

DS #: 5215

APN: 140-19-803-006

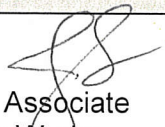
PROJECT: Rivera Shopping Center

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		December 2, 2019
TO: Land Development Services Department of Building & Safety		FROM: Jennifer Shinn, P.E.  Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:	
	Rivera Shopping Center	
Cross Streets:	Owens Ave and Lamb Blvd	Jesus Rivera
File Number:	F:\Depot\DSMemos\DS5215A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	140-19-803-006	CCPW
Zoning Action:	N/A	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES X	NO

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	11/7/2019	12/2/2019	See Comments Below	\$400.00	3639347: \$400
TOTAL FEES (LDDRS):				\$400.00	----

REMARKS:

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

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

Note that the Clark County Regional Flood Control District (District) has begun efforts to update the Hydrologic Criteria and Drainage Design Manual (HCDDM) and is requesting participation from the engineering community. The District is collecting comments and suggestions on errors, clarifications, or changes needed to the current Manual and/or content and usability enhancements to be incorporated into the updated Manual. Additional information on procedures and deadline to provide feedback and comments are available online at (<http://www.ccrfed.org/hcddmupdate.html>).

1. Clearly identify and label the different jurisdictions on the Plans.

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

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

END OF REMARKS

jks

T/R/S: T20S/R62E/19

AREA N-19



Department of Public Works

500 S Grand Central Pky • Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

Denis Cederburg, P.E., Director • E-Mail: dlc@ClarkCountyNV.gov

Drainage Study Approval Letter

Date: October 29, 2019
Firm: Blue Diamond Civil
Engineer: Philip D. Wakefield, P.E.
Address: 452 E. Silverado Ranch Boulevard, Suite 186, Las Vegas, NV 89183
Phone: (702) 287-8914
Fax: (702)
E-mail: pwakefield@bdce-lv.com

Subject: Technical Drainage Study for Rivera Shopping Center
Location: NW of Owens Avenue and Lamb Boulevard
APN: 140-19-803-006
Sec, Township, Range: S19, T20S, R62E
Flood Zone & Panel: Shaded Zone X, 2179F, Dated November 16, 2011
Application Number: pw19-12009

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	03/08/2019	03/27/2019	WG	
Addendum #1	10/15/2019	10/29/2019	WG	

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is Required
	Boulder City	Adjacent to or Impacts Jurisdiction
	City of Mesquite	Adjacent to or Impacts Jurisdiction
	City of Henderson	Adjacent to or Impacts Jurisdiction
X	City of Las Vegas	Adjacent to or Impacts Jurisdiction
	City of North Las Vegas	Adjacent to or Impacts Jurisdiction
	Nevada Department of Transportation	Adjacent to or Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corps of Engineers	Impacts a USACE Facility
	Clark County Regional Flood Control District	Regional Significance, Adjacent to or Impacts CCRFCD MPU Facility or In a SFHA

BOARD OF COUNTY COMMISSIONERS
MARILYN KIRKPATRICK, Chair • LAWRENCE WEEKLY, Vice Chair
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YOLANDA T. KING, County Manager

The referenced **Technical Drainage Study** has been reviewed and is accepted as complying with minimum improvement standards. As set forth in the subject drainage study, the following measures will be taken to mitigate flood hazards.

The site shall be graded with respect to drainage as shown on "**Rivera Shopping Center**", grading plan sheets C1.01, C1.02, C3.01, C5.01, C5.02, C5.03, signed and sealed by Philip D. Wakefield, P.E., on October 14, 2019.

Check appropriate conditions

X	Retaining/screen wall combination may be in excess of current Clark County Unified Development Code, Chapter 30.64.050.
	A FEMA Elevation Certificate, completed by a licensed surveyor, must be submitted to and approved by CCPW Development Review Plan Check prior to the issuance of Certificates of Occupancy for those structures.
X	Mylars of the grading plan must be submitted to the CCPW Development Review Plan Check for approval signatures prior to map recordation (residential) or permit issuance (commercial).
	An administrative variance to allow the finished floor elevation(s) to be set below the current Clark County criteria must be approved. The finished floor variance must be submitted to CCPW Development Review front counter after drainage study approval and prior to offsite final review.
X	The grading plan will be reviewed by the Building Office Operations Division to ensure compliance with the ADA access requirements. Revisions to the grading plan may be required if the site accessibility design does not comply with the requirements set forth in the Accessibility Chapter of the Clark County Building Code.
	The plans show work is proposed on another property. Notarized written permission must be obtained prior to plan approval. A grading permit must be obtained from Building Dept prior to grading.
X	Right-of-way dedication must be verified.
	Any previously approved drainage easements that are not being used must be vacated.
	Per <i>Regional Flood Control District Policies and Procedures Manual, Section VIII. D. 13. Uniform Regulations for the Control of Drainage</i> , the Engineer of Record shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.
X	Structural calculations are required. The structural calculations, plans, and details must be approved prior to "Offsite" submittal and prior to CCRFCD submittal, if applicable.
X	Plan revisions can be found on the red-lined plans and must be addressed.
X	Prepare drainage easement documents as shown on the grading plans.

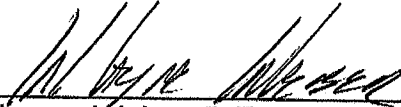
Additional Conditions:

1. Any improvements not depicted on the above mentioned grading plans may require an Update to this Technical Drainage Study.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.



Wade Gerstenkorn
Associate
Development Review
wade@ClarkCountyNV.gov



W. Layne Weber, P.E., CFM
Principal Engineer
Development Review
wlweber@ClarkCountyNV.gov

UPDATE #1 TO THE TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER (aka Lamb and Owens)

Project No. 1813080

March 2019

Prepared for:

Jesus Rivera
1315 Ringe Lane
Las Vegas NV 89110

Prepared by:



BLUE DIAMOND CIVIL ENGINEERING
452 E. Silverado Ranch Blvd., #186
Las Vegas NV 89183
(702) 287-8914

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Rivera Shopping Center Date: 3/6/19

Location of Development: a) Descriptive (Cross Streets) North/South: Lamb Boulevard
East/West: Owens Avenue

b) Section: 19 Township: T20S Range: R62E

c) APN : 140-19-803-006

Name of Owner: Jesus Rivera

Telephone No.: NA Fax No.: NA E-Mail Address: NA

Address: 1315 Ringe Lane, Las Vegas, NV 89110

Contact Person-Name: Philip D. Wakefield, P.E. Telephone No.: 702-287-8914

* E-Mail Address: pwakefield@bdce-lv.com Fax No.: _____

Firm: Blue Diamond Civil Engineering

Address: 452 E. Silverado Ranch Blvd, #186, Las Vegas, NV 89183

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: 2+/- Acres Being Developed/Disturbed: 2+/- Acres

2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No

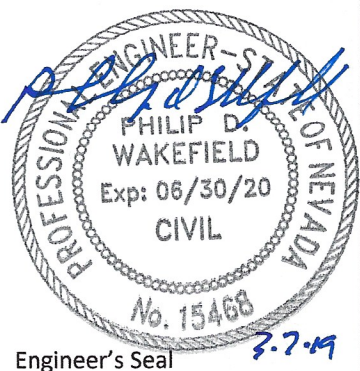
4. Proposed type of development (Residential, Commercial, Etc.): Commercial

5. Approximate upstream land area which drains to the subject site: Approximately 10 acres

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: The TDS for Lamb and Owens (PW08-28279)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The site is discharged to Owens Avenue.

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



Engineer's Seal

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

*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

Study Overview and Purpose

Blue Diamond Civil Engineering has prepared this drainage study as an update to the approved Technical Drainage Study for Lamb and Owens (PW08-28279). This study addresses any changes to the previously approved study. The original approved study has been reviewed and there are no changes to the offsite hydrology. The onsite improvements have changed in that the project includes revisions to the onsite layout.

Location

The project area is within the Southeast Quarter (SE 1/4) of Section 19, Township 20 South, Range 62 East, Mount Diablo Meridian, Clark County, Nevada. The site is located on the north side of Owens Avenue approximately 300 feet west of Lamb Boulevard (APN 140-19-803-006). See Figures 1 and 1A, *Vicinity Map* and *APN Map*.

Existing Site Description

The Riviera Shopping Center site is currently undeveloped and has natural desert vegetation. The site consists of approximately 2.14 acres in moderate hydrologic condition. The general area slopes to the southeast at approximately 0.5 percent. There is also a large drainage ditch along the north and west sides of the lot that feeds into an existing 24-inch storm drain. The properties adjacent to the site are generally a patchwork of residential or commercial developments. See Figure 2, *Site Description Map*.

FEMA Floodplain Information

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) Community-Panel Number 32003C2179F, effective date November 16, 2011, indicates the site is located within a FEMA Shaded Zone 'X'. A Shaded Zone 'X' is described by FEMA as areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1% annual chance flood. A map depicting the FEMA flood zones in the vicinity of the site is included in the appendix of this study. (Figure 3- FIRM Map)

CCRFC Master Plan Information

As shown on Figure F-25 from the *Flood Control Master Plan Update of the Las Vegas Valley* (see Figures 4 and 5 in the Appendix), prepared by Atkins, etc., the subject site is not adjacent to an existing or proposed Master Plan Flood Control Facility. Figure W-3 has also been provided (see Figure 6 in the appendix) and the site is a part of basin OA02.

Existing Drainage Description

The existing condition was analyzed in the approved Technical Drainage Study for Lamb and Owens (PW08-28279). The existing condition was not re-evaluated and information has been included in the appendix.

Future Drainage Description

The future condition was analyzed in the approved Technical Drainage Study for Lamb and Owens (PW08-28279). Offsite flows and basins impacting the site have not changed. Flows in Owens Avenue were determined to be 119 cfs and 475 cfs for the 10-year and 100-year condition, respectively (see concentration point CP3E in the reference material). Onsite basin EON1 from the reference material

generates 0 cfs and 2 cfs in the 10-year and 100-year condition, respectively. The flows were removed and were replaced with the proposed onsite basins. The onsite basin delineations have been based on the grading plan. Basins FUTON1, FUTON2, and FUTON3 encompasses the entire project and discharges into Owens Avenue. Flows and basins impacting the site are shown on the onsite basin map included in the appendix (see Figure 7). The following table shows a summary of the runoff amounts determined in the future condition:

**10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS**

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
FUTON1	0.66	1	2
FUTON2	0.49	1	2
FUTON3	0.98	2	3
COM1 *	--	123	480

*Include flows referenced from the TDS for Lamb and Owens

Offsite street flow calculations for the 10-year and 100-year, 6-hour storm events are summarized in the following tables:

OFFSITE STREET FLOW CALCULATIONS

STREET	Q₁₀/Q₁₀₀ (cfs)	D₁₀/D₁₀₀ (ft)	V₁₀/V₁₀₀ (ft/s)	V x D
Owens Ave (Section 1) COM1	123/480	0.95/1.46	3.28/5.45	3.12/7.96

Onsite street flow calculations for the 10-year and 100-year, 6-hour storm events are summarized in the following tables:

ONSITE STREET FLOW CALCULATIONS

STREET	Q₁₀/Q₁₀₀ (cfs)	D₁₀/D₁₀₀ (ft)	V₁₀/V₁₀₀ (ft/s)	V x D
Section 2 25% FUTON1	0/1	0.00/0.18	0.00/1.33	0.00/0.24
Section 3 FUTON1	1/2	0.24/0.27	1.10/1.29	0.26/0.35
Section 4 25 % FUTON3	1/1	0.13/0.13	1.07/1.07	0.14/0.14
Section 5 50% FUTON3	1/2	0.22/0.29	2.18/2.64	0.48/0.77

Conclusions

The street calculations show that the *CCRFCD Hydrologic Criteria & Drainage Design Manual* velocity/depth products criteria are met in the future. The velocity/depth products are below 6 and 8 for the 10- and 100-year storms, respectively. Owens Avenue is a 100-foot right of way and requires 12 feet of dry lane on both sides of the centerline of the street and beyond the center median. The dry lane is not met, however, this project does not significantly increase the flows in the street. All finished floor

elevations have been raised a minimum of twice the depth of flow up to 18 inches above the water surface elevation in the street along the frontage and the interior drive aisles. All finished floors have been set at least 18 inches above top of curb measured from the center of the structure.

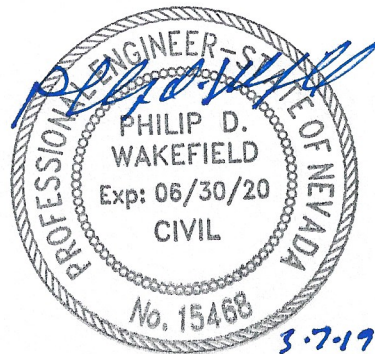
A stormdrain has been provided onsite to capture and convey flows impacting the site from the east and north. As determined in the approved Technical Drainage Study for Lamb and Owens (PW08-28279), the existing stormdrain in Owens Avenue does not have the capacity to accept the flows from the onsite stormdrain (see reference material). The flows will bubble out of the stormdrain and continue east in Owens Avenue along the frontage of the site. Hydraulic calculations have been provided in the appendix showing the capacities of the onsite stormdrain.

Onsite BMPs have been included for this proposed development. A landscape swale has been provided for the control of surface water quality and the velocities are mitigated by erosion protection for the 100-year condition (see calculations in the appendix). The 100-year flowrate was used and is conservative since it is considered to be more than what is required to be mitigated in the BMP design. The total mitigated impervious area within this project is more than 75%. The proposed design satisfies BMP requirements.

I trust this satisfies your concerns regarding this project. If there are any questions, or additional information necessary, please contact this office.

