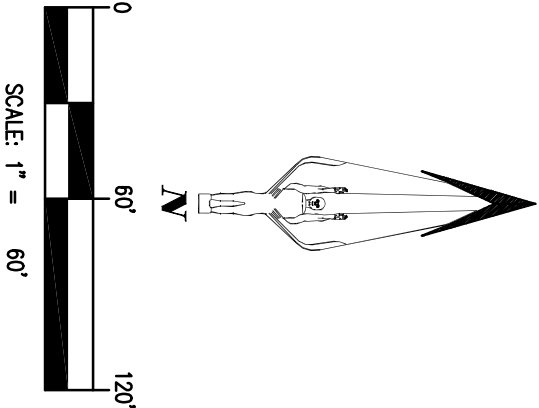
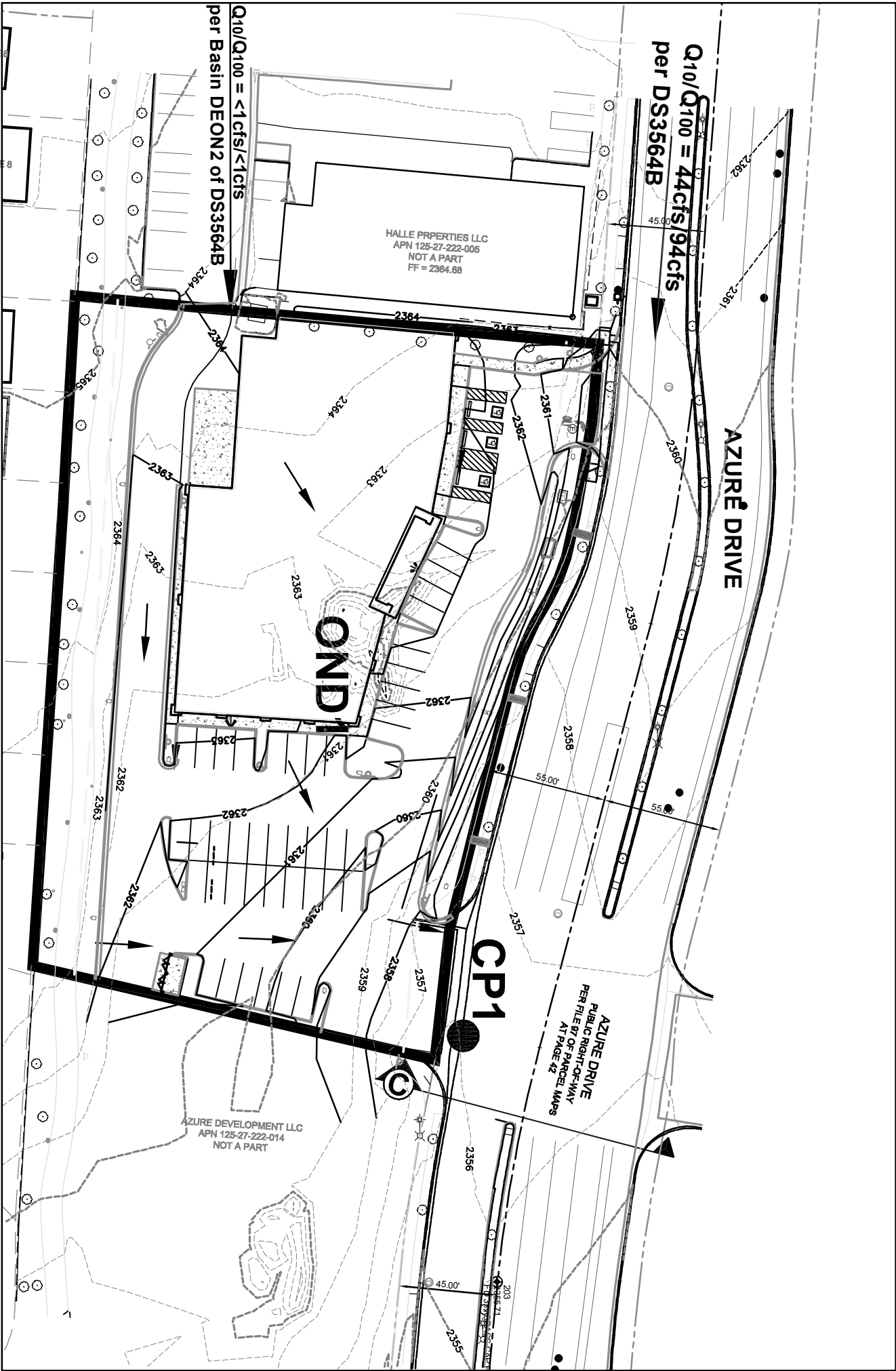
6725 S. EASTERN AVE., STE 105, LAS VEGAS, NV 89119
PHONE (702) 898-6269 FAX (877) 557-8292

DRAINAGE BASINS

BASIN NAME/ CONCENTRATION POINT	AREA (ARCES)	Q ₁₀ /Q ₁₀₀ (CFS)
*DEON2	-	<1/<1
*AZRF	-	44/94
OND1	1.61	2/4
**CP1	-	47/99

• Reference from 'TDS for Discount Tre'
COLV DS-3564B
• CP1- •DEON2 + •AZRF + OND1

CROSS SECTION NAME	ROW (FT)	Q ₁₀ (CFS)	D ₁₀ (FT)	Q ₁₀₀ (CFS)	D ₁₀₀ (FT)	V ₁₀₀ (CFS)	DxV
Azure Lane SEC 1	110	47	0.61	99	0.74	4.23	3.13



LEGEND	
ON1X	Basin Name
	Flow Arrow
	Basin Boundary

NOTE:
-SEE GRADING PLAN SHEETS
FOR DETAILED CONTOURS
AND PRECISE GRADING

LEE'S DISCOUNT LIQUOR AZURE
OFFSITE AND ONSITE DEVELOPED
CONDITION
DRAINAGE BASIN EXHIBIT

APRIL, 2020

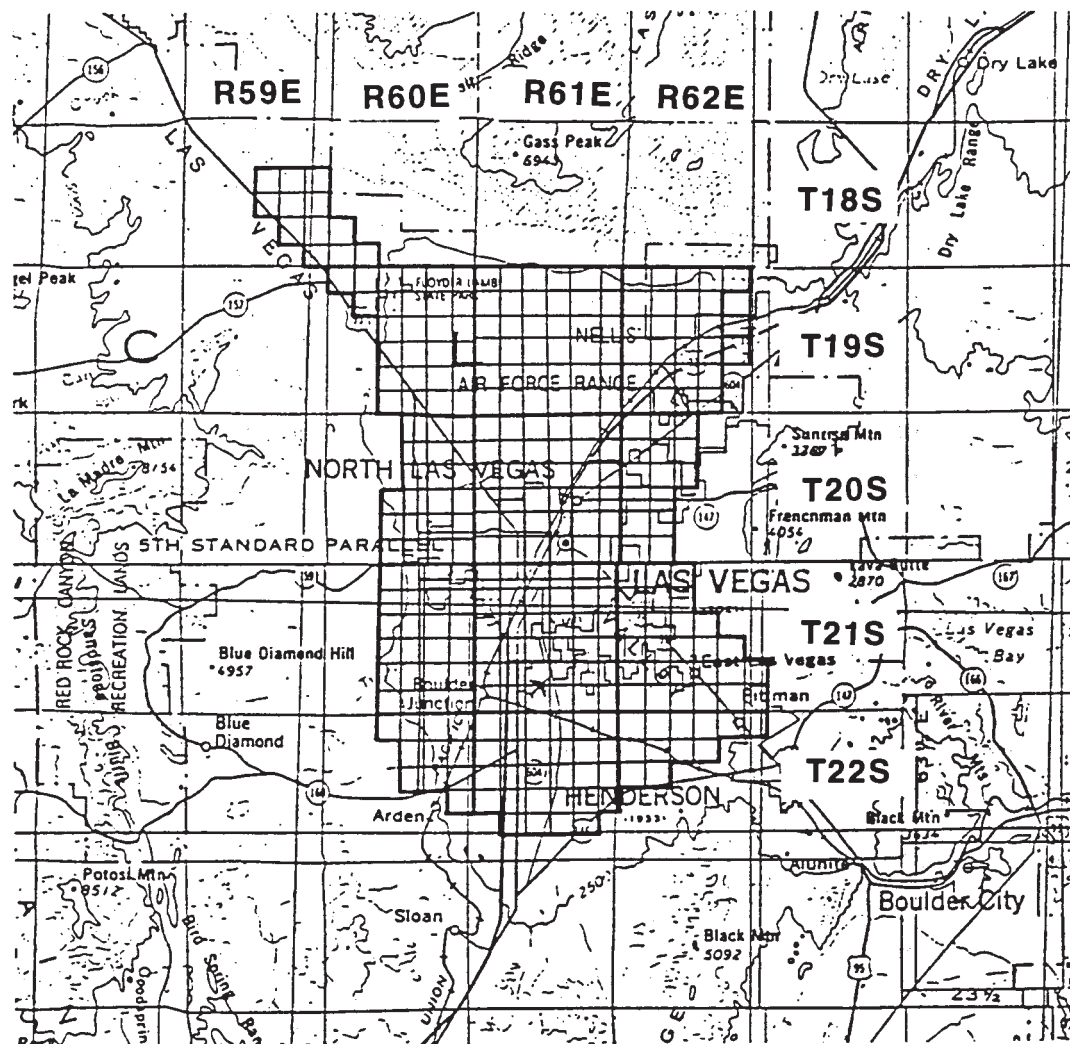
JPL ENGINEERING INC.