Sincerely,

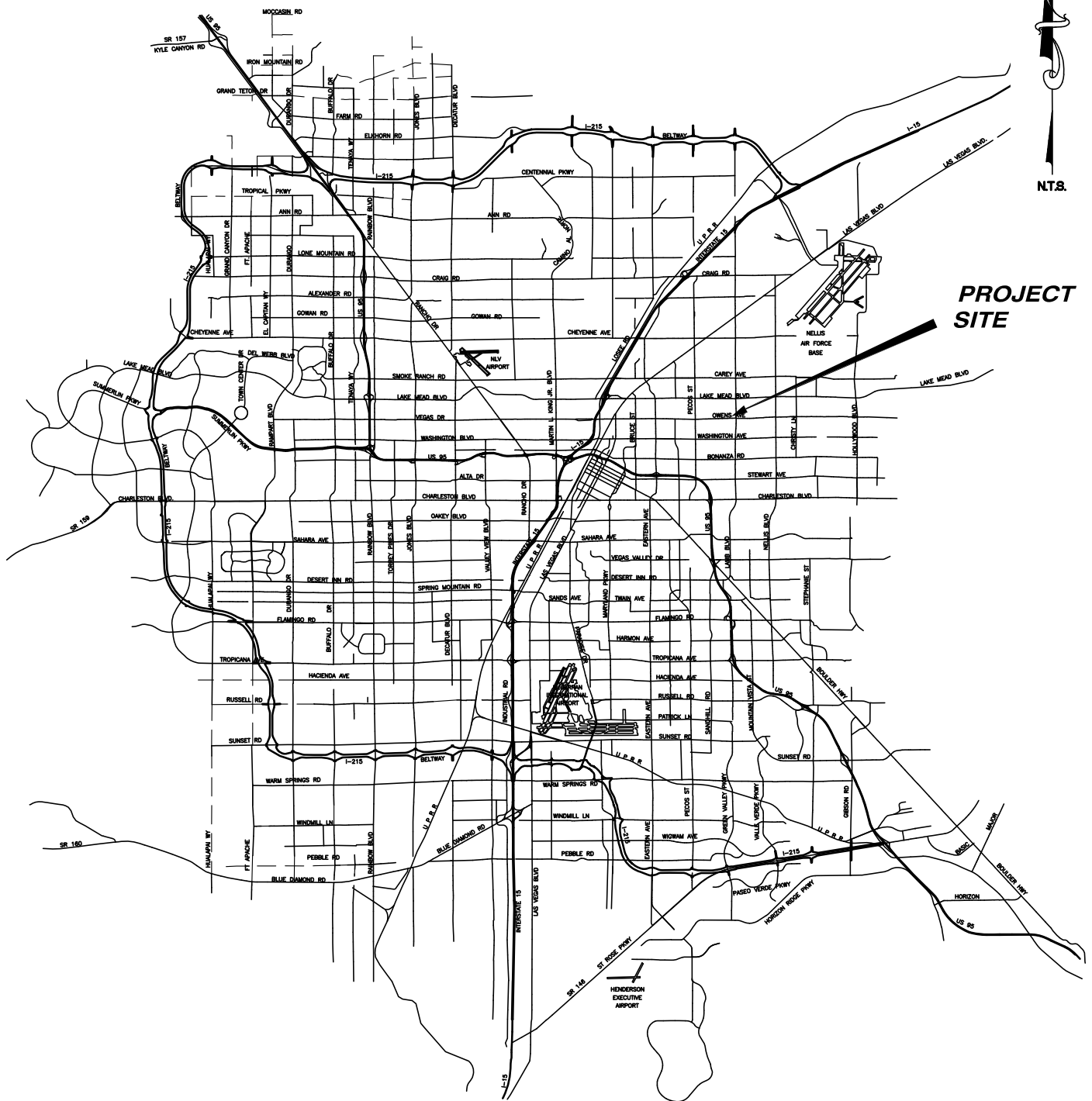
Blue Diamond Civil Engineering



Philip D. Wakefield, P.E.
Principal

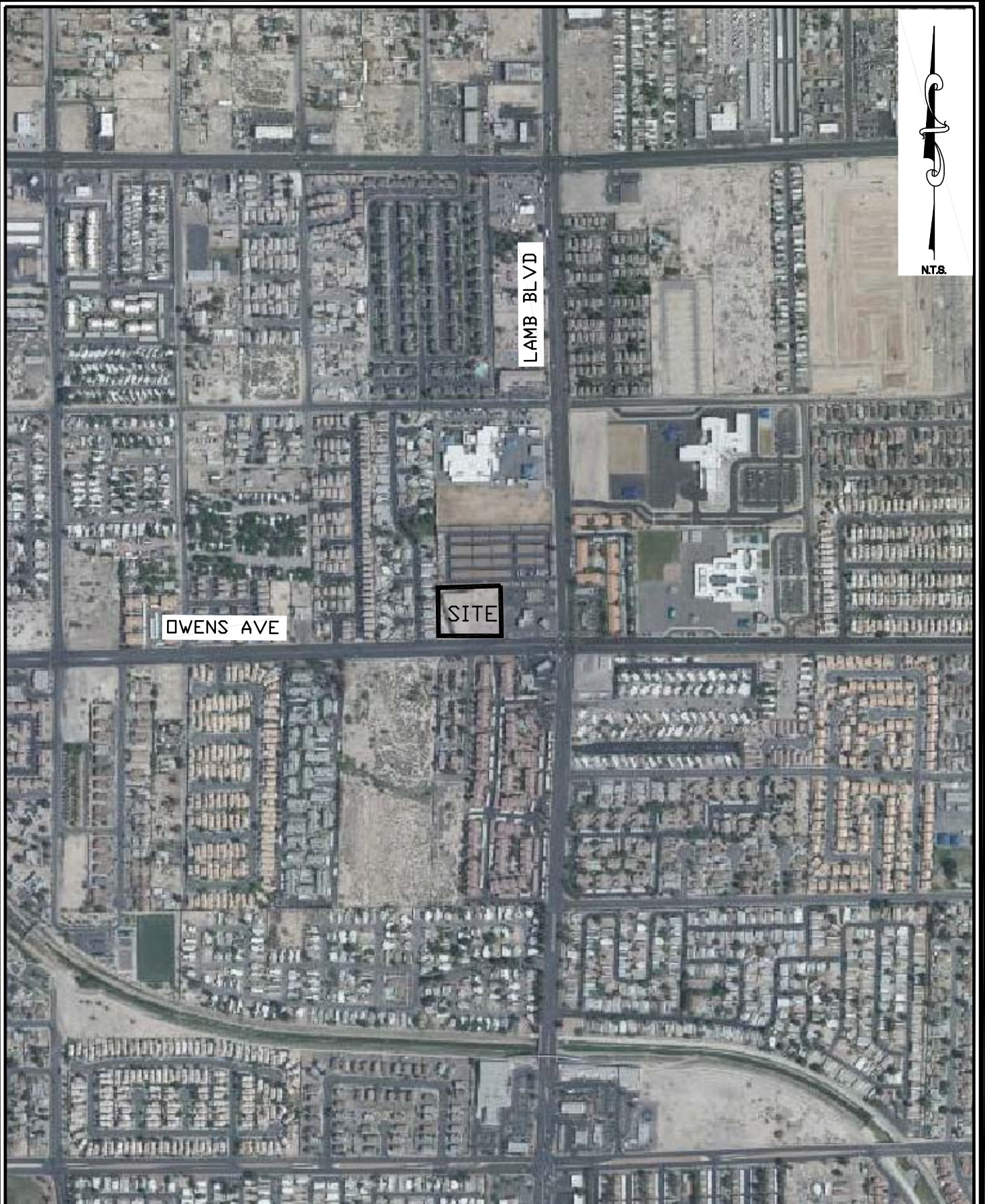
APPENDIX

Figures



BLUE DIAMOND CIVIL ENGINEERING
 452 E. SILVERADO RANCH BLVD., #186
 LAS VEGAS, NV 89183
 (702) 287-8914

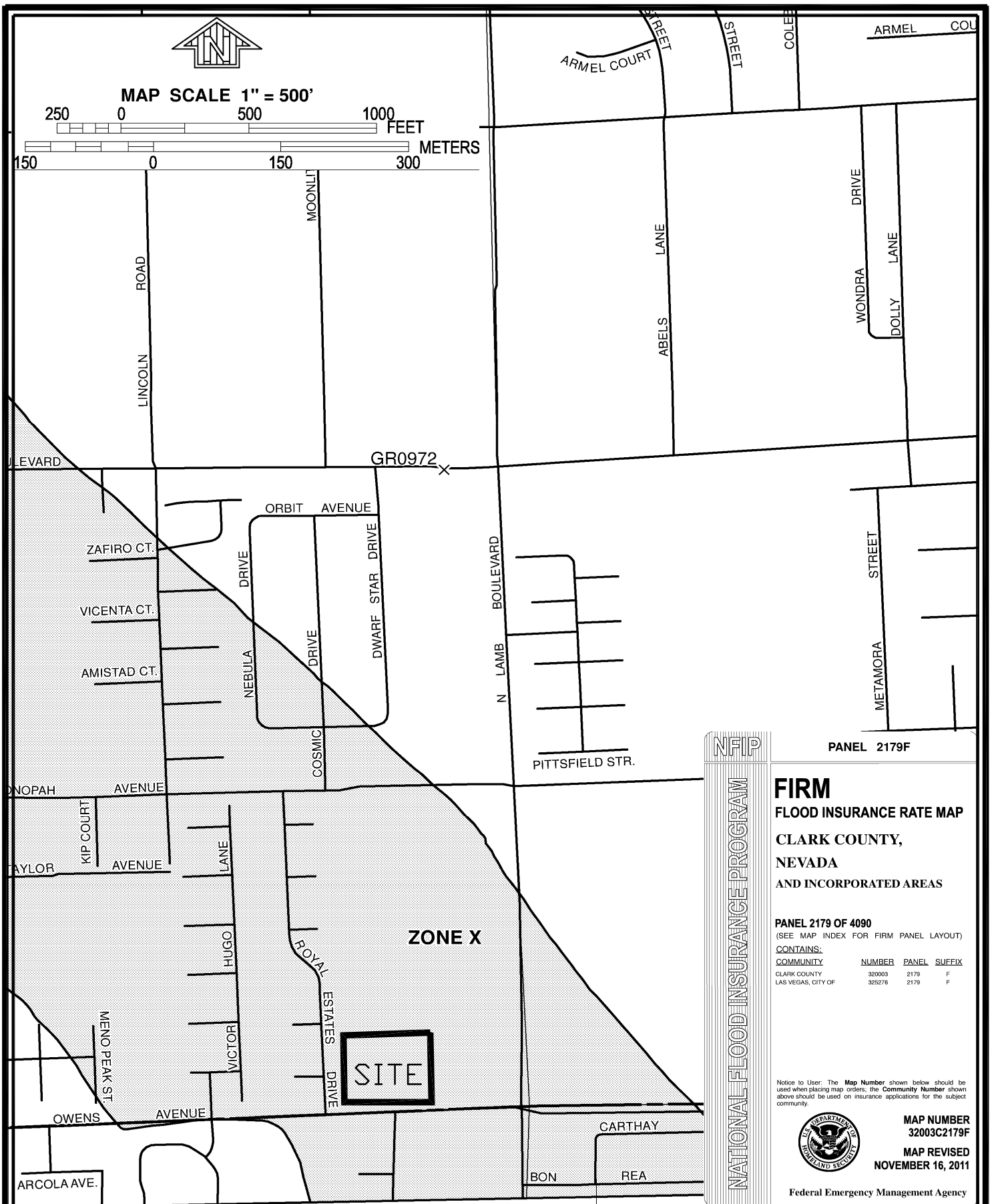
FIGURE 1
VICINITY MAP



BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH BLVD., #186
LAS VEGAS, NV 89183
(702) 287-8914

FIGURE 2

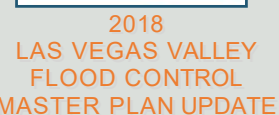
SITE DESCRIPTION MAP



BLUE DIAMOND CIVIL ENGINEERING
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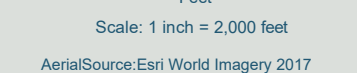
FIGURE 3

FIRM



LEGEND

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



ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CABZ 0010	E	CEDAR AVENUE - BONANZA 60" RCP	1450					0.30
LCCH 0013	E	LAS VEGAS CREEK CHANNEL 2: 12' X 6' RCB	2035	3050	CLC20-C	MEADOWS4	9.60	0.82
LV15		FREEWAY CHANNEL						
0000	E	CONC CHNL 20'W 10'D 1.5:1 SS (REPLACE W/ LV150001)	1759	5012	2CLV1E-3	CWEST4	11.19	0.12
0001	P0	CONC CHNL 55'W 11'D 0:1 SS (REPLACES LV150000)	1759	5012	2CLV1E-3	CWEST4	11.19	0.12
0035	E	CONC CHNL 20'W 10'D 1.5: SS	899	1404 [^]	2CLV1D-5 [^]	CWEST4	10.29	0.16
0050	E	2: 8' X 10' RCB	1504	1404 [^]	2CLV1D-5 [^]	CLVMD4	10.29	0.75
0051	E	12' X 10' RCB	2524	3275 [^]	2CLV1D-5 [^]	CLVMD4	10.29	5.20
0078	E	CONC CHNL 20'W 10'D 1.5:1 SS (REPLACE W/ LV150079)	1608	4679	2CLV1D-5	CWEST4	10.29	0.14
0079	P0	CONC CHNL 50'W 11'D 0:1 SS (REPLACES LV150078)	1608	4679	2CLV1D-5	CWEST4	10.29	0.14
0109	E	CONC CHNL 15:20'W 10'D 1.5:1 SS (REPLACE W/ LV150110)	1576	4353	CLV1D-4	CWEST4	9.49	0.11
0110	P0	CONC CHNL 45'W 11:5D 0:1 SS (REPLACES LV150109)	1576	4353	CLV1D-4	CWEST4	9.49	0.11
0139	E	CONC CHNL 15'W 10'D 1.5:1 SS (REPLACE W/ LV150140)	3665	4353	CLV1D-4	CWEST4	9.49	0.18
0140	P0	CONC CHNL 45'W 11'D 0:1 SS (REPLACES LV150139)	3665	4353	CLV1D-4	CWEST4	9.49	0.18
0206	E	CONC CHNL 48'W 13'D 0:1 SS	329	4081	OW1C2	NW4SC	8.92	0.46
0208	E	CONFLUENCE STRUCTURE 64' 48'W 10:13'D 0:1 SS	298	4081	OW1C2	NW4SC	8.92	0.42
0210	E	3: 12' X 9' RCB	725	3689	CCVG24	NW3SC	7.14	0.25
0223	E	CONFLUENCE STRUCTURE 40'W 9'D 0:1 S:1	185	3689	CCVG24	NW3SC	7.14	0.25
0230	E	12' X 4.5' RCB @ LAKE MEAD	177	1265	DRAILRD	NW3	5.30	1.16
0231	E	CONC CHNL 8'W 8'D 0:1 SS	900	1265	DRAILRD	NW3	5.30	2.50
0248	E	8' X 8' RCB @ UPRR	300	1265	DRAILRD	NW3	5.30	1.34
0255	E	CONC CHNL 8'W 8'D 0:1 SS	1330	1265	DRAILRD	NW3	5.30	2.00
0280	E	CONC CHNL 21'W 8'D 0:1 SS	550	2530	CCVG10	NW3	5.30	2.00
0284	E	14' X 6' RCB	1790	1444	CVG10-C	NW3	4.91	0.50
0316	E	11' X 6' RCB	3010	1152	CWA20-C	NW3	4.52	0.59
0372	E	8' X 6' RCB	1970	1152	CWA20-C	NW3	4.52	0.66
LVBR		LAS VEGAS - BROOK						
0000	E	96" CMPC @ UPRR	107	346 [^]	CLV1D-5 [^]	WEST3	0.80	0.35
0001	E	8' X 4' RCB @ UPRR	107	530 [^]	CLV1D-5 [^]	WEST3	0.80	0.93
0002	E	CONC CHNL 27'W 9'D 0:1 SS	125	876	CLV1D-5	WEST3	0.80	1.57
0005	E	CONC CHNL 18'W 4:75D 0:1 SS	367	876	CLV1D-5	WEST3	0.80	2.43
0011	E	2: 9' X 3' RCB @ LOSEE	135	876	CLV1D-5	WEST3	0.80	0.71
0013	E	CONC CHNL 12'W 4:5D 2:1 SS	750	876	CLV1D-5	WEST3	0.80	1.50
0014	E	12' X 4' RCB @ N. 5TH ST	100	876	CLV1D-5	WEST3	0.80	2.60
LVBZ		LAS VEGAS WASH - BONANZA						
0000	P	2: 12' X 7' RCB	1760	1753	CBN15-C	SW3	2.15	0.40
0025	P	2: 12' X 7' RCB	2700	1753	CBN15-C	SW3	2.15	0.40
0064	P	2: 12' X 7' RCB	2630	1603	CBN12-C	SW3	1.87	0.40
0114	P	2: 12' X 6' RCB	2740	1311	CBN10-C	SW3	1.54	0.40
0166	E	54" RCP (REPLACE W/ LVB20167)	930	1106	CBN09	SW3	1.29	0.45
0167	P0	10' X 9' RCB (REPLACES LVB20166)	930	1106	CBN09	SW3	1.29	0.45
0187	E	48" RCP (REPLACE W/ LVB20188)	1235	1106	CBN09	SW3	1.29	0.71
0188	P0	9' X 9' RCB (REPLACES LVB20187)	1235	1106	CBN09	SW3	1.29	0.71
0210	E	42" RCP (REPLACE W/ LVB20211)	704	1004	CBN08	SW3	1.05	1.37
0211	P0	8' X 8' RCB (REPLACES LVB20210)	704	1004	CBN08	SW3	1.05	1.37
0223	E	36" RCP (REPLACE W/ LVB20224)	2275	856	CBN03	SW3	0.84	0.72
0224	P0	8' X 8' RCB (REPLACES LVB20223)	2275	856	CBN03	SW3	0.84	0.72
LVCC		LAS VEGAS WASH CARTIER CHANNEL						
0000	P	CONC CHNL 12'W 9:5D 0:1 SS	1900	995	CLW1A-3	CCWEST3	1.00	0.40
0035	P	10' X 5' RCB	6750	417	A-C	WEST3	0.40	0.32
LVCL		LAS VEGAS WASH - COLTON						
0000	E	CONC CHNL 9'W 13'D 0:1 SS	102	1071	QLV1E-3	WEST3	0.90	0.63
0002	E	102" RCP	157	1071	QLV1E-3	WEST3	0.90	0.62
0005	E	9' X 8' RCB	1320	1071	QLV1E-3	WEST3	0.90	0.94
0030	E	7' X 6' RCB	2148	1071	QLV1E-3	WEST3	0.90	2.22
LVCS		LAS VEGAS WASH - COMMERCE STREET						
0000	E	12' X 5' RCB	290	1590	CVG24	NW3	5.78	1.64
0004	E	10' X 6' RCB	100	1590	CVG24	NW3	5.78	4.84
0015	E	10' X 8' RCB	1700	1590	CVG24	NW3	5.78	0.97
0050	E	CONC CHNL 10'W 8'D 0:1 SS	200	1265	DDCVG10	NW3	5.30	2.27

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVKC		LAS VEGAS WASH - KING CHARLES CHANNEL						
0000	E	CONC CHNL 35'W 10'D 0:1 SS	592	5518	CLV99B-7	CWEST5	14.74	0.40
0009	E	CONC CHNL 21:8'W 10'D 1.5:1 SS	3280	5518	CLV99B-7	CWEST5	14.74	0.40
LVLA		LAS VEGAS WASH - LAMB						
0000	P	2: 13' X 9' RCB	2200	2461	CLW03	WEST3	3.30	0.30
0041	P	13' X 11' RCB	2600	2320	COA02	WEST3	3.07	0.58
0090	P	13' X 11' RCB	2700	2047	CLW64-3	WEST3	2.65	0.44
0141	P	13' X 10' RCB	2650	1693	CLW64-2	WEST3	2.12	0.38
0191	P	12' X 9' RCB	2700	1452	CLW64-1	WEST3	1.61	0.56
LVLE		LAKE MEAD DRAIN TO LAS VEGAS WASH						
0000	P	12' X 6' RCB	2600	660	CLV1B-2	WEST3	0.78	0.40
0047	P	12' X 4' RCB	2400	458	LV1B-1	WEST3	0.49	0.50
LVLM		LAS VEGAS WASH - LAKE MEAD						
0000	E	43'X 68" HERCP (REPLACE W/ LVLMD0001)	847	1159	CLM20-C	NW3SC	1.36	4.60
0001	P0	12' X 4' RCB (REPLACES LVLMD0000)	847	1159	CLM20-C	NW3SC	1.36	4.60
0016	E	54" RCP (REPLACE W/ LVLMD0017)	965	1159	CLM20-C	NW3SC	1.36	4.38
0017	P0	12' X 4' RCB (REPLACES LVLMD0016)	965	1159	CLM20-C	NW3SC	1.36	4.38
0033	E	60" RCP (REPLACE W/ LVLMD0034)	1186	1159	CLM20-C	NW3SC	1.36	1.62
0034	P0	12' X 5' RCB (REPLACES LVLMD0033)	1186	1159	CLM20-C	NW3SC	1.36	1.62
0059	E	72" RCP (REPLACE W/ LVLMD0060)	5952	1159	CLM20-C	NW3SC	1.36	0.66
0060	P0	12' X 7' RCB (REPLACES LVLMD0059)	5952	1159	CLM20-C	NW3SC	1.36	0.66
LVLV		LAS VEGAS BLVD DRAIN						
0000	P	2: 10' X 8' RCB	2600	823	CLW075-4	WEST3	1.03	0.10
LVMD		LAS VEGAS WASH - MIDDLE						
1178	E	EARTH CHNL 30'W 18:20'D 2:1 SS (REPLACE W/ LVMD1179)	1500	13206	CLVW04-C	CLVWASH5	109.77	0.57
1179	P	CONC CHNL 60'W 9:5D 2:1 SS (REPLACES LVMD1178)	1500	13206	CLVW04-C	CLVWASH5	109.77	0.57
1208	E	BANK-STAB. CHNL 65'W 15D 2:1 SS (REPLACE W/ LVMD1209)	1420	13206	CLVW04-C	CLVWASH5	109.77	0.32
1209	P	CONC CHNL 60'W 11'D 2:1 SS (REPLACES LVMD1208)	1420	13206	CLVW04-C	CLVWASH5	109.77	0.32
1230	E	4 SPAN BRIDGE 162'W 13'D @ WASHINGTON	105	13172	CCLVW03	CLVWASH5	109.50	0.73
1232	E	BANK-STAB. CHNL 48'W 8'D 2:1 SS (REPLACE W/ LVMD1233)	1900	13172	CCLVW03	CLVWASH5	109.50	0.73
1233	P	CONC CHNL 90'W 8'D 0:1 SS (REPLACES LVMD1232)	1900	13172	CCLVW03	CLVWASH5	109.50	0.73
1271	E	4 SPAN BRIDGE 94'W 10:12'D 2:1 SS @ LAMB	120	12412	OCLVW01C	CLVWASH5	106.21	0.38
1272	E	EARTH CHNL 80'W 10'D 2:1 SS (REPLACE W/ LVMD1273)	2400	12412	OCLVW01C	CLVWASH5	106.21	0.38
1273	P	CONC CHNL 80'W 9'D 2:1 SS (REPLACES LVMD1272)	2400	12412	OCLVW01C	CLVWASH5	106.21	0.38
1230	E	GABION CHNL 100'W 10'D 2:1 SS (REPLACE W/ LVMD1321)	1950	9070	OCK-C1	CLVWASH5	103.98	0.38
1321	P	CONC CHNL 80'W 8:5D 2:1 SS (REPLACES LVMD1320)	1950	9070	OCK-C1	CLVWASH5	103.98	0.38
1354	E	5 SPAN BRIDGE 110'W 7:8D 2:1 SS @ OWENS	120	7810	2CLV1B-2	CLVWASH5	169.06	0.58
1355	E	GABION CHNL 100'W 10'D 2:1 SS	3122	7810	2CLV1B-2	CLVWASH5	169.06	0.58
1390	E	ENERGY DISSIPATOR	137	7692	CLW64-4	CLVWASH5	168.27	0.10
1400	E	CONC CHNL 90' W 12D 0:1	173	7692	CLW64-4	CLVWASH5	168.27	5.00
1421	E	2 SPAN BRIDGE 84'W 8'D @ LAKE MEAD	200	8906	CLW64-4	CCWEST5	80.53	0.60
1424	E	CONC CHNL 78'W 8:5D 0:1 SS	1615	8906	CLW64-4	CCWEST5	80.53	0.34
1444	E	CONC CHNL 84'W 8'D 0:1 SS	1450	8906	CLW64-4	CCWEST5	80.53	0.34
1482	E	1 SPAN BRIDGE 84'W 7'D @ CAREY	72	8906	CLW64-4	CCWEST5	80.53	1.00
1484	E	CONC CHNL 84'W 8:9D 0:1 SS	1880	8906	CLW64-4	CCWEST5	80.53	0.37
1522	E	CONC CHNL 90'W 10'D 0:1 SS	376	8866	2CLW1A-3	CCWEST5	80.16	0.53
1529	E	CONC CHNL 90'W 9:8D 0:1 SS	360	8866	2CLW1A-3	CCWEST5	80.16	0.53
1534	E	1 SPAN BRIDGE 72:5'W 7:5D @ LAS VEGAS BLVD	120	8742	CLW1A-4	CCWEST5	78.13	0.88
1536	E	CONC CHNL 70'W 8'D 0:1 SS	455	8742	CLW1A-4	CCWEST5	78.13	0.49
1543	E	CONFLUENCE STRUCTURE	393	8742	CLW1A-4	CCWEST5	78.13	1.44
1550	E	CONC CHNL 90'W 7:5:9D 0:1 SS	2150	8260	CHYPKOT	CCWEST5	77.19	0.45
1594	E	1 SPAN BRIDGE 90'W 5'D @ CHEYENNE	124	8260	CHYPKOT	CCWEST5	77.19	0.71
1595	E	CONC CHNL 90'W 7'D 0:1 SS	580	8260	CHYPKOT	CCWEST5	77.19	0.40
1606	E	TRANSITION STRUCTURE	144	8260	CHYPKOT	CCWEST5	77.19	0.40
1609	E	60' X 7:25' RCB WITH 2' CENTER PIER	221	8260	CHYPKOT	CCWEST5	77.19	0.40
1614	E	CONC CHNL 60'W 9:11'D 0:1 SS	703	13796	CHYPKIN	CCWEST5	77.19	0.15
1626	E	TRANSITION STRUCTURE	227	13796	CHYPKIN	CCWEST5	77.19	2.46
1643	E	64,000 CFS PMF SPILLWAY (REPLACE W/ LVMD1644)		64000	CHYPKIN	CCWEST5	77.19	
1644	P	MODIFY 64,000 CFS PMF SPILLWAY, RAISE BY 1' (REPL LVMD1643)		64000	CHYPKIN	CCWEST5	77.19	
1645	E	456 AC-FT CHEYENNE PEAKING BASIN		13796	CHYPKIN	CCWEST5	77.19	
1646	P	UPGRADE TO 590 AC-FT CHEYENNE PEAKING BASIN		13796	CHYPKIN	CCWEST5	77.19	
1647	E	CONC CHNL 120'D 10'W 0:1 SS	800	13796	CHYPKIN	CCWEST5	77.19	0.40

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMD		LAS VEGAS WASH - MIDDLE						
1648	E	3 SPAN BRIDGE 95W 8:10'D 2:1 SS @ CIVIC CENTER	120	13796	CHYPKIN	CCWEST5	77.19	0.70
1663	E	CONC CHNL 80'W 10'D 2:1 SS	700	13715	3C99B-7	CCWEST5	76.87	0.70
1664	E	3 SPAN BRIDGE 75W 10'D 2:1 SS @ I-15	120	13715	3C99B-7	CCWEST5	76.87	0.70
1665	E	TRANSITION STRUCTURE	200	8157	CLV99B-5	WEST5	48.36	0.36
1669	E	FREE SPAN BRIDGE 55W 12'D @ UPRR	40	8157	CLV99B-5	WEST5	48.36	0.36
1670	E	CONC CHNL 82'W 10'D 0:1 SS	370	8157	CLV99B-5	WEST5	48.36	1.69
1677	E	CONC CHNL 80'W 10'D 2:1 SS	119	8157	CLV99B-5	WEST5	48.36	0.37
1679	E	4 SPAN BRIDGE 100'W 12'D 2:1 SS @ LOSEE	120	8157	CLV99B-5	WEST5	48.36	0.37
LVNC		LAS VEGAS WASH - N CHANNEL						
0001	E	18' X 7' RCB	150	1059	CLW100	CWEST5	14.59	0.33
0004	E	CONC CHNL 18'W 8.5'D 0:1 SS	200	1059	CLW100	CWEST5	14.59	0.33
0007	E	DROP STRUCTURE 18'W 2.8'D 3:1 SS	200	1059	CLW100	CWEST5	14.59	0.70
0008	E	CONC CHNL 18'W 10'D 2:1 SS	1250	1059	CLW100	CWEST5	14.59	0.70
0037	E	2: 14' X 7'-6" CMAP @ CHEYENNE	120	1059	CLW100	CWEST5	14.59	0.70
0038	E	CONC CHNL 32'W 8.5'D 2:1 SS	363	1059	CLW100	CWEST5	14.59	0.30
0043	E	CONC CHNL 12'W 6.8'D 2:1 SS	1930	1059	CLW100	CWEST5	14.59	0.50
0079	E	TRANSITION CONC CHNL	350	1059	CLW100	CWEST5	14.59	1.00
0090	E	3: 12' X 6' RCB	120	1059	CLW100	CWEST5	14.59	0.70
0091	E	14' X 6' RCAP	1324	1059	CLW100	CWEST5	14.59	0.52
LVOE		OWENS AVENUE - EAST						
0000	P	15' X 12' RCB	4700	3018	OK-C1	SW5	24.06	0.47
0085	P	14' X 12' RCB	2540	2908	CG	SW5	23.74	0.62
0134	P	12' X 11' RCB	5380	2833	CE-C	SW5	23.51	1.00
0236	P	13' X 9' RCB	5000	2643	CH-C	SW5	22.90	1.50
0331	P	13' X 12' RCB	1940	2576	DLV0E	SW5	22.61	0.60
0345	P	13' X 12' RCB	990	2576	DLV0E	SW5	22.61	0.60
LVOW		OWENS AVENUE SYSTEM						
0000	E	10' X 6' RCB	145	1219	CLM16B-C	NW3	2.43	0.76
0003	E	96" RCP	7500	1219	CLM16B-C	NW3	2.43	0.70
LVSR		LAS VEGAS WASH - SMOKE RANCH						
0000	E	CONC CHNL 22'W 8'D 0:1 SS	79	1086	CS1-C	NW3SC	1.42	2.32
0001	E	FREE SPAN BRIDGE 22'W 10'D	50	1086	CS1-C	NW3SC	1.42	2.32
0002	E	CONC CHNL 22'W 8'D 0:1 SS	468	1086	CS1-C	NW3SC	1.42	2.32
0009	E	72" RCP (REPLACE W/ LVSR0010)	702	1086	CS1-C	NW3SC	1.42	2.32
0010	P	10' X 5' RCB (REPLACES LVSR0009)	702	1086	CS1-C	NW3SC	1.42	2.32
0020	E	80" RCP (REPLACE W/ LVSR0021)	1320	1086	CS1-C	NW3SC	1.42	3.03
0021	P	10' X 5' RCB (REPLACES LVSR0020)	1320	1086	CS1-C	NW3SC	1.42	3.03
0045	E	54" RCP (REPLACE W/ LVSR0046)	1180	1086	CS1-C	NW3SC	1.42	3.41
0046	P	10' X 5' RCB (REPLACES LVSR0045)	1180	1086	CS1-C	NW3SC	1.42	3.41
0070	E	66" RCP (REPLACE W/ LVSR0071)	4118	1086	CS1-C	NW3SC	1.42	0.73
0071	P	10' X 6' RCB (REPLACES LVSR0070)	4118	1086	CS1-C	NW3SC	1.42	0.73
LVWH		WASHINGTON AVENUE CHANNEL						
0086	E	3: 12' X 6' RCB	1210	3825	CLW01-C	SW5SC	16.58	0.35
0087	E	3: 12' X 6' RCB	1560	3825	CLW01-C	SW5SC	16.58	0.33
0136	E	3: 12' X 6' RCB	2063	3728	CQ-C	SW5SC	16.35	0.33
0155	E	3: 10' X 6' RCB	3630	3618	CP-C	SW5SC	16.09	0.68
0234	E	2: 12' X 6' RCB	600	3502	CN-C	SW5SC	15.78	0.71
0240	E	2: 12' X 6' RCB	3240	3502	CN-C	SW5SC	15.78	1.50
0305	E	12' X 6' RCB	2950	1562"	CV1-C ¹	SW5SC	14.95	2.93
0361	E	12' X 6' RCB	548	1562"	CV1-C ¹	SW5SC	14.95	0.90
0371	E	12' X 6' RCB	590	1562"	CV1-C ¹	SW5SC	14.95	2.62
0382	E	CONC CHNL 50'W 10'D 0:1 SS	260	3124	CV1-C	SW5SC	14.95	0.80
0387	E	12' X 6' RCB	125	1562"	CV1-C ¹	SW5SC	14.95	7.43
0389	E	12' X 6' RCB	2110	1562"	CV1-C ¹	SW5SC	14.95	0.90
0426	E	16' X 6' RCB	150	1562"	CV1-C ¹	SW5SC	14.95	1.08
0429	E	SPLITTER STRUCTURE (2: 12' X 6' RCB)	190	2870	DQLC21	SW5	22.61	1.90
0431	E	3: 14.33' X 10' RCB	665	2870	DQLC21	SW5	22.61	0.15
0446	E	JUNCTION STRUCTURE	69	2870	DQLC21	SW5	22.61	0.15
0447	E	3: 14.33' X 10' RCB	1955	5193	CCAL93	SW5	22.05	0.15
RWSL		RANGE WASH - SLOAN						
0694	E	CONC CHNL 10'W 8'D 1.5:1 SS	1500	1688	C47C4	RW3SC	2.40	0.56