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APPENDIX A

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP RANGE SECTIONS

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

TOWNSHIP RANGE SECTIONS

20 South	62 East	4-9,16-20,29-32
21 South	60 East	1-4,9-16,21-28,33-36
21 South	61 East	ALL SECTIONS
21 South	62 East	4-9,15-23, 25-36
22 South	60 East	1-4,10-15,24
22 South	61 East	1-24,26-29
22 South	62 East	1-10,17-18

Notes:

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

Revision	Date

WRC
ENGINEERING

REFERENCE:

USACE, Los Angeles District, 1988

FIGURE 513

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

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

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

Revision	Date

REFERENCE:

TABLE 503

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

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

See Table 602A

Developing urban areas

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

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

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

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

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

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

Revision	Date

Curve Number Summary Table for Developed/Existing Conditions																		
Basin Name	Soil Composition	Soil Type	Percent of each soil Type	Hydrologic Group				Precent of each hydrologic group				Land Use	Percent of each land use	Curve numbers for respective land use				Composite Curve number calculations
				A	B	C	D	A	B	C	D			A	B	C	D	
Basin ONXD	Dalian	192	70	X	X		X	55	35	0	10	Commercial	100	89	92	94	95	90.7
	Las Vegas-Destazo	305	30	X		X	X	60	0	25	15	Commercial	100	89	92	94	95	91.2
														Composite CN				90.8
Basin ONX	Dalian	192	70	X	X		X	55	35	0	10	Undeveloped	100	63	77	85	88	70.4
	Las Vegas-Destazo	305	30	X		X	X	60	0	25	15	Undeveloped	100	63	77	85	88	72.3
														Composite CN				71.0

Notes: Refer Table 602 and Table 602A of criteria manual for CN of different hydrologic soil groups

Soil Map—Las Vegas Valley Area, Nevada, Part of Clark County



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

4/23/2020
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County

Survey Area Data: Version 14, Sep 16, 2019

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

Date(s) aerial images were photographed: May 7, 2011—Feb 25, 2014

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
192	Dalian-McCullough complex, 0 to 4 percent slopes	81.0	62.3%
305	Las Vegas-DeStazo complex, 0 to 2 percent slopes	49.0	37.7%
Totals for Area of Interest		130.0	100.0%

Las Vegas Valley Area, Nevada, Part of Clark County

192—Dalian-McCullough complex, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: hrb5

Elevation: 1,800 to 5,700 feet

Mean annual precipitation: 4 to 10 inches

Mean annual air temperature: 57 to 68 degrees F

Frost-free period: 170 to 260 days

Farmland classification: Not prime farmland

Map Unit Composition

Dalian and similar soils: 55 percent

McCullough and similar soils: 35 percent

Minor components: 10 percent

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

Description of Dalian

Setting

Landform: Fan skirts

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Alluvium derived from limestone and dolostone

Typical profile

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

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

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High
(1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 60 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0
to 2.0 mmhos/cm)

Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: A

Hydric soil rating: No

Description of McCullough

Setting

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

Typical profile

H1 - 0 to 5 inches: very gravelly very fine sandy loam
H2 - 5 to 30 inches: stratified sandy loam to loam
H3 - 30 to 40 inches: stratified coarse sand to loamy fine sand
H4 - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat):
Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Minor Components

Las vegas

Percent of map unit: 5 percent
Landform: Basin-floor remnants
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Tencee

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 14, Sep 16, 2019

Las Vegas Valley Area, Nevada, Part of Clark County

305—Las Vegas-DeStazo complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hrbs

Elevation: 1,400 to 5,200 feet

Mean annual precipitation: 3 to 10 inches

Mean annual air temperature: 55 to 70 degrees F

Frost-free period: 180 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Las vegas and similar soils: 60 percent

Destazo and similar soils: 25 percent

Minor components: 15 percent

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

Description of Las Vegas

Setting

Landform: Alluvial flats

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam

H2 - 2 to 8 inches: fine sandy loam

H3 - 8 to 12 inches: gravelly sandy clay loam

H4 - 12 to 16 inches: indurated

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: 3 to 14 inches to petrocalcic

Natural drainage class: Well drained

Runoff class: Very high

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

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 85 percent

Gypsum, maximum in profile: 5 percent

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

Sodium adsorption ratio, maximum in profile: 12.0

Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Description of Destazo

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 51 inches: very gravelly sandy clay loam
H3 - 51 to 62 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat):
Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)
Hydric soil rating: No

Minor Components

Glencarb

Percent of map unit: 5 percent
Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: LOAMY BOTTOM (030XB020NV)
Hydric soil rating: No

Bluepoint

Percent of map unit: 5 percent
Landform: Fan piedmonts, sand sheets

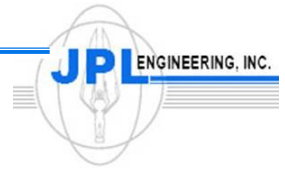
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: LIMY SAND 5-7" P.Z.
(030XB037NV_2)
Hydric soil rating: No

Skyhaven

Percent of map unit: 5 percent
Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: SHALLOW LIMESTONE SLOPE
5-8 P.Z. (030XB030NV_2)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 14, Sep 16, 2019

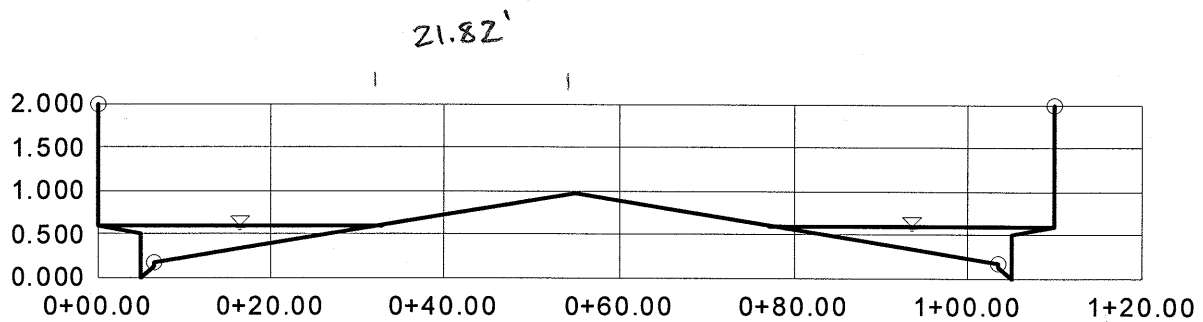


STREET FLOWMASTER CALCULATIONS

AZURE DRIVE 100' ROW 10-YEAR Cross Section for Irregular Channel

Project Description	
Worksheet	110 foot street with 5' sidewalk AZURE DRIVE 10-YEA
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	1.10 %
Water Surface Elevation	0.61 ft
Elevation Range	0.00 to 2.00
Discharge	47.00 cfs



$$y_1 = 0.970 - 0.170$$

$$X_1 = 55 - 6.5$$

V: 10.0
H: 1
NTS

$$y_1 = 0.80$$

$$X_1 = 48.5$$

$$y_2 = 0.61 - 0.170$$

$$X_2 = 48.5 \left(\frac{0.44}{0.80} \right)$$

$$48.5 - 26.68$$

$$y_2 = 0.44$$

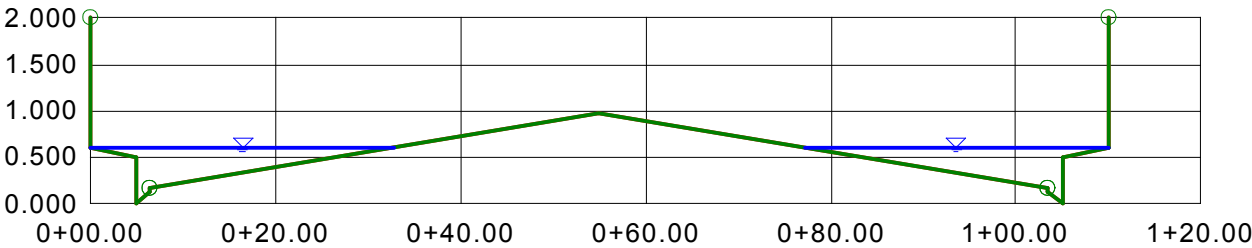
$$X_2 = 26.68$$

$$21.82$$

**AZURE DRIVE 100' ROW 10-YEAR
Cross Section for Irregular Channel**

Project Description	
Worksheet	110 foot street with 5' sidewalk AZURE DR
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	1.10 %
Water Surface Elev	0.61 ft
Elevation Range	.00 to 2.00
Discharge	47.00 cfs



V:10.0
H:1
NTS

AZURE DRIVE 110' ROW 10-YEAR

Worksheet for Irregular Channel

Project Description	
Worksheet	110 foot street with 5' sidewalk AZURE DRIVE 10-YE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	1.10 %
Discharge	47.00 cfs

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

Results	
Mannings Coefficient	0.016
Water Surface Elevation	0.61 ft
Elevation Range	0.00 to 2.00
Flow Area	13.7 ft²
Wetted Perimeter	66.901 ft
Top Width	65.790 ft
Actual Depth	0.61 ft
Critical Elevation	0.65 ft
Critical Slope	0.59 %
Velocity	3.44 ft/s
Velocity Head	0.18 ft
Specific Energy	0.79 ft
Froude Number	1.33
Flow Type	Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.50	0.015
0+06.50	1+03.50	0.016
1+03.50	1+10.00	0.015

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2.000
0+00.00	0.600
0+05.00	0.500
0+05.00	0.000
0+06.50	0.130
0+06.50	0.170
0+55.00	0.970
1+03.50	0.170
1+03.50	0.130
1+05.00	0.000
1+05.00	0.500