2018 Las Vegas Valley Master Plan Update

Figure W-3
Lower Northern Las Vegas Wash Watershed

Legend

- Flow Arrows
- Concentration Points
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- Subbasins
- 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

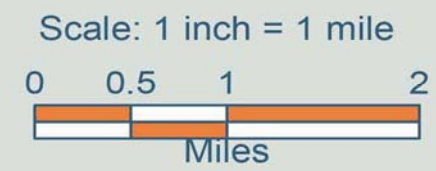
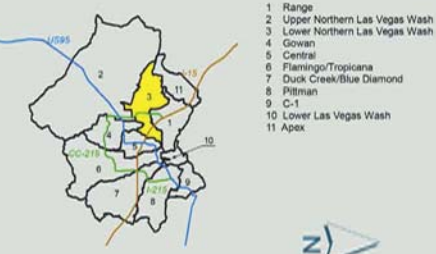
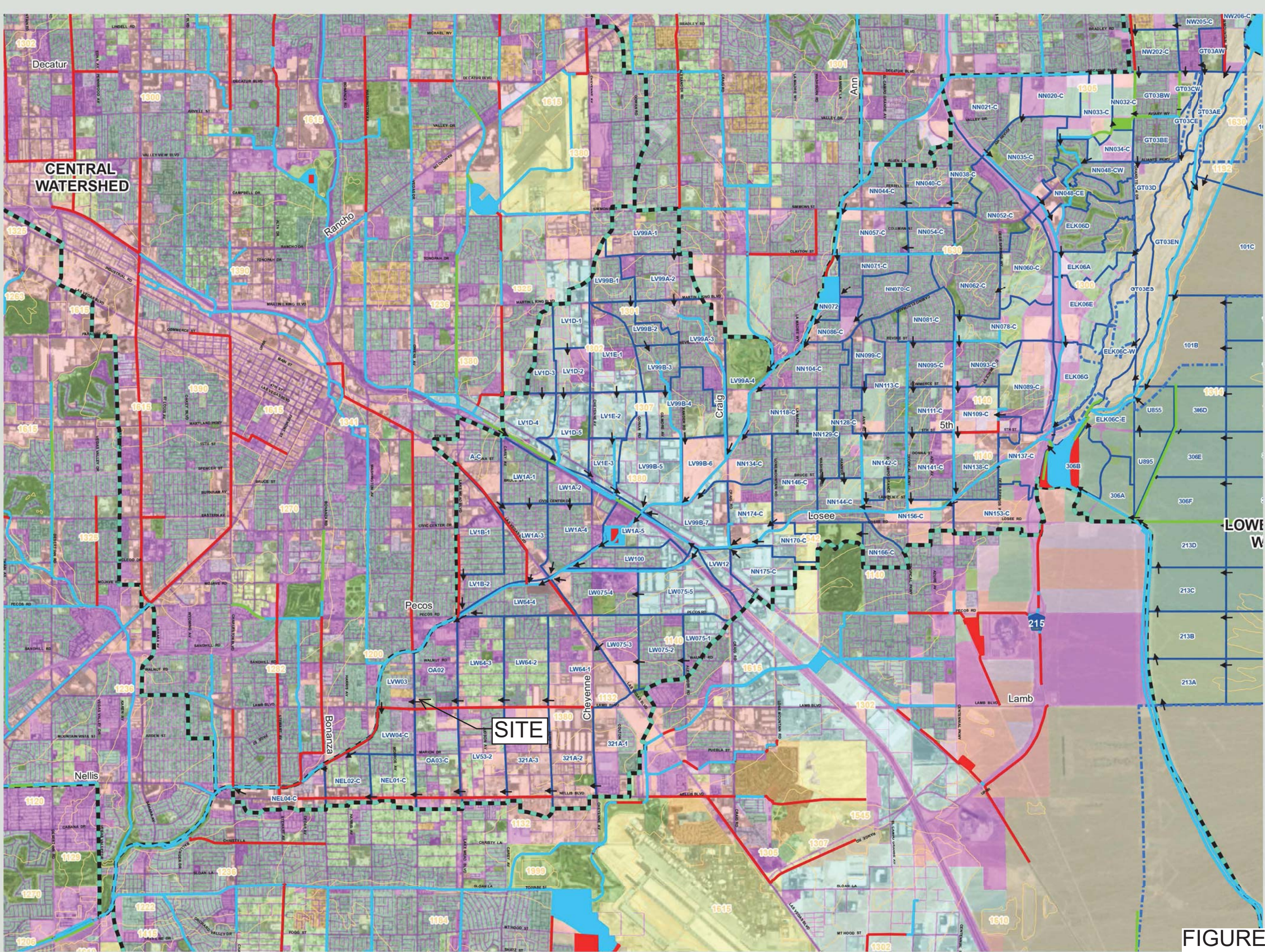
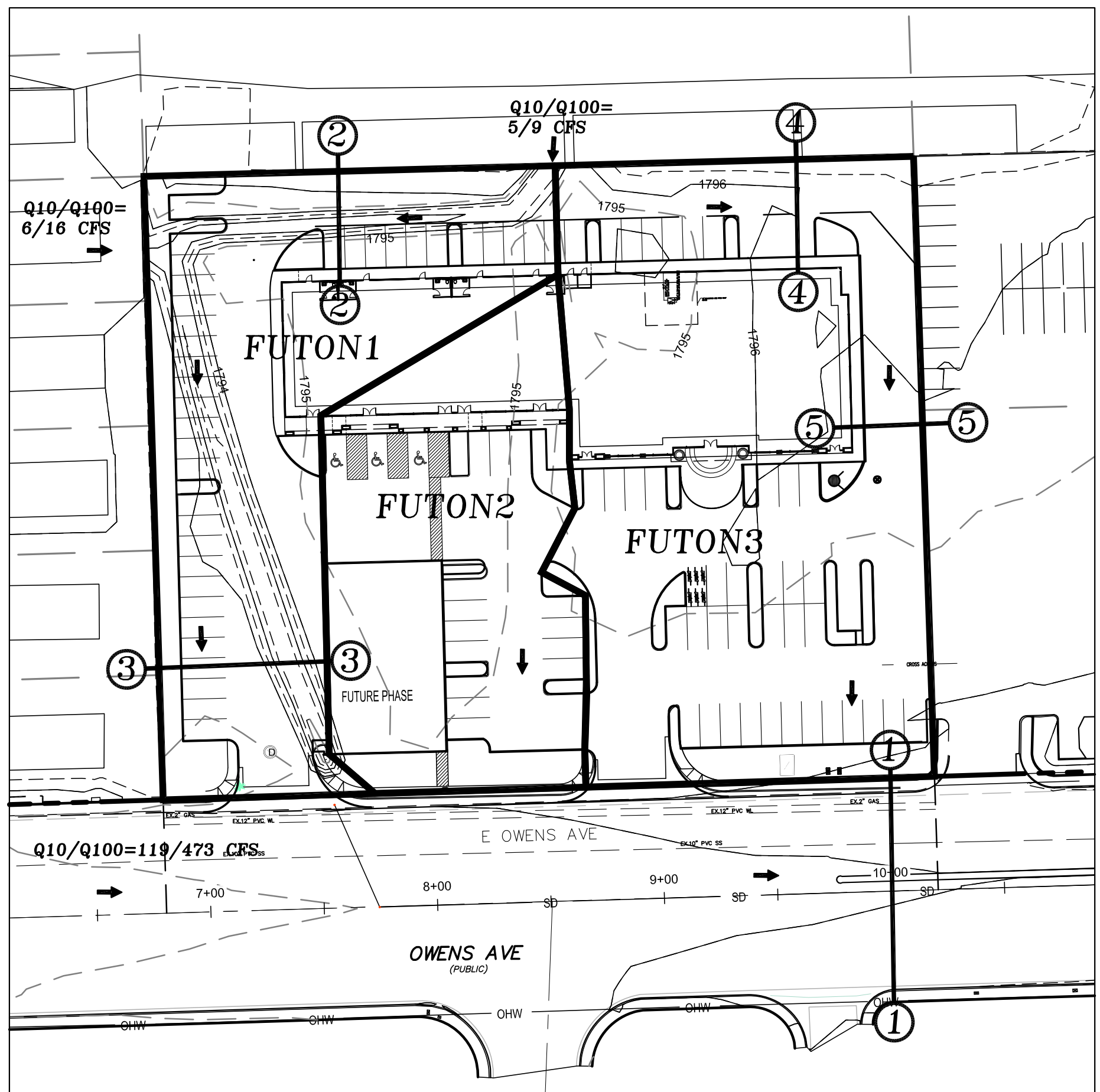


FIGURE 6





LEGEND

DEV1

- BASIN NAME
- CONCENTRATION POINT
- FLOW DIRECTION
- BASIN BOUNDARY
- 7 — HYDRAULIC SECTION

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.

10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
FUTON1	0.66	1	2
FUTON2	0.49	1	2
FUTON3	0.98	2	3
COM1*	--	123	480

*Include flows referenced from the TDS for Lamb and Owens

OFFSITE STREET FLOW CALCULATIONS

STREET	Q ₁₀ /Q ₁₀₀ (cfs)	D ₁₀ /D ₁₀₀ (ft)	V ₁₀ /V ₁₀₀ (ft/s)	V x D
Owens Ave (Section 1) COM1	123/480	0.95/1.46	3.28/5.45	3.12/7.96

ONSITE STREET FLOW CALCULATIONS

STREET	Q ₁₀ /Q ₁₀₀ (cfs)	D ₁₀ /D ₁₀₀ (ft)	V ₁₀ /V ₁₀₀ (ft/s)	V x D
Section 2 25% FUTON1	0/1	0.00/0.18	0.00/1.33	0.00/0.24
Section 3 FUTON1	1/2	0.24/0.27	1.10/1.29	0.26/0.35
Section 4 25 % FUTON3	1/1	0.13/0.13	1.07/1.07	0.14/0.14
Section 5 50% FUTON3	1/2	0.22/0.29	2.18/2.64	0.48/0.77

FIGURE 7

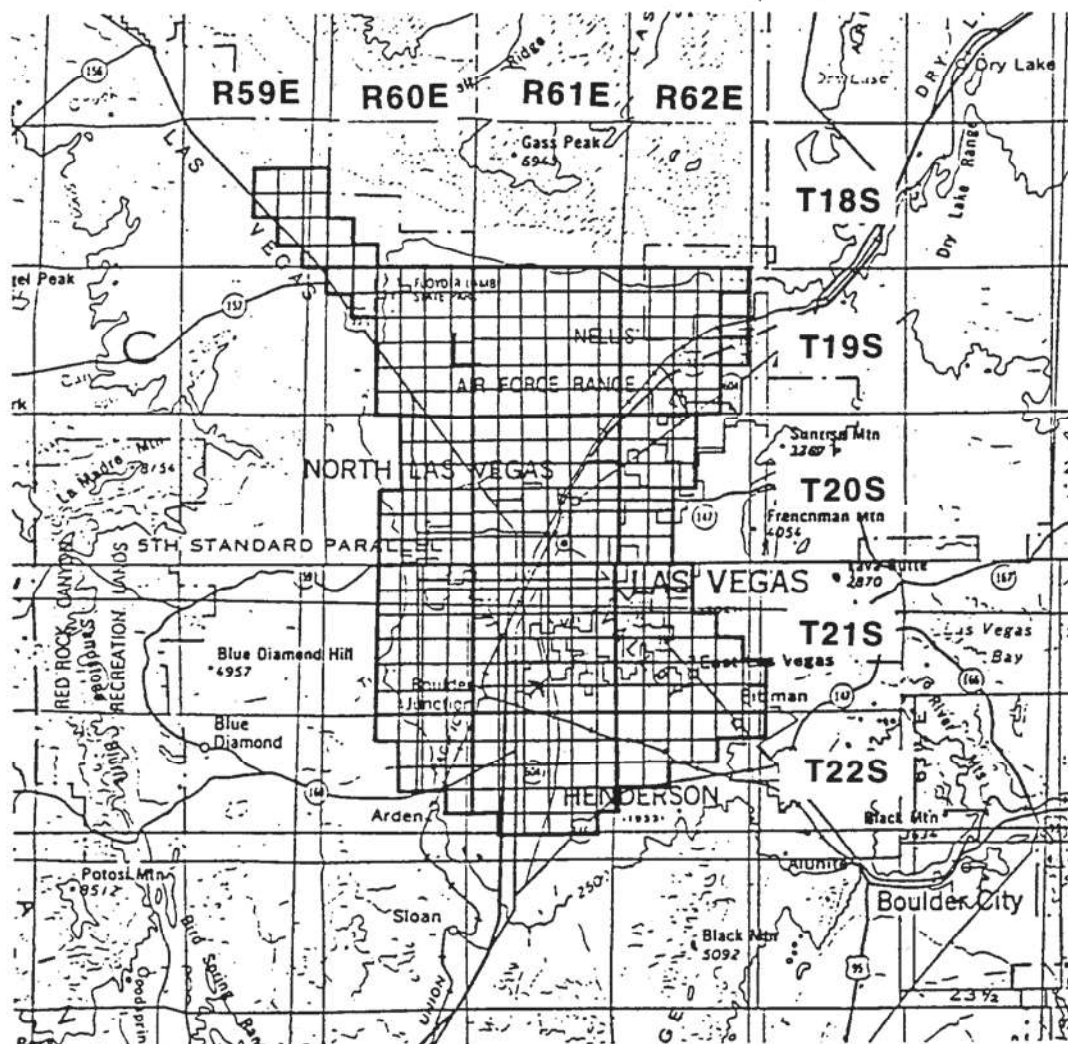
DEVELOPED ONSITE
BASIN MAP

BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH BLVD, #186
LAS VEGAS, NV 89183
(702) 287-8914

Hydrologic Parameters

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

SIX HOUR DEPTH-AREA REDUCTION FACTORS

<u>Drainage Area</u> <u>(Square Miles)</u>	<u>Six-Hour Depth-Area</u> <u>Reduction Factor</u>
---	---

0.0	1.00
0.5	0.98
1.0	0.97
2.0	0.93
4.0	0.91
6.0	0.90
8.0	0.88
10.0	0.86
20.0	0.79
30.0	0.74
50.0	0.68
100.0	0.60
150.0	0.55
200.0	0.51
300.0	0.46
400.0	0.42
500.0	0.39

NOTES: 1. A graphical representation of these factors is presented in Figure 514.

2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

Revision	Date

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA (IN INCHES)

TIME	RECURRENCE INTERVAL					
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5 min.	0.15	0.27	0.35	0.46	0.54	0.63
10 min.	0.25	0.44	0.57	0.74	0.89	1.02
15 min.	0.33	0.57	0.74	0.97	1.15	1.32
30 min.	0.44	0.78	1.01	1.31	1.55	1.79
1 hour	0.52	0.89	1.15	1.50	1.78	2.06
2 hour	0.59	1.01	1.30	1.70	2.01	2.30
3 hour	0.64	1.08	1.39	1.82	2.15	2.48
6 hour	0.72	1.22	1.58	2.05	2.41	2.77
24 hour (TR-55)	1.20	1.60	1.80	2.40	2.70	2.96

- NOTE: 1. Refer to Figure 513 for a description and drawing of the area included in the McCarran Airport Rainfall Area.
2. The 24 hour values presented above are for use with TR-55 only.
3. Table 501 adjustments not required.

Revision	Date

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.

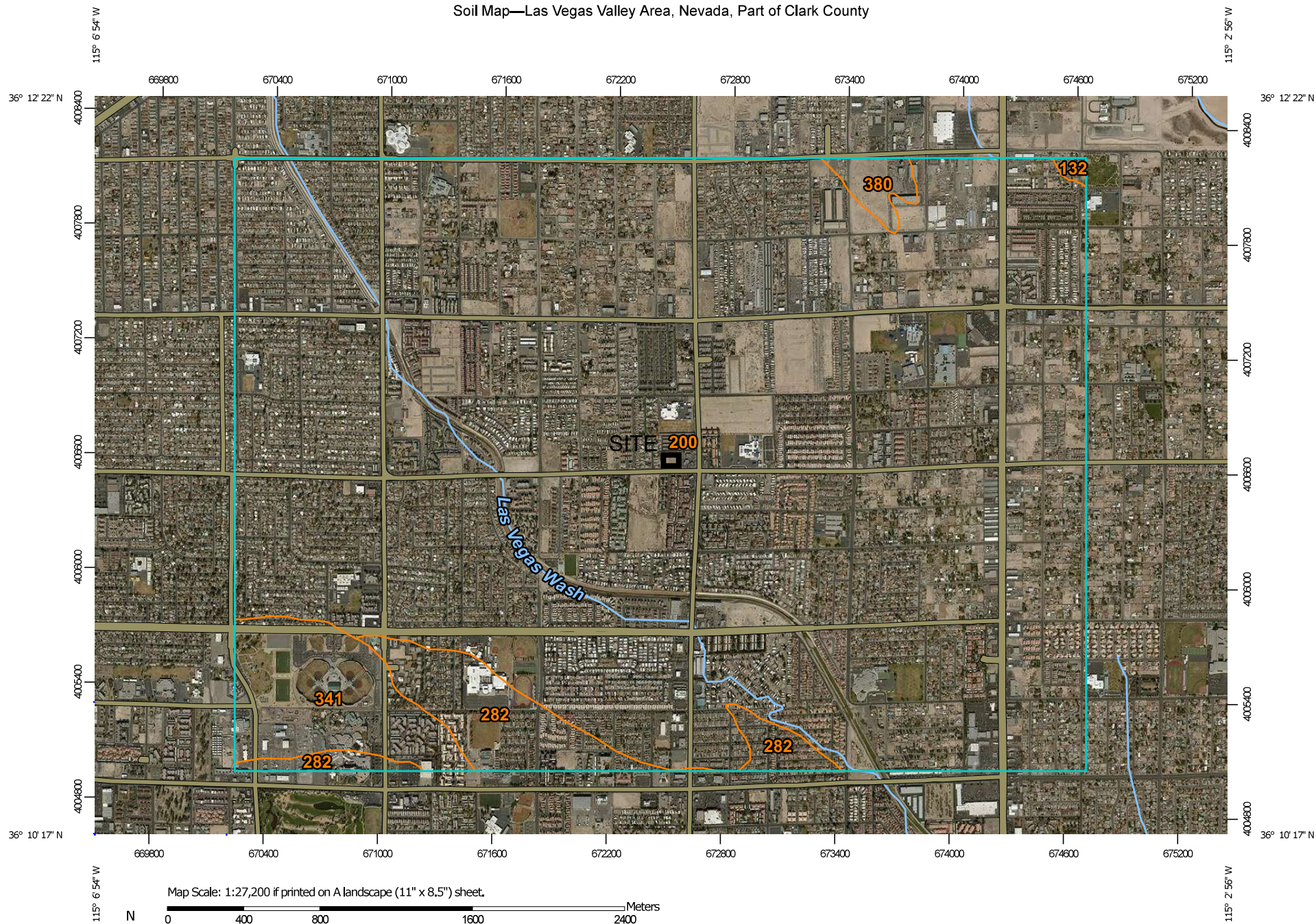
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

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

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



Map Scale: 1:27,200 if printed on A landscape (11" x 8.5") sheet.

0 400 800 1600 2400 Meters

0 1000 2000 4000 6000 Feet

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



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/7/2019
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.

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

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

Survey Area Data: Version 13, Sep 14, 2018

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

Date(s) aerial images were photographed: Sep 26, 2013—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
132	Bracken very gravelly fine sandy loam, 2 to 8 percent slopes	4.4	0.1%
200	Glencarb silt loam	3,203.9	90.2%
282	Land silty clay loam	154.0	4.3%
341	Paradise silt loam	162.7	4.6%
380	Skyhaven very fine sandy loam, 0 to 4 percent slopes	26.0	0.7%
Totals for Area of Interest		3,550.9	100.0%

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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

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

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

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

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—Las Vegas Valley Area, Nevada, Part of Clark County														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
132—Bracken very gravelly fine sandy loam, 2 to 8 percent slopes														
Bracken	100	A	0-5	Very gravelly fine sandy loam	GM	A-1	0- 0- 0	0- 3- 5	30-40-50	25-35-45	20-30-40	10-18-25	0-7 -14	NP
			5-50	Gypsiferous material	GP	A-1	—	—	—	—	—	—	—	—
			50-60	Weathered bedrock	—	—	—	—	—	—	—	—	—	—
200—Glencarb silt loam														
Glencarb	100	C	0-6	Silt loam	CL-ML, ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-95-100	70-80-90	20-25-30	NP-5-10
			6-60	Stratified very fine sandy loam to silty clay loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	75-80-85	25-30-35	5-10-15
282—Land silty clay loam														
Land	100	C	0-2	Silty clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	35-40-45	15-18-20
			2-64	Stratified silt loam to silty clay	CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	25-33-40	10-15-20

Engineering Properties—Las Vegas Valley Area, Nevada, Part of Clark County														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
341—Paradise silt loam														
Paradise	100	B	0-10	Silt loam	CL-ML, ML, CL	A-4	0- 0- 0	0- 0- 0	95-98-100	95-98-100	85-93-100	65-75-85	25-30-35	5-8 -10
			10-39	Sandy loam, loam, silt loam	ML, SM	A-4	0- 0- 0	0- 0- 0	85-93-100	85-93-100	65-78-90	45-58-70	20-23-25	NP-3 -5
			39-61	Silt loam	CL-ML, ML, CL	A-4	0- 0- 0	0- 0- 0	85-93-100	85-93-100	75-85-95	60-73-85	25-30-35	5-8 -10
380—Skyhaven very fine sandy loam, 0 to 4 percent slopes														
Skyhaven	100	C	0-1	Very fine sandy loam	ML, SM	A-4	0- 0- 0	0- 0- 0	80-90-100	75-88-100	70-83-95	40-55-70	15-20-25	NP-3 -5
			1-8	Clay loam	CL	A-6	0- 0- 0	0- 0- 0	80-90-100	75-88-100	70-83-95	55-68-80	35-38-40	15-18-20
			8-37	Gravelly silty clay loam, gravelly loam, gravelly clay loam	CL, GC	A-6	0- 0- 0	0- 3- 5	60-70-80	50-63-75	45-58-70	35-50-65	30-35-40	10-15-20
			37-41	Indurated	—	—	—	—	—	—	—	—	—	—

Data Source Information

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

Survey Area Data: Version 13, Sep 14, 2018



SOIL TYPE CALCULATED CURVE NUMBER

Soil Type #200 – (Commercial)

Soil	Percent(%)	Soil Type	CN
Glencarb	100	C	94

CN = 94.0

Future Hec-1 Model


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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 05MAR19 TIME 03:34:48 *
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*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

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

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1 ID
2 ID TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER
3 ID CLARK COUNTY, NEVADA
4 ID
5 ID PREPARED FOR:
6 ID
7 ID PREPARED BY:
8 ID BLUE DIAMOND CIVIL ENGINEERING
9 ID 452 E. SILVERADO RANCH, # 186
10 ID LAS VEGAS, NV 89183
11 ID
12 ID
13 ID FUTURE 100- & 10-YEAR
14 ID FILENAME:RSC-FUTA.DAT
15 ID JOB#1813080
16 ID
17 ID
18 ID
19 *DIAGRAM
20 IT 5 0 0 300
21 IO 5
22 IN 5
23 JR PREC 1.00 0.57
24 *
25 KK FUTON1
26 KM FUTURE ONSITE BASIN FUTON1
27 BA 0.0010
28 PB 2.77
29 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
30 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
31 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
32 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
33 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
34 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
35 PC .982 .985 .987 .989 .990 .993 .994 .995 .998
36 PC .998 .999 1.00
37 LS 0 94.0
38 UD 0.050
39 *
40 KK FUTON2
41 KM FUTURE ONSITE BASIN FUTON2
42 BA 0.0008
43 LS 0 94.0
44 UD 0.050
45 *
46 KK FUTON3
47 KM FUTURE ONSITE BASIN FUTON3
48 BA 0.0015
49 LS 0 94.0
50 UD 0.050
51 *

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1 HEC-1 INPUT PAGE 2

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

```

47      KK      COM1
48      KM      COMBINE FUTON1, FUTON2, AND FUTON3
49      HC      3
          *
50      ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE    (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.     (.) CONNECTOR    (<---) RETURN OF DIVERTED OR PUMPED FLOW
23      FUTON1
      .
      .
37      .      FUTON2
      .
      .
42      .      .      FUTON3
      .      .
      .      .
47      COM1.....

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*      FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*      JUN 1998 *
*      VERSION 4.1 *
* RUN DATE 05MAR19 TIME 03:34:48 *
* *****

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```

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

```

TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER CLARK COUNTY, NEVADA

PREPARED FOR:

PREPARED BY: BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH, # 186
LAS VEGAS, NV 89183