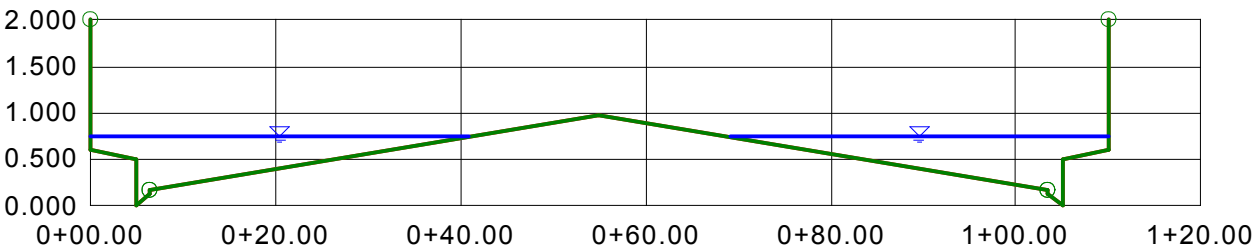
AZURE DRIVE 110' ROW 10-YEAR Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
1+10.00	0.600
1+10.00	2.000

AZURE DRIVE 100' ROW 100-YEAR
Cross Section for Irregular Channel

Project Description	
Worksheet	110 foot street with 5' sidewalk AZURE DRI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	1.10 %
Water Surface Elev	0.74 ft
Elevation Range	.00 to 2.00
Discharge	99.00 cfs



V:10.0
H:1
NTS

AZURE DRIVE 110' ROW 100-YEAR SECTION

Worksheet for Irregular Channel

Project Description	
Worksheet	110 foot street with 5' sidewalk AZURE DRI
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data
Channel Slope 1.10 %
Discharge 39.00 cfs

Options
Current Roughness Method ☒ Overlotter's Method
Open Channel Weighting ☒ Overlotter's Method
Closed Channel Weighting ☐ Horton's Method

Results
Mannings Coefficient 0.016
Water Surface Elevation 0.74 ft
Elevation Range 0.00 to 2.00
Flow Area 23.4 ft²
Wetted Perimeter 83.176 ft
Top Width 81.798 ft
Actual Depth 0.74 ft
Critical Elevation 0.82 ft
Critical Slope 0.54 %
Velocity 4.23 ft/s
Velocity Head 0.28 ft
Specific Energy 1.02 ft
Froude Number 1.39
Flow Type Supercritical

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+06.50	0.015
0+06.50	1+03.50	0.016
1+03.50	1+10.00	0.015

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2.000
0+00.00	0.600
0+05.00	0.500
0+05.00	0.000
0+06.50	0.130
0+06.50	0.170
0+55.00	0.970
1+03.50	0.170
1+03.50	0.130
1+05.00	0.000
1+05.00	0.500

AZURE DRIVE 110' ROW 100-YEAR SECTION

Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
1+10.00	0.600
1+10.00	2.000

TIME OF CONCENTRATION

JPL ENGINEERING INC.
File: STNDFORM4.XLS

LEE's LIQUOR - AZURE

DATE: 4/29/20

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Min	Min	Tlag= 0.6Tc/60 Hours
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(13)	(14)	
ONX1	E	71.0	0.547	1.61	0.0025	100	1.00	10.0	385	2.00	2.1	4.2	3.1	13.0	N/A	0.130
OND1	D	90.8	0.809	1.61	0.0025	100	1.00	5.2	430	1.60	2.5	3.9	2.9	8.1	12.9	0.081

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^{1/2} / S^{1/3}

K = 0.0132 (CN) - 0.39

Tc Check = L/180+10

For the travel time (Tt) calculations,

V1 applies to the first 500 feet of travel distance;

V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^{1/2}

Existing V2 = 29.4*(S/100)^{1/2}

Developed V1 = 20.2*(S/100)^{1/2}

Developed V2 = 30.6*(S/100)^{1/2}

HEC-1 (EXISTING AND DEVELOPED CONDITIONS)


```

1*****
*****
*
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
ENGINEERS
* JUN 1998
*
* CENTER *
* VERSION 4.1
STREET
*
95616
* RUN DATE 18MAR20 TIME 09:53:47
*
*
*
*****
*****

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LL

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

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT

STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77

VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```

1 HEC-1 INPUT PAGE 1
LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID File: LL.DAT
2 ID 18 MARCH 2020
3 ID
4 ID LEE'S DISCOUNT LIQUOR - AZURE DRIVE
5 ID EXISTING AND DEVELOPED DRAINAGE CONDITIONS RUN
6 ID
7 ID
*** FREE ***
8 IT 5 0 0 300
9 IO 5 0 0
10 IN 5 0 0
11 JR PREC 1.00 .57
*
12 KK ONX1
13 KM ONSITE 1 EXISTING CONDITION BASIN
14 BA0.002516
15 PB 2.77
16 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
17 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
18 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
19 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
20 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
21 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
22 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
23 PC .998 .999 1.00
24 LS 0 71.0
25 UD 0.130
*

```

LL

26 KK OND1
27 KM ONSITE DEVELOPED CONDITION BASIN 1
28 BAO.002516
29 LS 0 90.8
30 UD 0.081
*
*
31 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

12 ONX1
.
26 . OND1

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****

* * *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

ENGINEERS * *

* JUN 1998 *

CENTER * VERSION 4.1 *

* STREET * *

95616 * *

* RUN DATE 18MAR20 TIME 09:53:47 *

* * *

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

File: LL.DAT
18 MARCH 2020

LEE'S DISCOUNT LIQUOR - AZURE DRIVE
EXISTING AND DEVELOPED DRAINAGE CONDITIONS RUN

9 IO OUTPUT CONTROL VARIABLES

IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

LL
 JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS
 JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 1.00 .57
 1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION	
					RATIO 1 1.00	RATIO 2 .57
HYDROGRAPH AT +	ONX1	.00	1	FLOW	1.	0.
				TIME	3.58	3.67
HYDROGRAPH AT +	OND1	.00	1	FLOW	4.	2.
				TIME	3.50	3.50

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

Reference Material

“Technical Drainage Study for Tenaya Village Discount Tire” Tetra Tech, Inc., June 2004 DS3564

CITY OF LAS VEGAS				DATE:	
INTER-OFFICE MEMORANDUM				June 9, 2004	
TO: Land Development Services Department of Public Works				FROM: Albert Sung, P.E. <i>AT for</i> Flood Control Project Engineer Department of Public Works	
SUBJECT: Drainage Study for: Tenaya Village Discount Tire				COPIES TO: Tetra Tech	
Cross Streets:		South of Azure & 2400' West of Tenaya		Montecito Companies	
File Number:		F:\Depot\DSMemos\DS3564B.doc		Bart Anderson, P.E., DevCo	
Parcel Number:		125-27-222-002			
Zoning Action:					
FEMA Flood Zone	YES	NO	X		
Proposed Storm Drain	YES	NO	X		
HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No.
1 st Submittal	4/21/2004	5/5/2004	See Comments Below	\$400.00	123490: \$400
2 nd Submittal	5/26/2004	6/9/2004	See Comments Below	\$400.00	125898: \$400
TOTAL FEES (LDDRS):				\$800.00	----

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. This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.

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

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

END OF REMARKS

ays/ajj

T/R/S: T19S/R60E/27
AREA G-27

3 EXISTING DRAINAGE CONDITIONS

3.1 Existing Offsite Drainage Description

The offsite basin is undeveloped land in poor hydrological condition and extends westward to Ranch House Road. Azure Drive has been constructed and the 10-year flows are 44 cfs and the 100-year flows are 94 cfs. These flows are referenced from the approved Montecito East study.

3.2 Existing Onsite Drainage Description

The site was analyzed as two basins, including the off-site basin (see Figure 5, *Existing Basins*). Flows from these basins discharge to the northeast in Azure Drive.

The HEC-1 analysis and Standard Form 4 for the existing drainage conditions is located in *Appendix C*. Table 2 summarizes the runoff amounts.

Table 2. Existing Basin Runoff Amounts

BASIN / CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
EXON1	0.80	<1	1
EXOF1	3.96	3	8
PT1	-	3	9

4 DEVELOPED DRAINAGE CONDITIONS

4.1 Developed Off-Site Drainage Conditions

For the developed drainage conditions model, the offsite basin is analyzed as commercial development.

4.2 Developed On-Site Drainage Conditions

Developed on-site drainage basins are delineated on Figure 6, *Developed Basins*. Flows in both on-site basins discharge to the north in Azure Drive. The flows in Azure Drive have been obtained from the approved *Addendum #1 to the Technical Drainage Study for Tropical Parkway a.k.a. Montecito East* and reference material from this study including the approval

Table 3. Developed Drainage Conditions

BASIN / CONC. POINT	AREA (Acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
DEON1	0.65	1	2
DEON2	0.15	<1	<1
DEOF1	3.21	5	9
PT1	-	6	11

5 PROPOSED DRAINAGE FACILITIES

5.1 Hydraulic Calculations

Street capacities were calculated based on the developed drainage condition model. Table 4 summarizes the street capacities. Calculations are located in *Appendix E*.

Table 4. Hydraulic Calculations

CROSS SECTION	Q10/Q100 (cfs)	D10/D100 (ft)	V10/V100 (ft/s)	V x D
Azure Drive (Sec 1-1)	44/94	.57/.70	4.56/5.18	2.60/3.63
Parking Area (Sec 2-2)	6/11	.26/.32	1.81/2.10	.47/.67

6 CONCLUSIONS

The following recommendations are provided to facilitate safety, both public and private, for the proposed residential development.