FUTURE 100- & 10-YEAR
FILENAME:RSC-FUTA.DAT
JOB#1813080

```

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

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

          COMPUTATION INTERVAL .08 HOURS
          TOTAL TIME BASE 24.92 HOURS

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

JP         MULTI-PLAN OPTION
          NPLAN      1 NUMBER OF PLANS

JR         MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          1.00      .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	RATIO 2
				1.00	.57
HYDROGRAPH AT					
+	FUTON1	.00	1 FLOW	2.	1.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	FUTON2	.00	1 FLOW	2.	1.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	FUTON3	.00	1 FLOW	3.	2.
			TIME	3.50	3.50
3 COMBINED AT					
+	COM1	.00	1 FLOW	7.	4.
			TIME	3.50	3.50

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

Hydraulic Calculations

Worksheet for 10 Yr Owens Ave (Section 1)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 ft/ft
Discharge 123.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+93.00, 0.13)	0.016
(0+93.00, 0.13)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for 10 Yr Owens Ave (Section 1)

Results

Normal Depth		0.95	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		37.49	ft ²
Wetted Perimeter		93.76	ft
Hydraulic Radius		0.40	ft
Top Width		91.96	ft
Normal Depth		0.95	ft
Critical Depth		0.92	ft
Critical Slope		0.00494	ft/ft
Velocity		3.28	ft/s
Velocity Head		0.17	ft
Specific Energy		1.12	ft
Froude Number		0.91	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.95	ft
Critical Depth	0.92	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00494	ft/ft

Cross Section for 10 Yr Owens Ave (Section 1)

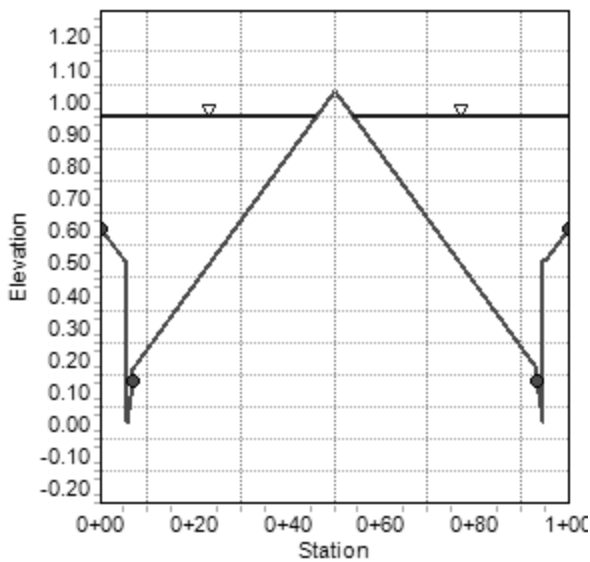
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	0.95	ft
Discharge	123.00	ft ³ /s

Cross Section Image



Worksheet for 100 Yr Owens Ave (Section 1)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 ft/ft
Discharge 480.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+93.00, 0.13)	0.016
(0+93.00, 0.13)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for 100 Yr Owens Ave (Section 1)

Results

Normal Depth		1.46	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		88.08	ft ²
Wetted Perimeter		102.83	ft
Hydraulic Radius		0.86	ft
Top Width		100.00	ft
Normal Depth		1.46	ft
Critical Depth		1.47	ft
Critical Slope		0.00380	ft/ft
Velocity		5.45	ft/s
Velocity Head		0.46	ft
Specific Energy		1.92	ft
Froude Number		1.02	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.46	ft
Critical Depth	1.47	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00380	ft/ft

Cross Section for 100 Yr Owens Ave (Section 1)

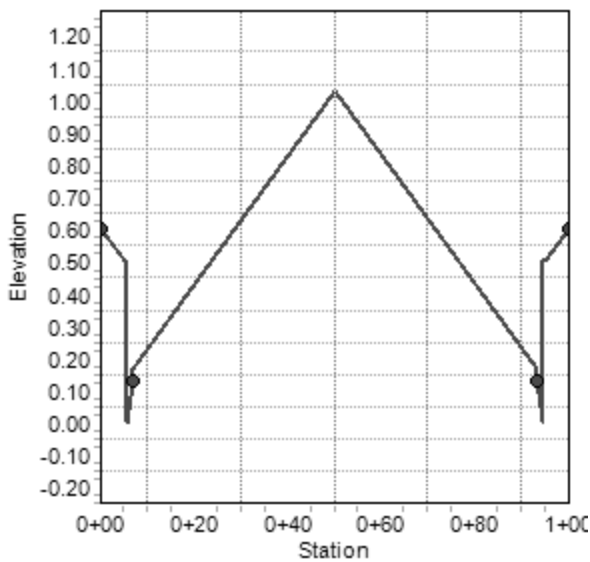
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	1.46	ft
Discharge	480.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)	Elevation (ft)
100	100.00
200	100.00
300	100.00
400	100.00
500	100.00
600	100.00
700	100.00
800	100.00
900	100.00
1000	100.00
1100	100.00
1200	100.00
1300	100.00
1400	100.00
1500	100.00
1600	100.00
1700	100.00
1800	100.00
1900	100.00
2000	100.00
2100	100.00
2200	100.00
2300	100.00
2400	100.00
2500	100.00
2600	100.00
2700	100.00
2800	100.00
2900	100.00
3000	100.00
3100	100.00
3200	100.00
3300	100.00
3400	100.00
3500	100.00
3600	100.00
3700	100.00
3800	100.00
3900	100.00
4000	100.00
4100	100.00
4200	100.00
4300	100.00
4400	100.00
4500	100.00
4600	100.00
4700	100.00
4800	100.00
4900	100.00
5000	100.00
5100	100.00
5200	100.00
5300	100.00
5400	100.00
5500	100.00
5600	100.00
5700	100.00
5800	100.00
5900	100.00
6000	100.00
6100	100.00
6200	100.00
6300	100.00
6400	100.00
6500	100.00
6600	100.00
6700	100.00
6800	100.00
6900	100.00
7000	100.00
7100	100.00
7200	100.00
7300	100.00
7400	100.00
7500	100.00
7600	100.00
7700	100.00
7800	100.00
7900	100.00
8000	100.00
8100	100.00
8200	100.00
8300	100.00
8400	100.00
8500	100.00
8600	100.00
8700	100.00
8800	100.00
8900	100.00
9000	100.00
9100	100.00
9200	100.00
9300	100.00
9400	100.00
9500	100.00
9600	100.00
9700	100.00
9800	100.00
9900	100.00
10000	100.00

Roughness Segment Definitions

Options

Results

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

Worksheet for 100 Yr Section 2

Results

Velocity Head	0.03	ft
Specific Energy	0.21	ft
Froude Number	0.78	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.18	ft
Critical Depth	0.16	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00860	ft/ft

Cross Section for 100 Yr Section 2

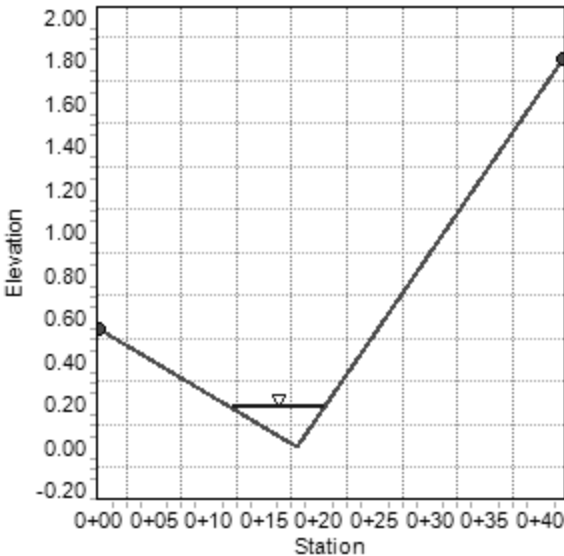
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.18	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Worksheet for 10 Yr Section 3

Results

Critical Depth	0.24	ft
Critical Slope	0.01039	ft/ft
Velocity	1.10	ft/s
Velocity Head	0.02	ft
Specific Energy	0.26	ft
Froude Number	0.90	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.24	ft
Channel Slope	0.00850	ft/ft
Critical Slope	0.01039	ft/ft

Cross Section for 10 Yr Section 3

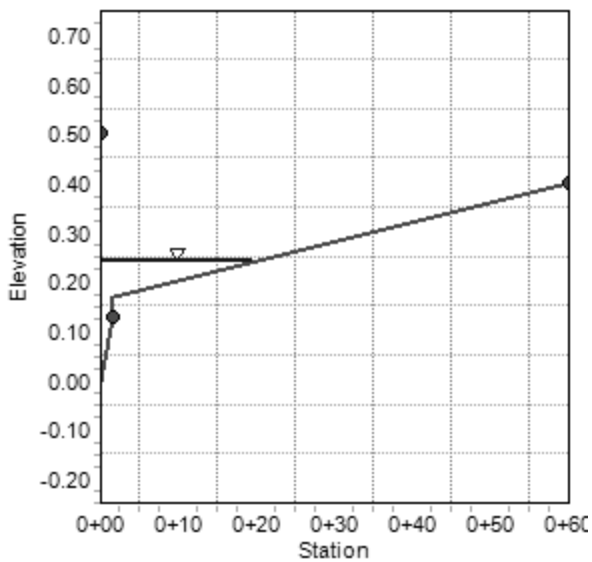
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00850	ft/ft
Normal Depth	0.24	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for 100 Yr Section 3

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00850 ft/ft
Discharge 2.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.00	0.00
0+01.50	0.13
0+01.50	0.17
0+60.00	0.40

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+60.00, 0.40)	0.016

Options

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

Results

Normal Depth 0.27 ft
Elevation Range 0.00 to 0.50 ft
Flow Area 1.55 ft²
Wetted Perimeter 26.94 ft
Hydraulic Radius 0.06 ft
Top Width 26.62 ft
Normal Depth 0.27 ft

Worksheet for 100 Yr Section 3

Results

Critical Depth	0.27	ft
Critical Slope	0.00964	ft/ft
Velocity	1.29	ft/s
Velocity Head	0.03	ft
Specific Energy	0.29	ft
Froude Number	0.95	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.27	ft
Critical Depth	0.27	ft
Channel Slope	0.00850	ft/ft
Critical Slope	0.00964	ft/ft

Cross Section for 100 Yr Section 3

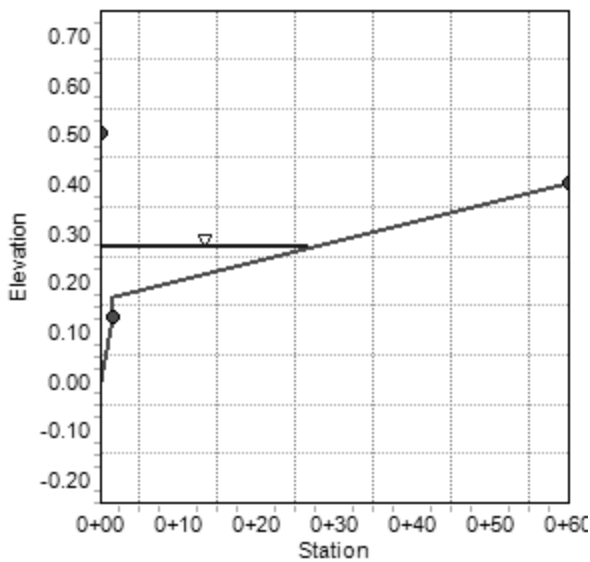
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00850	ft/ft
Normal Depth	0.27	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Options

Results

Worksheet for 10 & 100 Yr Section 4

Results

Velocity Head	0.02	ft
Specific Energy	0.15	ft
Froude Number	0.74	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.13	ft
Critical Depth	0.12	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00962	ft/ft

Cross Section for 10 & 100 Yr Section 4

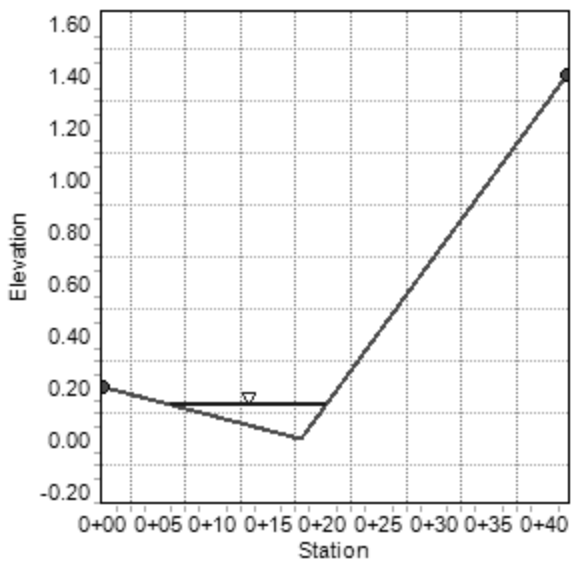
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.13	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Elevation (ft)

Options

Results

Worksheet for 10 Yr Section 5

Results

Velocity Head	0.07	ft
Specific Energy	0.30	ft
Froude Number	1.13	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.22	ft
Critical Depth	0.24	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00768	ft/ft

Cross Section for 10 Yr Section 5

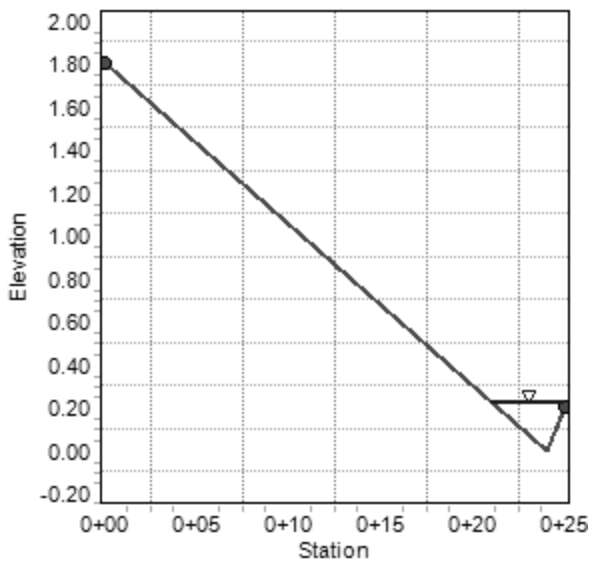
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01000	ft/ft
Normal Depth	0.22	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Project Description

Input Data

0+00.00	1.80
0+24.00	0.00
0+25.00	0.20

(0+00.00, 1.80)	(0+25.00, 0.20)	0.016
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Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Normal Depth		0.29	ft
Elevation Range	0.00 to 1.80 ft		
Flow Area		0.76	ft ²
Wetted Perimeter		5.01	ft
Hydraulic Radius		0.15	ft
Top Width		4.89	ft
Normal Depth		0.29	ft
Critical Depth		0.31	ft
Critical Slope		0.00703	ft/ft
Velocity		2.64	ft/s

Worksheet for 100 Yr Section 5

Results

Velocity Head	0.11	ft
Specific Energy	0.40	ft
Froude Number	1.18	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.31	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00703	ft/ft

Cross Section for 100 Yr Section 5

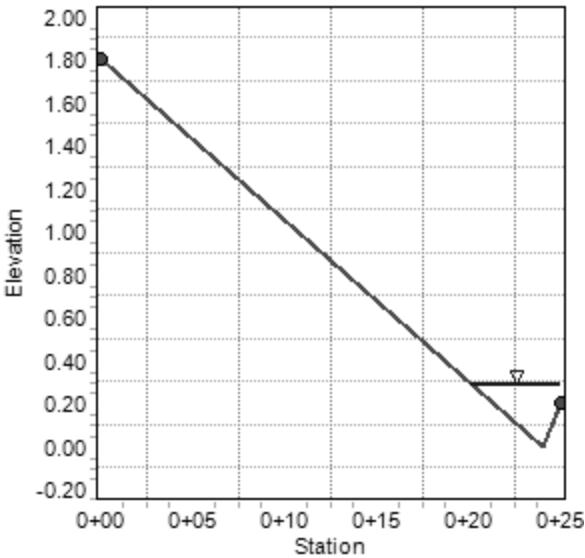
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01000	ft/ft
Normal Depth	0.29	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for 24" Pipe @ S=0.005

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.00	ft ³ /s

Results

Discharge	16.00	ft ³ /s
Normal Depth	2.00	ft
Flow Area	3.14	ft ²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.44	ft
Percent Full	100.0	%
Critical Slope	0.00662	ft/ft
Velocity	5.09	ft/s
Velocity Head	0.40	ft
Specific Energy	2.40	ft
Froude Number	0.00	
Maximum Discharge	17.21	ft ³ /s
Discharge Full	16.00	ft ³ /s
Slope Full	0.00500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 24" Pipe @ S=0.005

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.44	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00662	ft/ft

Cross Section for 24" Pipe @ S=0.005

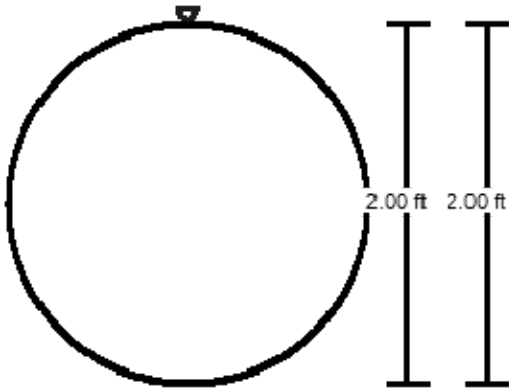
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00500 ft/ft
Normal Depth	2.00 ft
Diameter	2.00 ft
Discharge	16.00 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for 24" Pipe @ S=0.023

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02300	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	34.31	ft ³ /s

Results

Discharge	34.31	ft ³ /s
Normal Depth	2.00	ft
Flow Area	3.14	ft ²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.91	ft
Percent Full	100.0	%
Critical Slope	0.01999	ft/ft
Velocity	10.92	ft/s
Velocity Head	1.85	ft
Specific Energy	3.85	ft
Froude Number	0.00	
Maximum Discharge	36.90	ft ³ /s
Discharge Full	34.31	ft ³ /s
Slope Full	0.02300	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 24" Pipe @ S=0.023

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.91	ft
Channel Slope	0.02300	ft/ft
Critical Slope	0.01999	ft/ft

Cross Section for 24" Pipe @ S=0.023

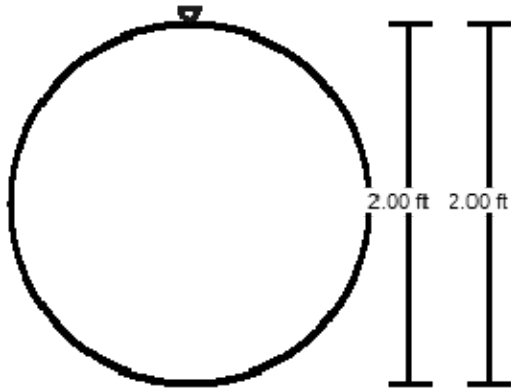
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.02300 ft/ft
Normal Depth	2.00 ft
Diameter	2.00 ft
Discharge	34.31 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for 30" Pipe @ S=0.006

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00600	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	31.77	ft ³ /s

Results

Discharge	31.77	ft ³ /s
Normal Depth	2.50	ft
Flow Area	4.91	ft ²
Wetted Perimeter	7.85	ft
Hydraulic Radius	0.63	ft
Top Width	0.00	ft
Critical Depth	1.92	ft
Percent Full	100.0	%
Critical Slope	0.00684	ft/ft
Velocity	6.47	ft/s
Velocity Head	0.65	ft
Specific Energy	3.15	ft
Froude Number	0.00	
Maximum Discharge	34.18	ft ³ /s
Discharge Full	31.77	ft ³ /s
Slope Full	0.00600	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 30" Pipe @ S=0.006

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	1.92	ft
Channel Slope	0.00600	ft/ft
Critical Slope	0.00684	ft/ft

Cross Section for 30" Pipe @ S=0.006

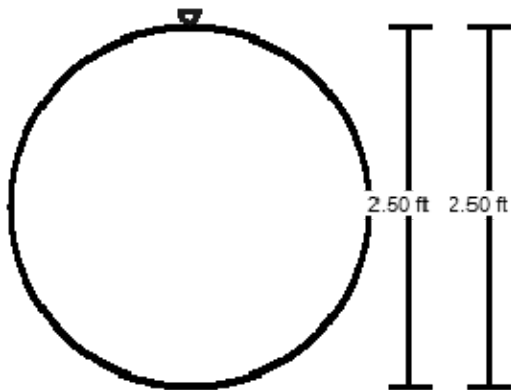
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00600 ft/ft
Normal Depth	2.50 ft
Diameter	2.50 ft
Discharge	31.77 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for 30" Pipe @ S=0.01

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	41.01	ft ³ /s

Results

Discharge	41.01	ft ³ /s
Normal Depth	2.50	ft
Flow Area	4.91	ft ²
Wetted Perimeter	7.85	ft
Hydraulic Radius	0.63	ft
Top Width	0.00	ft
Critical Depth	2.15	ft
Percent Full	100.0	%
Critical Slope	0.00926	ft/ft
Velocity	8.36	ft/s
Velocity Head	1.08	ft
Specific Energy	3.58	ft
Froude Number	0.00	
Maximum Discharge	44.12	ft ³ /s
Discharge Full	41.01	ft ³ /s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for 30" Pipe @ S=0.01

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	2.15	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00926	ft/ft

Cross Section for 30" Pipe @ S=0.01

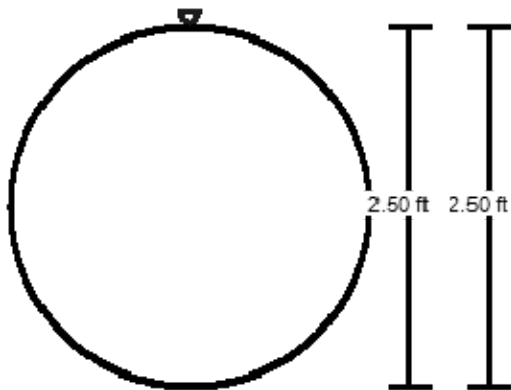
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.01000 ft/ft
Normal Depth	2.50 ft
Diameter	2.50 ft
Discharge	41.01 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for BMP for FUTON1 & FUTON2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	2.00	ft ³ /s

Results

Normal Depth	0.54	ft
Flow Area	1.15	ft ²
Wetted Perimeter	4.43	ft
Hydraulic Radius	0.26	ft
Top Width	4.30	ft
Critical Depth	0.43	ft
Critical Slope	0.03091	ft/ft
Velocity	1.73	ft/s
Velocity Head	0.05	ft
Specific Energy	0.58	ft
Froude Number	0.59	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.43	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.03091	ft/ft

Cross Section for BMP for FUTON1 & FUTON2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	ft/ft
Normal Depth	0.54	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	2.00	ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for BMP for FUTON3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00400	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	3.00	ft ³ /s

Results

Normal Depth	0.74	ft
Flow Area	2.21	ft ²
Wetted Perimeter	6.13	ft
Hydraulic Radius	0.36	ft
Top Width	5.94	ft
Critical Depth	0.51	ft
Critical Slope	0.02928	ft/ft
Velocity	1.36	ft/s
Velocity Head	0.03	ft
Specific Energy	0.77	ft
Froude Number	0.39	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.74	ft
Critical Depth	0.51	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.02928	ft/ft

Cross Section for BMP for FUTON3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00400	ft/ft
Normal Depth	0.74	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	3.00	ft³/s

Cross Section Image



V: 1
H: 1

Excerpts from
Technical Drainage Study
for Lamb and Owens



Department of Development Services

500 S Grand Central Pky 1st Fl • Box 551799 • Las Vegas NV 89155-1799

(702) 455-4600 • Fax (702) 388-2550

Ronald L. Lynn, Director/Building Official

Dean Friedli
Assistant Director
Administrative Division

Greg Franklin
Assistant Director
Building Division

Robert Thompson
Assistant Director
Civil Engineering Division



Drainage Study Approval Letter

08-28279
LTV

Date: November 24, 2008
Firm: Taney Engineering.
Engineer: Robert D. Cunningham, P.E.
Address: 6030 South Jones Boulevard, Suite #100
Phone: (702) 362-8844
Fax: (702) 362-5233
E-mail:

Subject: Technical Drainage Study for Lamb and Owens
Location: NWC of Lamb Boulevard and Owens Avenue
APN: 140-19-803-006
Sec, Township, Range: S19, T20S, R62E
Flood Zone & Panel: Shaded Zone X, 2179E, Revised September 27, 2002
Application Tracking #: 08-28279



Submittals	Date Received	Date Returned	Clark Co. Reviewer	WILLDAN Reviewer	Misc.
Technical	10/17/2008	10/24/2008	GH	N/A	
Addendum	11/13/2008	11/17/2008	GH	N/A	
Supplement to Add#1	11/19/2008	11/24/2008	GH	N/A	

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is required
	City of Henderson	Adjacent to or Impacts Henderson
X	City of Las Vegas	Adjacent to or Impacts Las Vegas
	City of North Las Vegas	Adjacent to or Impacts North Las Vegas
	Nevada Department of Transportation	Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corp of Engineers	Impacts a USACE Facility
	Clark County Regional Flood Control District	Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

The referenced **Technical Drainage Study** has been reviewed and is accepted as complying with minimum improvement standards. As set forth in the subject drainage study, the following measures will be taken to mitigate flood hazards.

The site shall be graded with respect to drainage as shown on "Lamb and Owens," drainage plan sheet DP, signed and sealed by Robert D. Cunningham, P.E. on November 19, 2008.

Check appropriate conditions

	Retaining/screen wall combination may be in excess of current Clark County Unified Development Code, Chapter 30.64.050.
	A FEMA Elevation Certificate, completed by a licensed surveyor, must be submitted to and approved by Clark County Civil Engineering Division Plan Check prior to the issuance of Certificates of Occupancy for those structures.
X	Mylars of the grading plan must be submitted to the Clark County Civil Engineering Division Plan Check for approval signatures prior to map recordation (residential) or permit issuance (commercial).
	An administrative variance to allow the finished floor elevation(s) to be set below the current Clark County criteria must be approved. The finished floor variance must be submitted to Development Services Civil Engineering front counter after drainage study approval and prior to offsite final review.
	The grading plan will be reviewed by the Building Office Operations Division to ensure compliance with the ADA access requirements. Revisions to the grading plan may be required if the site accessibility design does not comply with the requirements set forth in the Accessibility Chapter of the Clark County Building Code.
	The plans show work is proposed outside of the project boundary. Notarized written permission must be obtained prior to grading plan approval.
X	Right-of-way dedication must be verified.
	Any previously approved drainage easements that are not being used must be vacated.
	Per <i>Regional Flood Control District policies and Procedures manual, Section VIII. D. 13. Uniform Regulations for the Control of Drainage</i> , the Engineer of Record shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.
	Structural calculations are required. The structural calculations, plans, and details must be approved prior to "Offsite" submittal.
X	Plan revisions can be found on the red-lined plans and must be addressed.
	Prepare Drainage Easement and/or Drainage Conveyance Area documents as shown on the grading plans.

Additional Conditions:

1. As a condition of final approval, an Update to the Technical Drainage Study will be required prior to any future improvements or changes to the site.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.

By



Glenn S. Hale, P.E.
Senior Civil Engineer
Department of Development Services
Civil Engineering Division

cc: Vegas Land and Development LLC
Development File

Comment 5: The offsite basin map, Figure 5, must include topography to verify slopes entered in the Standard Form 4 for offsite basins.

Response 5: Figure 5 has been revised to show 1 foot contours onsite and 5 foot contours offsite (See Appendix B). A new HEC-1 analysis has also been provided to show the correct slope for existing basin EOFF1 (See Appendix C).

Comment 6: The geometry of hydraulic section HS2/5 must be revised to match the plans. The flow used in the calculation must match the summary table.

Response 6: The hydraulic section has been revised accordingly (see Appendix D). The summary table below has also been updated to match the flows used in the calculations.

**TABLE 1
DEPTH OF FLOW ANALYSIS**

Hydraulic Section	Q10 (cfs)	Q100 (cfs)	Depth 10yr (ft)	Depth 100-yr (ft)	V10 (ft/s)	V100 (ft/s)	VxD 10yr	VxD 100yr
HS1/5	10	25	1.15	1.62	3.02	3.80	3.47	6.16
HS2/5	119	474	0.90	1.39	3.13	5.43	2.82	7.55

Comment 7: Reference material must be provided for the design flow used to size the 24 inch storm drain lateral.

Response 7: Since no reference material could be found for the existing 24" storm drain lateral, a hydraulic section for the existing 24-in lateral has been provided in Appendix D. However, it has been determined that the existing 36-in storm drain system this lateral ties into will not be able to accept the design flow. The 36-in storm drain system is already exceeding its full flow capacity since it intercepts upstream street flow from (9) existing drop inlets and (2) existing drops inlets adjacent to the site. Please refer to Response 8 for further explanation.

Comment 8: A copy of the storm drain plan and profile in Owens avenue must be provided. The engineer must verify whether there is adequate capacity to accept the flow from the site lateral and Owens Avenue drop inlet.

Response 8: In the 10 year storm event, the existing storm drain system upstream of the site accepts flow from (8) 5-ft drop inlets located within Owens Avenue and (1) 5-ft drop inlet located within Gateway Road (see referenced storm drain plan and profile in Appendix E). There are also (2) additional 5-ft drop inlets adjacent to the site that ties into the existing storm drain system. Hydraulic calculations with a 50% clogging factor have been provided to show that a 5-ft drop inlet within Owens can accept 5.0 cfs and a 5-ft drop inlet within Gateway can accept 1.8 cfs. This generates a total of 41.8 cfs within the existing 36" storm drain upstream of

the site (see Appendix D). At full flow capacity, the existing 36-in storm drain conveys 45.2 cfs thus only allowing an additional combined flow of 3.4 cfs to be intercepted by the (2) existing drop inlets adjacent to the site (see Appendix D). Since there is not adequate capacity to accept flow from the existing site lateral, both the 10-year and 100-year flow generated within the existing onsite channel will overtop and travel east in Owens Avenue as surface flow. In the future, a drainage study update will be required prior to any onsite or offsite development. At that time, the study will address the any impacts that the proposed development will have on adjacent properties and propose any improvements needed for flood protection.

Comment 9: **The 100-year street flow depth section HS 2/5 shows Owens Avenue flows entering the site. It should be noted that the future development of the site will need to address how this flow will be conveyed and address and adverse impacts to existing properties to south of the right-of-way.**

Response 9: Acknowledged. Any future development of the site will be flood protected and a technical drainage study update will be provided to address the issue of any adverse impacts on adjacent properties.

Comment 10: **Reference material or drop inlet calculations must be provided to support the 18 cfs being intercepted by the existing Owens Avenue drop inlet.**

Response 10: The existing storm drain system in Owens Avenue has been analyzed in response to comment 8. Results show that approximately 41.8 cfs in the 10-year condition is conveyed within the storm drain system upstream of the site. At full flow capacity, the existing 36-in storm drain conveys approximately 45.2 cfs thus only allowing an additional combined flow of 3.4 cfs to be intercepted by the (2) existing drop inlets adjacent to the site for the 10-year condition (see Appendix D). No additional flow will be intercepted by the (2) existing drop inlets in the 100-year condition since the storm drain system be already be at its full capacity.

Comment 11: **Any additional site improvements not depicted on the grading plans will require an Update to this Technical Drainage Study.**

Response 11: Acknowledged. Any future improvements will prepare and submit a Technical Drainage Study Update.

I hope this addresses all of your review concerns. If you need any additional information, please do not hesitate to call me at my office.

Sincerely,

TANEY ENGINEERING

Michael Cunningham E.I.
Designer I

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

```

X      X  XXXXXX  XXXXX      X
X      X  X      X      X  XX
X      X  X      X      X  X
XXXXXXXX  XXXX  X      XXXXX  X
X      X  X      X      X  X
X      X  X      X      X  X
X      X  XXXXXXX  XXXXX  XXXX

```

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

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
3 ID LAMB AND OWENS
4 ID HYDROLOGIC MODEL
5 ID -----
6 ID EXISTING CONDITION
7 ID 10-YR & 100-YR STORM EVENT
8 ID -----
9 ID TANAY ENGINEERING
10 ID
11 ID FILE: CCE.DAT
12 ID PROJECT No: VLD-08-001
13 ID DATE: NOVEMBER 2008
14 ID <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
15 ID
16 ID ----> 6-HOUR / SDN 3 <----
17 ID
18 IT 5 0 0 300
19 IO 5
20 IN 5
21 JR PREC 0.57 1.00

22 KK EOFF1
23 KM EXISTING OFFSITE BASIN EOFF1
24 BA .0120
25 PB 2.77
26 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
27 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
28 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
29 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
30 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
31 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
32 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
33 PC .998 .999 1.00
34 LS 0 86
35 UD .115

36 KK EOFF2
37 KM EXISTING OFFSITE BASIN EOFF2
38 BA .0039
39 LS 0 96
40 UD .050

41 KK EQN1
42 KM EXISTING ONSITE BASIN EQN1
43 BA .0033
44 LS 0 75
45 UD .140

```

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10.....
46	KK CP2E
47	KM COMBINE FLOWS

1

INPUT
LINE

22 EOFF1

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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

---> 6-HOUR / SDN 3 <---

COMPUTATION INTERVAL	.08 HOURS
TOTAL TIME BASE	24.92 HOURS

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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 .57 1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT					
+	EOFF1	.01	1 FLOW	6.	16.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	EOFF2	.00	1 FLOW	5.	9.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	EON1	.00	1 FLOW	0.	2.
			TIME	3.58	3.58
3 COMBINED AT					
+	CP2E	.02	1 FLOW	11.	26.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	EOFF3	.00	1 FLOW	2.	5.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	ST1	.00	1 FLOW	3.	5.
			TIME	3.50	3.50
3 COMBINED AT					
+	CP3E	.02	1 FLOW	15.	35.
			TIME	3.50	3.50

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

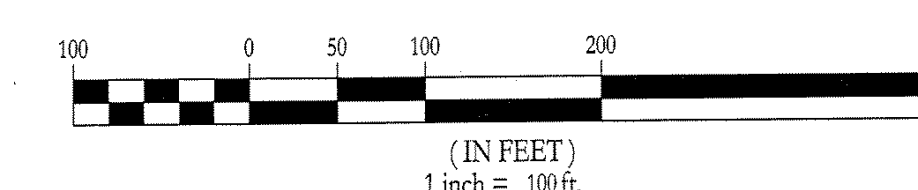


DRAINAGE LEGEND	
Q10-XX CFS	10-YR FLOW
Q100-XXX CFS	100-YR FLOW
—	BASIN BOUNDARY
OFF1	BASIN IDENTIFICATION
X	BASIN ACREAGE
● CP1	CONCENTRATION POINT #
HS1	HYDRAULIC SECTION (HS) ID#
5	HYDRAULIC X-SECTION
FIGURE #	

10-YR/100-YR STORM FLOW RATES			
BASIN	AREA (AC)	Q10 (CFS)	Q100 (CFS)
EOFF1	7.68	6	16
EOFF2	2.47	5	9
EOFF3	1.85	2	5
ST1	1.56	3	5
EON1	2.14	0	2
CP1E*	-	149	485
CP2E**	-	11	26
CP3E***	-	119	475

- * CP1E: MANUALLY COMBINED 10-YR FLOWS OF 145 CFS + 1 CFS + 1 CFS + 2 CFS = 149 CFS
MANUALLY COMBINED 100-YR FLOWS OF 476 CFS + 3 CFS + 2 CFS + 4 CFS = 485 CFS
- ** CP2E: COMBINED FLOW FROM BASINS EOFF1, EOFF2, AND EON1
- *** CP3E: 10-YR = 15 CFS (HEC-1, CP3E) + 149 CFS (CP1E) - 45 CFS (10-YR FLOW INTERCEPTED BY STORM DRAIN),
100-YR = 35 CFS (HEC-1, CP3E) + 485 CFS (CP1E) - 45 CFS (100-YR FLOW INTERCEPTED BY STORM DRAIN).