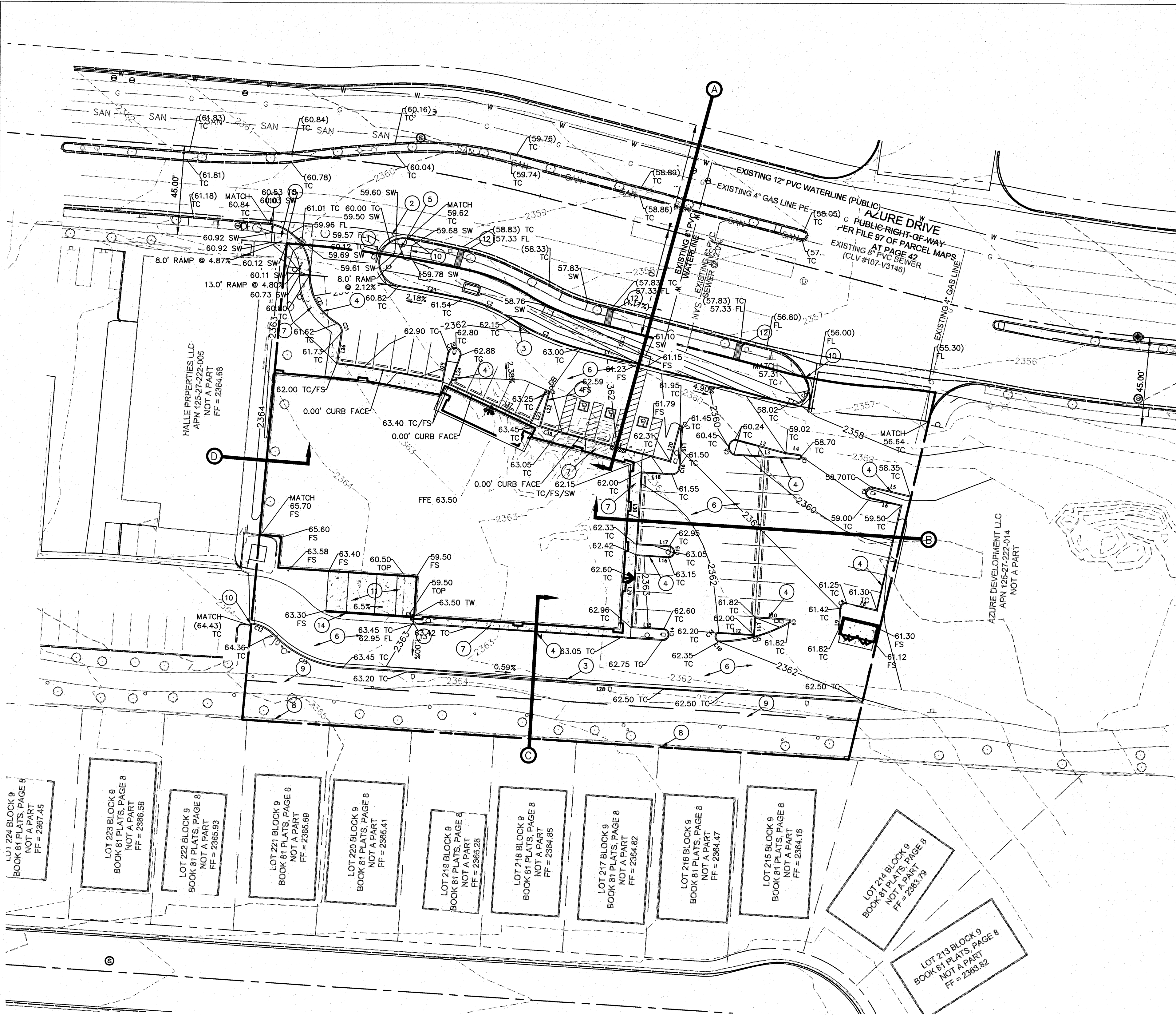
1. Elevate the finished floors to a minimum of twice the depth of flow up to 18 inches above the adjacent street flowline to prevent inundation by the 100-year, 6-hour storm event.
2. Construct all proposed street and gutter improvements to allow proper conveyance of stormwater.

7 REFERENCES

1. 2002 CCRFCD Flood Control Master Plan, Post, Buckley, Schuh, and Jernigan, Inc. and VTN Nevada, 1996.

ABBREVIATIONS (SEE CIV. SHT. FOR COMPLETE LIST)		
AC	ASPHALTIC CONCRETE	
ADJ	ADJUST	
AGG	AGGREGATE	
BC	BACK OF CURB	
BCR	BEGINNING OF CURB RETURN	
BEG	BEGIN	
BSW	BACK OF SIDEWALK	
BVC	BEGINNING OF VERTICAL CURVE	
CATV	CABLE TV	
CCASD	CLARK COUNTY AREA	
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT	
CL	CENTERLINE	
CLV	CITY OF LAS VEGAS	
CMU	CONCRETE MASONRY UNIT	
CO	CLEAN OUT	
COM	COMMUNICATIONS	
CONC	CONCRETE	
COND	CONDUIT	
CULV	CULVERT	
DC	DEPRESSED CURB	
DG	DECOMPOSED GRANITE	
DIP	DUCTILE IRON PIPE	
DOM	DOMESTIC	
ELEC	ELECTRIC	
EAC	EDGE OF AC	
ECR	END OF CURB RETURN	
EG	EXISTING GROUND	
ELEV	ELEVATION	
EP	EDGE OF PAVEMENT	
EVC	END OF VERTICAL CURVE	
EX	EXISTING	
FAST	FREWAY & ARTERIAL SYSTEM OF TRANSPORTATION	
FF	FINISH FLOOR	
FG	FINISH GRADE	
FL	FIRE HYDRANT	
FO	FIBER OPTICS	
FS	FINISHED SURFACE	
GB	GRADE BREAK	
HDPE	HIGH DENSITY POLYETHYLENE	
HGL	HEADWALL	
HP	HYDRAULIC GRADE LINE	
HP	HIGH POINT	
INV	INVERT	
IRR	IRRIGATION	
LF	LATERAL	
LF	LINEAL FEET	
LS	LANDSCAPE	
LT	LEFT	
LVWD	LAS VEGAS VALLEY WATER DISTRICT	
MAX	MAXIMUM	
MH	MANHOLE	
MIN	MINIMUM	
MTR	METER	
PB	PULL BOX	
PL	PROPERTY LINE	
PP	POWER POLE	
PROP	PROPOSED	
PVC	POLY VINYL CHLORIDE PIPE	
PVMT	PAVEMENT	
RT	RIGHT	
ROW	RIGHT-OF-WAY	
SS	SANITARY SEWER	
SD	STORM DRAIN	
SNWA	SOUTHERN NEVADA WATER AUTHORITY	
STA	STATION	
STLT	STREET LIGHT	
SVZ	SIGHT VISIBILITY ZONE	
SW	SIDEWALK	
TEL	TELEPHONE	
TC	TOP OF CURB	
TC	TOP OF FOOTING	
TW	TOP OF WALL	
TYP	TYPICAL	
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS	
VG	VALLEY GUTTER	
WL	WATER LINE	

LEGEND		
DESCRIPTION	EXISTING	PROPOSED
UTILITIES		
B.O. VALVE		
FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25" ELBOW		
22.5" ELBOW		
45" ELBOW		
90" ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL		
SANITARY SEWER		
STORM DRAIN		
TELEPHONE		
STREET LIGHTS		
100W HPS STLT.		
150W HPS STLT.		
200W HPS STLT.		
250W HPS STLT.		
400W HPS STLT.		
GRADING		
SPOT ELEV.	12.34 (TC)	12.34 TC
SLOPE	1.23%	1.23%
5' CONT.	(2005)	(2005)
1' CONT.	(2007)	(2007)
SITE		
SIGN		
"L" CURB		
"A" CURB		
EDGE OF PAVT.		
WALL		
LINE TYPES		
CL OR SECTION LINE		
PROPERTY LINE		
RIGHT OF WAY LINE		
EASEMENT LINE		
SAWTOOTH LINE		
FLOW LINE		
SHADES		
HEAVY AC PAVEMENT		
LIGHT AC PAVEMENT		
CONCRETE PAVEMENT		



SIGHT VISIBILITY ZONES

SIGHT VISIBILITY ZONE - NO WALLS, FENCES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM THE TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG SIGHT VISIBILITY LINE THROUGH LANDSCAPE MEDIANS.

GEOTECHNICAL NOTES:

A GEOLOGIST OR GEOTECHNICAL ENGINEER SHALL BE ON SITE DURING EXCAVATION AND MASS GRADING OPERATIONS TO EXAMINE THE SOIL CHARACTERISTICS AND GEOLOGICAL CONDITIONS ENCOUNTERED, AND TO PROVIDE PROFESSIONAL ADVICE TO THE OWNER IN THE EVENT THAT UNANTICIPATED SOIL PROBLEMS ARISE AND/OR SUBSURFACE SITE CONDITIONS ARE FOUND TO BE SIGNIFICANTLY DIFFERENT THAN DEFINED BY PRE-DESIGN EXPLORATION AND TESTING. CONTRACTOR TO ENSURE POSITIVE DRAINAGE. NO PONDING ALLOWED. CONTRACTOR TO FOLLOW RECOMMENDATIONS AS OUTLINE IN THE PROJECT GEOTECHNICAL REPORT, INCLUDING BUT NOT LIMITED TO EXCAVATION, GRADING AND COMPACTION. REFER TO THE REPORT PREPARED BY:

NOVA
DATE: MARCH 16, 2020
PROJECT NO.: G-20-040

GEOTECHNICAL ENGINEER:

PREPARED BY: NOVA, INC.
6835 SOUTH ESCONDIDO STREET SUITE A
LAS VEGAS, NEVADA 89119-3932
702-897-1424
NOVA
DATE: MARCH 16, 2020
PROJECT NO.: G-20-040

CONSTRUCTION NOTES

- CONSTRUCT COMMERCIAL DRIVEWAY AND CROSS GUTTER PER CCAUSD #225 GEOMETRICS PER CCAUSD #222.1.
- REMOVE EXISTING CURB, GUTTER AND SIDEWALK & DISPOSE OF PROPERLY.
- CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216.
- CONSTRUCT "A" TYPE CURB & GUTTER PER CCAUSD #219
- CONSTRUCT ADA RAMP PER CCAUSD #235.
- CONSTRUCT 3" AC PAVEMENT OVER 4.0" TYPE II AGGREGATE BASE PER GEOTECHNICAL REPORT.
- CONSTRUCT 5' WIDE CONCRETE SIDEWALK PER CCAUSD #234.
- EXISTING WALL PROTECT IN PLACE
- EXISTING WALKING PATH PROTECT IN PLACE
- MATCH EXIST. ELEVATION
- CONSTRUCT 7" CONCRETE OVER 8" TYPE II AGGREGATE BASE.
- INSTALL SIDEWALK UNDERDRAIN PER CCAUSD #236.
- CONSTRUCT 2x2 JENSEN DROP INLET (SEE DETAIL PAGE C7) AND SUMP PUMP SEE ELECTRICAL PLANS. PUMP DISCHARGES FLOW THROUGH 4" PVC PIPE THROUGH WALL AS SHOWN
- CONSTRUCT WALL PER SOUTHERN NEVADA BUILDING OFFICIALS REGIONAL STANDARD B-100-2

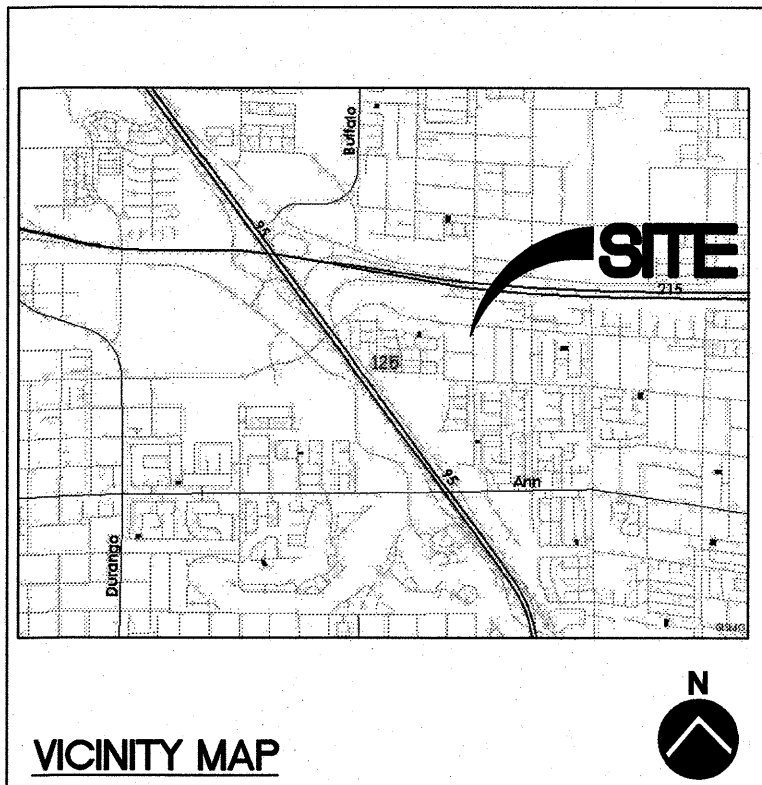
FLOOD CERTIFICATION

BRANDON A. POTTS PE #13121 DATE:

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

FLOOD NOTE

THE SUBJECT SITE IS COVERED BY A FLOOD INSURANCE RATE MAP (FIRM) FOR THE CLARK COUNTY AND INCORPORATED AREAS, NEVADA, COMMUNITY PANEL NUMBER 32003017PAGE, EFFECTIVE DATE: SEPTEMBER 27, 2002, AND FALLS WITHIN ZONE "X" - AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.



NOTE:

ALL LANDSCAPE AREAS LOCATED WITHIN 10 FEET OR LESS FROM AN EXISTING OR PROPOSED WALL OR STRUCTURE SHALL BE CONTAINED WITH A SEALED AND/OR WATER TIGHT AREA.

CONTRACTOR'S GRADING NOTE:

PER AMENDED SECTION 1804.4 OF THE 2018 IBC, IMPERVIOUS SURFACES MUST MAINTAIN A MINIMUM SLOPE OF 2% SLOPE AWAY FROM ALL STRUCTURES, EXCEPT TRUCK DOCKING AREAS, LANDSCAPE AREAS AND PAVEMENT AREAS. MUST MAINTAIN A MINIMUM SLOPE OF 5% AWAY FROM ALL STRUCTURES.

GRADING NOTES:

- SLOPES 4:1 OR STEEPER AND FINE-GRAINED MATERIALS THAT HAVE BEEN DISTURBED (SANDY AND SILTY MATERIALS) SHOULD BE PROTECTED WITH BURLAP OR OTHER EROSION CONTROL FABRIC/MATERIAL, UNLESS OTHERWISE SPECIFIED BY LANDSCAPE DRAWINGS AND SPECIFICATIONS OR THE SOILS REPORT.
- CONTRACTOR SHALL DETERMINE HIS OWN FOOTING OR BASEMENT EXCAVATION QUANTITIES, EVEN THOUGH SHOWN ON ROUGH GRADING PLANS. ADDITIONALLY, STRUCTURE BACKFILL COSTS SHOULD BE INCLUDED IN THE COST OF THE STRUCTURE, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
- CONTRACTOR SHALL NOTIFY CIVILWORKS INC WITHIN 24 HOURS OF OMISSIONS AND ERRORS DISCOVERED ON PLANS. CIVILWORKS INC WILL NOT BE RESPONSIBLE FOR ANY "CORRECTIVE" WORK DONE BY OTHERS.

LEGAL DESCRIPTION

PORTION OF LOT 2
BOOK 113 PLATS, PAGE 26, CLARK CO, LAS VEGAS, NV

BASIS OF BEARING

NORTH 00°51'56" EAST, BEING THE BEARING OF THE CENTERLINE OF TENAYA WAY BEING THE EAST LINE OF THE NORTHWEST (NW 1/4) OF SECTION 27, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN IN BOOK 113 OF PLATS AT PAGE 26, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK
MONUMENT ID: 6LV9027N6
FOUND: RIVET & PLATE IN TOP OF CURB AT NW COR. OF TENAYA WAY & AZURE DRIVE
ELEVATION: 2,350.880 (FEET)
716.550 (METERS)
CITY OF LAS VEGAS SURVEY BENCHMARK (NAVD 88).

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

FAST
Call before you Dig
Underground

Call before you Dig
Avoid hitting overhead power lines. It's costly.

1-800-227-2600 1-702-432-5300 1-702-227-2929

GRADING PLAN

PRINTS REQUIRE SIGNATURE AND SIGN FOR PROOF

SHEET #

C5

Civilworks Inc
Engineering with "sensible" solutions tailored to your "specific" needs.

CONSULTANT LIST:
HHMSurveyingInc4
4945 W. PATRICK LANE
LAS VEGAS, NEVADA 89118
OFFICE #: (702) 534-7505
FACSIMILE #: (702) 534-1830

LEE'S LIQUOR
7291 W AZURE DRIVE
LAS VEGAS, NEVADA
LEONGRENN
4728 COMMONWEALTH AVE.

DATE: 24 APRIL 2020
PROJ. NO.: 125013014.00
TECH. ENGR.:
ENGR. CHK.:
REVISIONS:
PROF. SEAL: CIVIL ENGINEER
BRANDON A. POTTS
Exp: 12/31/2020
No. 13121

ABBREVIATIONS

(SEE C.V.R. SHT. FOR COMPLETE LIST)

AC ASPHALTIC CONCRETE

ADJ ADJUST

AGG AGGREGATE

BC BACK OF CURB

BCR BEGINNING OF CURB RETURN

BEG BEGIN

BSW BACK OF SIDEWALK

BVC BEGINNING OF VERTICAL CURVE

CATV CABLE TV

CCAUUSD CLARK COUNTY AREA UNIFORM STANDARD DRAWING

CCRFCD CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT CENTERLINE

CL CITY OF LAS VEGAS

CMU CONCRETE MASONRY UNIT

CO CLEAN OUT

COMM COMMUNICATIONS

CONC CONCRETE

COND CONDUIT

CULV CULVERT

DC DEPRESSED CURB

DG DECOMPOSED GRANITE

DIP DUCTILE IRON PIPE

DOM DOMESTIC

ELEC ELECTRIC

EAC EDGE OF AC

EOR END OF CURB RETURN

EG EXISTING GROUND

ELEV ELEVATION

EP EDGE OF PAVEMENT

EVV END OF VERTICAL CURVE

EX EXISTING

FAST FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION

FF FINISH FLOOR

FG FINISH GRADE

FH FIRE HYDRANT

FL FLOW LINE

FO FIBER OPTICS

FS FINISHED SURFACE

GB GRADE BREAK

HDPE HIGH DENSITY POLYETHYLENE

HDWL HEADWALL

HGL HYDRAULIC GRADE LINE

HP HIGH POINT

INV INVERT

IRR IRRIGATION

LAT LATERAL

LS LANDSCAPE

LT LEFT

LVVWD LAS VEGAS VALLEY WATER DISTRICT

MAX MAXIMUM

MH MANHOLE

MIN MINIMUM

MTR METER

PB PULL BOX

PL PROPERTY LINE

PP POWER POLE

PROP PROPOSED

PVC POLY VINYL CHLORIDE PIPE

PVMT PAVEMENT

RIM TOP OF MANHOLE OR CLEANOUT

RT RIGHT

ROW RIGHT-OF-WAY

SS SANITARY SEWER

SD STORM DRAIN

SNWA SOUTHERN NEVADA WATER AUTHORITY

STA STATION

STLT STREET LIGHT

SVZ SIGHT VISIBILITY ZONE

SW SIDEWALK

TEL TELEPHONE

TC TOP OF CURB

TF TOP OF FOOTING

TW TOP OF WALL

TYP TYPICAL

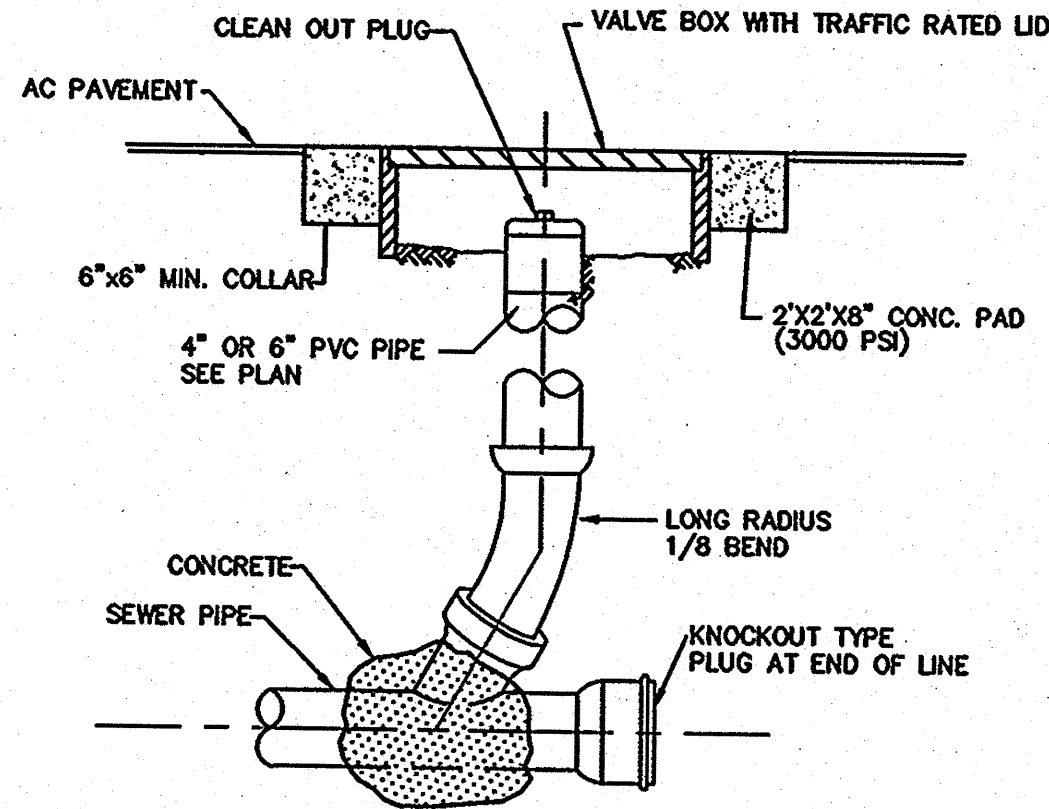
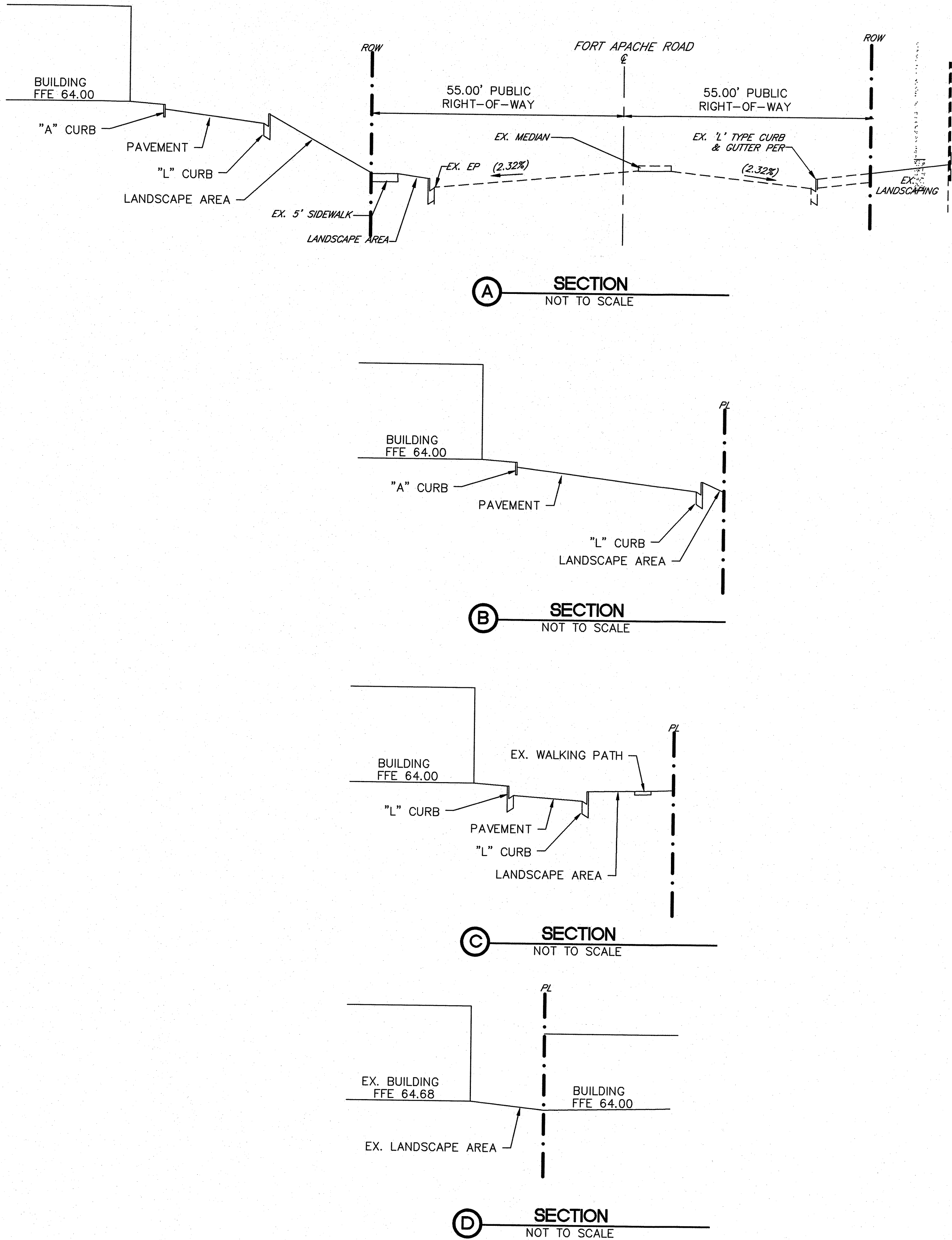
UDACS UNIFORM DESIGN AND CONSTRUCTION STANDARDS

VG VALLEY GUTTER

WL WATER LINE

LEGEND

DESCRIPTION	EXISTING	PROPOSED
UTILITIES		
B.O. VALVE		
FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25" ELBOW		
22.5" ELBOW		
45" ELBOW		
90" ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL		
SANITARY SEWER		
STORM DRAIN		
TELEPHONE		
STREET LIGHTS		
100W HPS STLT.		
150W HPS STLT.		
200W HPS STLT.		
250W HPS STLT.		
400W HPS STLT.		
GRADING		
SPOT ELEV.	12.34 (TC)	12.34 TC
SLOPE	1.23%	1.23%
5' CNT.	(2005)	(2005)
1' CNT.	(2007)	(2007)
SITE		
SIGN		
"L" CURB		
"A" CURB		
EDGE OF PAVT.		
WALL		
LINE TYPES		
CL OR SECTION LINE		
PROPERTY LINE		
RIGHT OF WAY LINE		
EASEMENT LINE		
SAWCUT LINE		
FLOW LINE		
SHADES		
HEAVY AC PAVEMENT		
LIGHT AC PAVEMENT		
CONCRETE PAVEMENT		



TRAFFIC RATED CLEANOUT
NO SCALE

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OR

1-800-227-2600

FAST

Call before you UnderGround

1-702-432-5300 1-702-227-2929

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FACSIMILE #: (702) 534-1830

LEE'S LIQUOR

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LEONGREEN
4728 COMMONWEALTH AVE.
LA CANADA, CA. 91011
MR. JAMES HONG
818-331-1425
TEAM.LEONGREEN@LEONGREENBUILDER.COM

DETAILS

DATE	BY	REVISIONS
12/24/2020	ENG. CHK.	
12/24/2020	ENG. CHK.	
12/24/2020	ENG. CHK.	
12/24/2020	ENG. CHK.	
12/24/2020	ENG. CHK.	
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12/24/2020	ENG. CHK.	
12/24/2020	ENG. CHK.	
12/24/2020	ENG. CHK.	

PRINTS REQUIRE ENGINEER'S SEAL AND SIGN FOR PROOF OF VALIDITY

BRANDON POTTIS

Exp: 12/31/21

CIVIL

No. 13121

4-24-20

SHEET #

C7

ASSESSOR'S PARCELS - CLARK COUNTY, NV.
Briana Johnson - Assessor

125-27-2

S 2 NW 4

27

T19S R60E

001 ROAD PARCEL NUMBER

001 PARCEL NUMBER

1.00 ACREAGE

202 PARCEL SUB/SEQ NUMBER

PB 24-45 PLAT RECORDING NUMBER

5 BLOCK NUMBER

5 LOT NUMBER

GLS GOV LOT NUMBER

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137 138 139

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ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANRB		ANN ROAD CHANNEL WEST - RAINBOW						
0000	E	9' X 6' RCB	167	817	CNW2B5-C	WEST3	0.99	0.30
0028	E	11' X 5' RCB	1140	817	CNW2B5-C	WEST3	0.99	0.23
0050	E	10' X 3' RCB	1240	517	CNW2A3-C	WEST3	0.63	0.35
ANWE		ANN ROAD CHANNEL WEST						
0290	E	8' X 8' RCB	2050	817	2CNW2B5C	CWEST3	0.99	0.70
0327	E	6' X 6' RCB	2360	135	RCHODB	WEST3	4.61	0.87
0371	E	6' X 6' RCB	760	135	RCHODB	WEST3	4.61	0.34
0385	E	54" RCP	1950	135	RCHODB	WEST3	4.61	1.17
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0195	E	CONC CHNL 36"W 9"D 0:1 SS	1130	3771	CNW3B3-C	WEST3	5.64	0.60
0200	E	CONC CHNL 36"W 9"D 0:1 SS	1340	3523	CNW2D4-C	WEST3	5.14	1.00
0226	E	2: 18" X 8.5" RCBC @ RIO VISTA	100	3523	CNW2D4-C	WEST3	5.14	0.51
0241	E	CONC CHNL 36"W 9.5"D 0:1 SS	405	3523	CNW2D4-C	WEST3	5.14	0.51
0251	E	CONC CHNL 36"W 9"D 0:1 SS	575	3234	CNW2D3-C	WEST3	4.64	0.51
0271	E	CONC CHNL 32"W 10"D 0:1 SS	229	3234	CNW2D3-C	WEST3	4.64	0.51
0274	E	32' X 10' RCBC @ TENAYA	142	3234	CNW2D3-C	WEST3	4.64	0.51
0277	E	CONC CHNL 32"W 9"D 0:1 SS	579	3234	CNW2D3-C	WEST3	4.64	0.64
0287	E	CONC CHNL 32"W 8"D 0:1 SS	865	2992	CNW2B2-C	WEST3	3.83	1.59
0301	E	2: 15' X 7' RCB	1738	2992	CNW2B2-C	WEST3	3.83	1.30
0304	E	22' X 7' RCB	3410	2992	CNW2B2-C	WEST3	3.83	1.85
GO95		GOWAN OUTFALL - U.S. 95 CHANNEL						
0000	P	CONC CHNL 12"W 4"D 2:1 SS	2640	318	GD17BG-C	GOW3A	0.36	0.30
0050	P	CONC CHNL 12"W 4"D 2:1 SS	2450	318	GD17BG-C	GOW3A	0.36	0.30
GOAL		GOWAN OUTFALL - ALEXANDER ROAD FACILITIES						
0168	P	10' X 7' RCB	4200	829	CPT2B2	GOW3A	2.32	0.50
0247	P	CONC CHNL 12"W 5.5"D 2:1 SS	2640	574	CGD20BMC	GOW3A	2.02	0.30
GOBU		GOWAN NORTH - BUFFALO BRANCH						
0000	E	2: 12' X 6' RCB	1705	421	CGD14CBC	GOW3A	2.52	0.20
0032	E	2: 12' X 5' RCB	1248	343	CGD14AAC	GOW3A	2.29	0.25
0058	E	2: 11' X 4' RCB	1398	301	CGD17AAC	GOW3A	1.87	0.25
0085	E	11' X 5' RCB	1356	241	CGD17ABC	GOW3A	1.49	0.25
0112	E	8' X 5' RCB	1380	180	CGD20ACC	GOW3A	1.12	0.65
0136	E	5' X 5' RCB	2740	72	GD24AA-C	GOW3A	0.44	0.50
GOBW		GOWAN BELTWAY WEST						
0000	E	48" RCP	2527	115	LMBWDB	GOW4A	10.81	4.37
0048	E	72" RCP	131	115	LMBWDB	GOW4A	10.81	2.21
0051	E	72" RCP OUTLET	1522	115	LMBWDB	GOW4A	10.81	0.30
0052	E	588 AC-FT LONE MOUNTAIN-BELTWAY DETENTION BASIN		5316	CLMBW1	GOW3B	3.64	
0082	E	17,100 CFS PMF SPILLWAY		17100	CLMBW1	GOW3B	3.64	
0097	E	60" RCP	375	660	UVB1-1	GOW3A	0.37	8.06
0100	E	ENERGY DISSIPATOR	162	660	UVB1-1	GOW3A	0.37	50.00
0103	E	42" RCP	92	660	UVB1-1	GOW3A	0.37	7.00
0106	E	8' X 8' RCB CONNECTOR PIPE UNDER LONE MOUNTAIN	699				0.25	
0128	E	20' X 10' RCB	100	3589	CWRBW1	GOW3B	2.41	25.00
0132	E	14' X 9' RCB	648	3156	CHLBW1-C	GOW3A	5.83	1.27
0156	E	14' X 9' RCB	1182	3156	CHLBW1-C	GOW3A	5.83	2.89
0183	E	14' X 9' RCB	3414	3156	CHLBW1-C	GOW3A	5.83	1.77
0227	E	10' X 8' RCB	739	1823	CEFPOA2	GOW3A	4.94	2.78
GOBX		GOWAN BOX CANYON						
0000	E	66" RCP	258	696	LWBW1	GOW3A	0.47	10.00
0005	E	ENERGY DISSIPATOR	206	696	LWBW1	GOW3A	0.47	39.00
0009	E	6' X 4' RCB	95	696	LWBW1	GOW3A	0.47	4.72
0015	P	66" RCP	6783	39	BOXDET	GOW3A	3.41	6.55
GODU		GOWAN NORTH - DURANGO BRANCH						
0000	E	12' X 6' RCB	2629	905	CLV14-C	GOW3A	1.40	0.91
0050	E	9' X 6' RCB	865	681	CLV20-C	GOW3A	0.98	1.50
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0000	E	10' X 8' RCB	1436	474	CWRJS-C*	GOW3A	1.95	1.07
0026	E	10' X 7' RCB	1330	474	CWRJS-C	GOW3A	1.95	0.82
0051	E	10' X 7' RCB	1290	439	CHLFR-C	GOW3A	1.69	1.06
0076	E	10' X 7' RCB	1335	392	CARFR-C	GOW3A	1.45	0.54
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0100	P	10' X 6' RCB	1320	321	CEAFR-C	GOW3A	1.21	0.76
0126	P	10' X 7' RCB	1320	290	CTRFR-C	GOW3A	0.96	0.38
0152	P	7' X 6' RCB	1320	238	CARFP-C	GOW3A	0.70	0.77
0176	P	78" RCP	1320	190	CCPFR-C	GOW3A	0.46	1.15
GOL2		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 2						
0000	E	5' X 4' RCB	150	359	CRBW	GOW3A	0.36	14.60
0003	E	66" RCP	607	359	CRBW	GOW3A	0.36	1.97
0014	E	84" RCP @ ALEXANDER	125	359	CRBW	GOW3A	0.36	4.00
GOL3		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
0000	E	2: 10' X 10' RCBC @ BELTWAY	500	3713	CLMT5	GOW3A	7.83	3.39
0010	E	CONC CHNL 20"W 10"D 0:1 SS	3037	3277	CRCLMT1R	GOW3A	7.31	2.78
GOL5		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 5						
0000	E	6' X 5' RCB	309	421	UVB2	GOW3A	0.33	7.69
0006	E	CONC CHNL 6"W 5"D 0:1 SS	740	421	UVB2	GOW3A	0.33	3.85
0020	E	6' X 5' RCBC @ ALEXANDER RD	615	421	UVB2	GOW3A	0.33	2.08
0032	E	CONC CHNL 6"W 5"D 0:1 SS	1756	421	UVB2	GOW3A	0.33	1.67
GOLM		GOWAN LONE MOUNTAIN SYSTEM						
0000	E	78" RCP	2590	278	CLV15-C	GOW4A	11.09	1.80
0049	E	6' X 5' RCB	585	278	CLV15-C	GOW4A	11.09	1.87
0060	E	66" RCP	817	278	CLV15-C	GOW4A	11.09	2.40
0075	E	60" RCP	1385	278	CLV15-C	GOW4A	11.09	2.55
0101	E	54" RCP	700	184	LMTNDB	GOW4A	10.74	1.74
0115	E	48" RCP	1799	184	LMTNDB	GOW4A	10.74	3.08
0140	E	42" RCP	438	184	LMTNDB	GOW4A	10.74	1.60
0142	E	48" RCP	348	184	LMTNDB	GOW4A	10.74	2.14
0144	E	66" RCP	196	184	LMTNDB	GOW4A	10.74	5.44
0145	E	66" RCP OUTLET	378	184	LMTNDB	GOW4A	10.74	0.90
0146	E	888 AC-FT LONE MOUNTAIN DETENTION BASIN		6518	LMTNIN	GOW3B	6.43	
0147	E	36,000 CFS PMF SPILLWAY		36000	LMTNIN	GOW3B	6.43	
0150	E	DROP STRUCTURE	481	5731	CGABW	GOW3B	5.49	
0162	E	28' X 8' RCBC @ HUALAPAI	625	5731	CGABW	GOW3B	5.49	1.86
0174	E	CONC CHNL 28"W 8"D 0:1 SS	2715	5532	COLMT5	GOW3B	5.19	3.20
0226	E	10' X 10' RCBC @ BELTWAY	246	2246	CUVB2	GOW3A	1.67	2.50
0230	E	10' X 10' RCB	290	1931	CLMT3	GOW3A	1.34	2.50
0236	E	CONC CHNL 15"W 8"D 0:1 SS	869	1931	CLMT3	GOW3A	1.34	3.69
GOLO		GOWAN OUTFALL - LONE MTN. ROAD BRANCH						
0275	E	8' X 6' RCB	3000	580	CPT3AA2	GOW3A	1.17	1.04
0332	E	8' X 6' RCB	150	492	C33AA1	GOW3A	1.02	1.90
GONO		GOWAN NORTH SYSTEM						
0000	E	8' X 8' RCB OUTLET	184	523	GWNNDB	GOW5A	68.55	0.51
0001	E	8' X 8' RCB OUTLET	156	523	GWNNDB	GOW5A	68.55	0.63
0006	E	30,780 CFS PMF SPILLWAY		30780	CCLV43-C*	GOW4B	11.91	
0008	E	921 AC-FT GOWAN NORTH DETENTION BASIN		2599	CCLV43-C*	GOW4B	11.91	
0009	E	3: 13' X 8' RCB	1662	2281	CLV43-C	GOW4B	11.22	0.62
0012	E	CONC CHNL 30"W 8.5" 8.5"D 0:1 SS	2665	2131	CCLV36-C	GOW4B	8.53	1.18
0062	E	BRIDGE 30'W 8.5'D @ CIMARRON	80	1912	CCLV15-C	GOW4B	8.02	0.30
0063	E	CONC CHNL 30"W 8.5"-10"D 0:1 SS	2302	1912	CCLV15-C	GOW4B	8.02	1.00
0110	E	2: 12' X 8' RCAC @ ALEXANDER	547	1392	CHAFR2-C	GOW3B	6.26	1.00
0117	E	2: 12' X 8' RCAP	424	1392	CHAFR2-C	GOW3B	6.26	1.10
0124	E	CONC CHNL 24"W 9"D 0:1 SS	887	1392	CHAFR2-C	GOW3B	6.26	1.36
0141	E	CONC CHNL 24"W 9"-10.5"D 0:1 SS	2064	1367	CCRSFR-C	GOW3B	6.12	0.59
0181	E	BRIDGE 30'W 7'D @ CRAIG	142	1367	CCRSFR-C	GOW3B	6.12	0.65
0183	E	CONC CHNL 22"W 8"-10.6"D 0:1 SS	2193	1185	CCRSFR-C	GOW3B	5.19	0.72
0225	E	CONC CHNL WIDTH VARIES DEPTH VARIES 0:1 SS	508	1144	CCLWFR-E	GOW3B	4.54	1.05
0230	E	13' X 5' RCB	256	766	CLWFR-W	GOW3B	2.46	2.78
0234	E	12' X 6' RCB	2010	766	CLWFR-W	GOW3B	2.46	1.67
0272	E	10' X 6' RCB	2797	766	CLWFR-W	GOW3B	2.46	3.15
0325	E	15' X 7' RCB	291	749	CWWRHW-C	GOW3B	2.34	4.20
0335	E	15' X 7' RCB	529	749	CWWRHW-C	GOW3A	2.34	0.40
0350	P	10' X 6' RCB	3473	749	CWRHW-C	GOW3A	2.34	0.88
0411	P	10' X 6' RCB	1320	679	CARHW-C	GOW3A	1.84	0.76
GONO		GOWAN NORTH SYSTEM						
0436	P	8' X 6' RCB	1320	607	CEAHW-C	GOW3A	1.50	1.14
0461	P	8' X 7' RCB	1320	508	CTRHW-C	GOW3A	1.21	0.38
0486	P	7' X 5' RCB	1320	400	CADHW-C	GOW3A	0.90	0.76
0511	P	6' X 5' RCB	1320	326	CCPHW-C	GOW3A	0.60	1.14
GOOF		GOWAN OUTFALL FACILITIES						
0511	E	8' X 5' RCB	8390	740	CPT6B-C	GOW3B	1.08	0.50
0531	E	8' X 5' RCB	1300	523	GWNNDB	GOW5A	68.55	0.50
0551	E	72" RCP	524	523	GWNNDB	GOW5A	68.55	0.62
0773	E	60" RCP	803	255	LV30-C	GOW3A	0.42	1.40
0775	E	60" RCP	1300	255	LV30-C	GOW3A	0.42	1.00
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0140	E	CONC CHNL 10"W 5"D 0:1 SS	2155	475	CDMNA1	WEST3	0.43	1.65
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0000	E	2: 12' X 8.5' RCAP	1700	1766	CNW1C-W*	WEST3	3.91	0.63
0034	E	CONC CHNL 21"W 8"D 0:1 SS	1000	1766	CNW1C-W	WEST3	3.91	1.19
0053	E	2: 12' X 8' RCBC @ SOUTH RAMP CONNECTOR	85	1465	CDW1C1-C	WEST3	3.55	1.40
0054	E	CONC CHNL 21"W 8"D 0:1 SS	432	1465	CDW1C1-C	WEST3	3.55	1.51
0062	E	TRANSITION STRUCTURE	130	1465	CDW1C1-C	WEST3	3.55	1.51
0065	E	24' X 7' RCB	480	1465	CDW1C1-C	WEST3	3.55	0.30
0074	E	24' X 6' RCB	50	1414	CNWB6C-C	WEST3	3.41	0.30
0075	E	20' X 6' RCBC @ BELTWAY	428	1414	CNWB6C-C	WEST3	3.41	2.81
0083	P	20' X 4' RCB	950	1414	CNWB6C-C	WEST3	3.41	2.49
0101	P	CONC CHNL 20"W 5"D 0:1 SS	980	1414	CNWB6C-C	WEST3	3.41	2.38
0120	E	20' X 6' RCBC @ GRAND MONTECITO	120	1414	CNWB6C-C	WEST3	3.41	1.00
0122	P	CONC CHNL 16"-20"W 6"D 0:1 SS	350	1414	CNWB6C-C	WEST3	3.41	1.84
RCHO		RANCHO ROAD SYSTEM						
0000	E	60" RCP W/ 36" ORIFICE PLATE	1183	135	RCHODB	WEST3	4.61	0.74
0025	E	321 AC-FT RANCHO ROAD DETENTION BASIN		2057	RCHOIN			



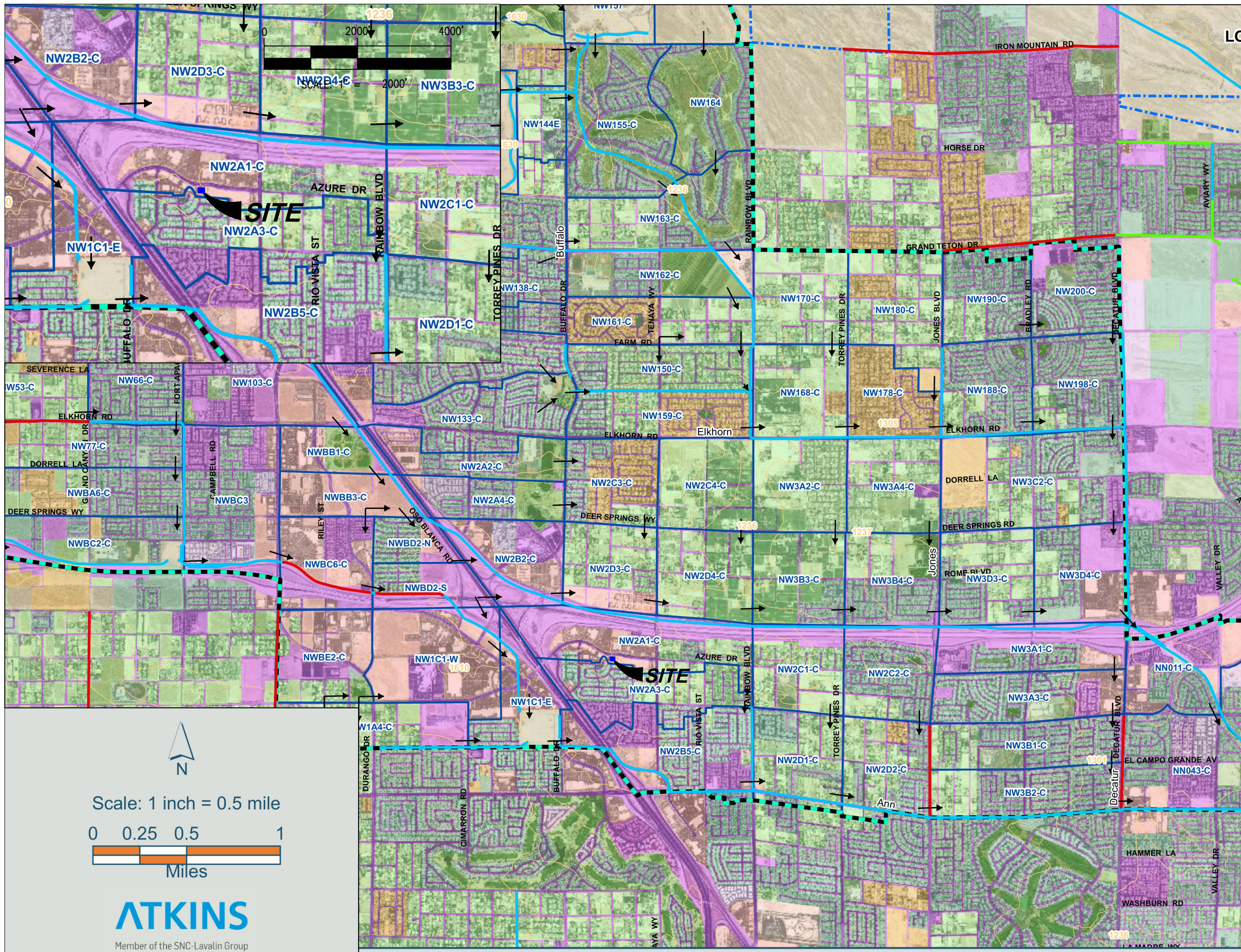
LEGEND

- ### Remove & Replace/Parallel Facilities



AerialSource:Esri World Imagery 2017



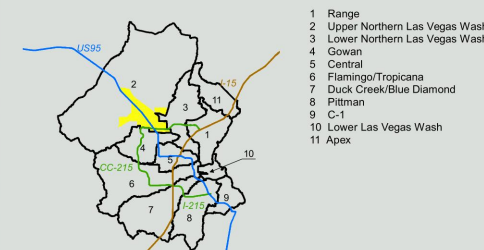


2018 Las Vegas Valley Master Plan Update

Figure W-2B
Upper Northern Las Vegas Wash Watershed

Legend

- Flow Arrows
- Concentration Points (NodeID flow(cfs))
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- BasinID
- Subbasins
- MUSYM
- Soils
- 1: Undeveloped Land, Open desert
- 2: Parks, Golf Courses
- 3: Rural, 0.5-1 units per acre (uses 1 unit/acre)
- 4: Low-Density Residential, 1-2 units per acre (uses 2 units/acre)
- 5: Medium-Density Residential, 2-4 units per acre (uses 3 units/acre)
- 6: High-Density Residential, 4-8 units per acre (uses 6 units/acre)
- 7: Public Facility and Residential, 8-12 units/acre
- 8: Very High-Density Residential, 12 units/acre or more
- 9: Commercial, Retail, Casino, High Rise Condominiums
- 10: Light Industrial
- 11: Heavy Industrial
- 12: Schools
- 13: Lakes



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