- 1 - FLOW REFERENCED FROM THE APPROVED TECHNICAL DRAINAGE STUDY FOR VEGAS STAR COMMERCIAL BY AZIMUTH ENGINEERING AND SURVEYING, INC.
- 2 - FLOW REFERENCED FROM THE APPROVED TECHNICAL DRAINAGE STUDY FOR CANTATA BY DEVELOPMENT RESOURCE CONSULTING, INC. AND THE APPROVED TECHNICAL DRAINAGE STUDY FOR EL PASO BY REDROCK ENGINEERING.
- 3 - FLOW REFERENCED FROM THE APPROVED TECHNICAL DRAINAGE STUDY FOR CANTATA BY DEVELOPMENT RESOURCE CONSULTING, INC.
- 4 - MANUALLY ADDED 10-YR FLOWS (121 CFS+ 20 CFS + 4 CFS = 145 CFS)
- 5 - FLOW REFERENCED FROM THE APPROVED TECHNICAL DRAINAGE STUDY FOR CANTATA BY DEVELOPMENT RESOURCE CONSULTING, INC. AND THE APPROVED TECHNICAL DRAINAGE STUDY FOR OWENS RESIDENTIAL BY DESIGN LAND CIVIL.
- 6 - FLOW REFERENCED FROM THE THE APPROVED TECHNICAL DRAINAGE STUDY FOR OWENS RESIDENTIAL BY DESIGN LAND CIVIL AND THE APPROVED TECHNICAL DRAINAGE STUDY FOR CANTATA BY DEVELOPMENT RESOURCE CONSULTING, INC.
- 7 - FLOW REFERENCED FROM THE APPROVED TECHNICAL DRAINAGE STUDY FOR OWENS RESIDENTIAL BY DESIGN LAND CIVIL.
- 7 - FLOW REFERENCED FROM THE APPROVED TECHNICAL DRAINAGE STUDY FOR STOCKBRIDGE BY TANEY ENGINEERING.



TANEY ENGINEERING
6030 S. JONES BLVD #100
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233

FIGURE 5

EXISTING
DRAINAGE BASIN MAP

08-28279
SUPPLAN

Supplement to Addmap 1

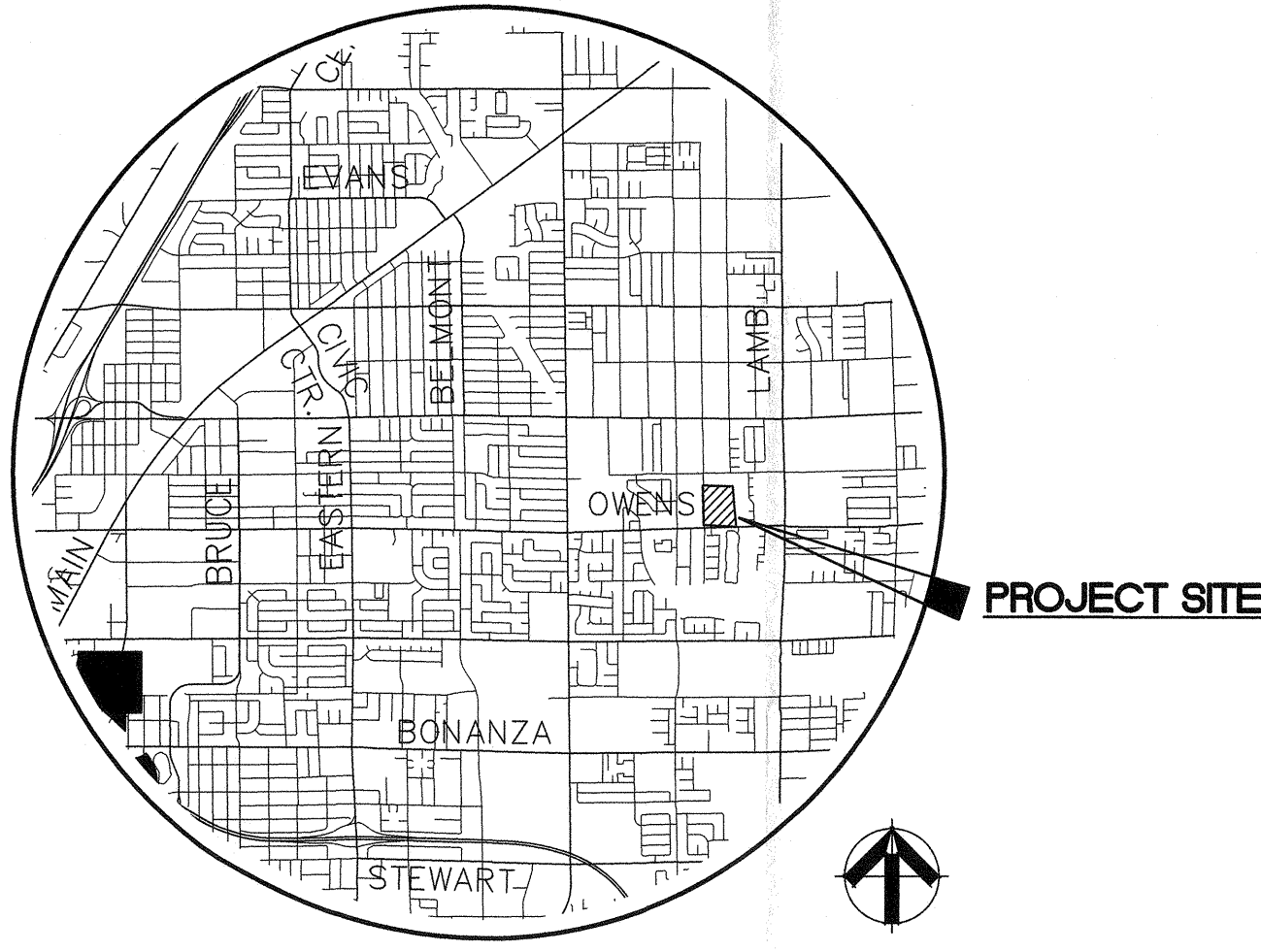
Project Plans

RIVERA SHOPPING CENTER
OWENS/LAMB
CLARK COUNTY, NEVADA
140-19-803-006

LEGEND	
	ROADWAY CENTERLINE
	SWALE/FLOWLINE
	PROPERTY LINE
	PROPOSED CMU WALL
	EXISTING CMU WALL
	EXISTING FENCE
	PROPOSED FENCE
	EXISTING 'L' TYPE CURB
	PROPOSED EDGE OF PAVEMENT
	EXISTING EDGE OF PAVEMENT
	'L' TYPE CURB & GUTTER W/ SIDEWALK
	'A' TYPE CURB
	'ROLL' TYPE CURB
	SETBACK LINE
	EXISTING SAWCUT LINE
	PROPOSED SAWCUT LINE
	BUILDING FOOTPRINT
	EXISTING BUILDING FOOTPRINT
	EXISTING 1' CONTOURS
	EXISTING 5' CONTOURS
	EXISTING SEWER LINE
	EXISTING GAS LINE
	EXISTING WATER LINE
	PROPOSED SEWER LINE
	PROPOSED WATER LINE
	EXISTING STREET LIGHT
	PROPOSED STREET LIGHT
	EXISTING AREA LIGHT
	EXISTING FIRE HYDRANT
	PROPOSED FIRE HYDRANT
	EXISTING WATER VALVE/GATE VALVE
	PROPOSED WATER VALVE/GATE VALVE
	EXISTING WATER METER
	PROPOSED WATER METER
	EXISTING WATER RPPA
	PROPOSED WATER RPPA
	EXISTING WATER DCDA
	PROPOSED WATER DCDA
	EXISTING SEWER MANHOLE
	PROPOSED SEWER MANHOLE
	EXISTING ELECTRIC VAULT
	EXISTING TELEPHONE MANHOLE
	EXISTING TELEPHONE PULL BOX
	EXISTING STREET LIGHT VAULT
	EXISTING ELECTRIC METER
	EXISTING ELECTRIC TRANSFORMER
	EXISTING ELEVATION
	PROPOSED ELEVATION
	GRADE AND FLOW DIRECTION
	CONSTRUCTION NOTES
	EXISTING SIGN
	PROPOSED SIGN
	SITE VISIBILITY ZONE/ ACCESSIBLE ROUTE
	CONCRETE
	EXISTING CONCRETE
	SCARP/SLOPE DOWN

ABBREVIATIONS

AC	ASPHALTIC CONCRETE	LP	LOW POINT
AB	ASPHALTIC CONCRETE	L/S	LANDSCAPE
AB	AGGREGATE BASE	LT	LEFT
BCR	BEGIN CURB RETURN	LVWD	LAS VEGAS VALLEY WATER DISTRICT
BSW	BACK OF SIDEWALK	ME	MATCH EXISTING
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING	MH	MAN HOLE
CL	CENTERLINE	NAP	NOT A PART
CO	CLEAN OUT	NTS	NOT TO SCALE
CONC	CONCRETE	OFF	OFFSET
DCDA	DOUBLE-CHECK DETECTOR ASSEMBLY	POC	POINT OF CONNECTION
DI	DROP INLET	PL	PROPERTY LINE
DG	DESIGN GRADE AT CENTERLINE	R/W	RIGHT OF WAY
DRNG	DRAINAGE	RT	RIGHT
ECR	END CURB RETURN	S	SLOPE
EG	EXISTING GROUND	SD	STORM DRAIN
EL	ELECTRIC	SSMH	SANITARY SEWER MANHOLE
EP	EDGE OF PAVEMENT	SS	SANITARY SEWER
ESMT	EASEMENT	SSCO	SANITARY SEWER CLEANOUT
EX	EXISTING	STA	STATION
FF	FINISH FLOOR	STLT	STREETLIGHT
FG	FINISH GRADE	SW	SIDEWALK
FL	FLOWLINE	TC	TOP OF CURB
FO	FIBER OPTIC	TDC	TOP OF DEPRESSSED CURB
FS	FINISHED SURFACE	TE	TRASH ENCLOSURE
G	GAS	TW	TOP OF WALL
GB	GRADE BREAK	TWLT	TWO WAY LEFT TURN LANE
HP	HIGH POINT	TYP	TYPICAL
INST.	INSTRUMENT	USD	UNIFORM STANDARD DRAWING
INV	INVERT	W	WATER
		WL	WATER LATERAL
		SVZ	SIGHT VISIBILITY ZONE



VICINITY MAP
T20S/ R62E/ SEC 19

SCALE: NONE

OWNER/DEVELOPER

IBARRA JESUS A RIVERA
& ANAYA VERENICE
LAS VEGAS, NV 89115

CIVIL ENGINEER

BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH BLVD., #186
LAS VEGAS, NV, 89183
TEL: 702-287-8914

BENCHMARK

CLARK COUNTY BENCHMARK
MONUMENT ID: 7C0219SSE6
RIVET AND SQUARE ALUMINUM PLATE IN TOP OF CURB, ON
THE NORTH SIDE OF OWENS AVE. AT THE NORTHWEST
CORNER OF ROYAL ESTATES TRAILER PARK. BENCH IS
ABOUT 0.25 MILES WEST OF LAMB BLVD.
ELEVATION: 1,796.367 (FEET) 547.534 (METERS)
PUBLIC WORKS SURVEY BENCHMARKS 2018 (NAVD 88).

BASIS OF BEARINGS

SOUTH 88°15'19" WEST, BEING THE BEARING OF THE CENTERLINE OF
OWENS AVENUE AND THE SOUTH LINE OF THE SOUTHEAST QUARTER
(SE 1/4) OF SECTION 19, TOWNSHIP 20 SOUTH, RANGE 62 EAST,
M.D.M., CLARK COUNTY, NEVADA AS RECORDED IN BOOK 124 OF
PLATS AT PAGE 31, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

DEVIATIONS FROM STANDARDS

NONE

INDEX OF SHEETS

- COVER SHEET
- GENERAL NOTES & QUANTITIES
- GRADING PLAN
- DETAIL SHEET
- UT-1 UTILITY PLAN
- HORIZONTAL CONTROL PLAN

CCWRD NOTES:

- SANITARY SEWER CONNECTION FEES (I.E., SDA CONNECTION FEES)
ARE TO BE PAID DIRECTLY TO CLARK COUNTY WATER RECLAMATION
DISTRICT FOR THIS JOB AT THE MYLAR APPROVAL.
- AT START OF CONSTRUCTION, CONTRACTOR IS TO CALL CCWRD
INSPECTIONS AT (702) 668-8205 FOR A JOB START AND
REFERENCE CCWRD PROJECT NUMBER.
- DEVELOPER IS TO PAY CCWRD CONNECTION FEES AT THE
SAME TIME CCWRD SIGN HERE ON THE PLANS.

APPROVALS

CLARK COUNTY WATER RECLAMATION DISTRICT DATE
PIPES NUMBER IS _____

SIGNATURE OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT
FOR AN APPROVAL OF ANY VIOLATION OF CLARK COUNTY WATER
RECLAMATION DISTRICT RULES, REGULATIONS OR DESIGN AND
CONSTRUCTION STANDARDS.

NV ENERGY DATE

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

COX COMMUNICATIONS DATE

SOUTHWEST GAS CORPORATION DATE

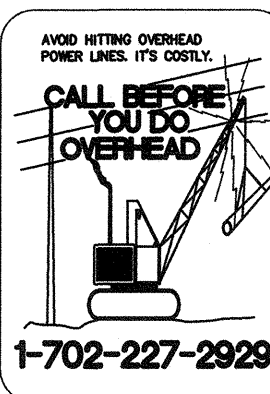
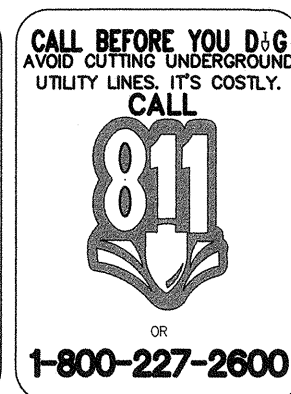
CENTRAL TELEPHONE COMPANY DBA CENTURY LINK DATE

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

BY:
CLARK COUNTY FIRE DEPT. DATE

APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT
FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS
OF THE STATE OR COUNTY LAWS.

FIRE FLOW 1,500 GPM AT 20 P.S.I. RESIDUAL.



Job No.	1813080
FILE No.	
REUSE OF DOCUMENTS	
THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, IS AN INSTRUMENT OF BLUE DIAMOND CIVIL ENGINEERING AND IS NOT TO BE USED IN THE WHOLE OR IN PART FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF BLUE DIAMOND CIVIL ENGINEERING.	
APPROVED	
REVISIONS	
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STANDARD SPECIFICATIONS AND STANDARD DRAWINGS FOR WATER LINE CONSTRUCTION

- II. STANDARD SPECIFICATION AND STANDARD DRAWINGS FOR WATER LINE CONSTRUCTION
- A. ALL WATER IMPROVEMENTS SHOWN ON THESE CONSTRUCTION DRAWINGS SHALL CONFORM TO THE STANDARDS DESCRIBED BELOW, AND IN ORDER OF PRECEDENCE SHOWN.
1. CITY OF NORTH LAS VEGAS MUNICIPAL WATER SERVICE DISTRICT SERVICE RULES AND REGULATIONS, LATEST EDITION.
2. UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS, CLARK COUNTY NEVADA, LATEST EDITION.
3. UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, LATEST EDITION.
- B. EXCEPTIONS TO THESE STANDARDS ARE NOTED BELOW:
1. NO WATER MAIN MAY BE SHUT DOWN TO MAKE CONNECTIONS WITHOUT PRIOR APPROVAL OF THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
2. MATERIALS USED FOR WATER DISTRIBUTION FACILITIES SHALL BE INCLUDED ON THE CITY OF NORTH LAS VEGAS APPROVED MATERIALS LIST, LATEST REVISION, OR SPECIFICALLY IDENTIFIED AND APPROVED ON THESE PLANS.
3. ALL WATER METERS TWO (2) INCHES AND SMALLER SHALL BE INSTALLED BY THE CITY OF NORTH LAS VEGAS. NOTE THAT ALL LOCATIONS MUST BE CLEARLY IDENTIFIED AND MARKED AT THE SITE. THE SERVICE LINES, LATERALS, METER BOXES AND SIDEWALKS OR COLLARS MUST ALL BE INSTALLED AND SET AT GRADE OR THE METER WILL NOT BE SET.
4. THE CITY OF NORTH LAS VEGAS TRENCH BACKFILL POLICY, DATED AUGUST 15, 1998, SHALL BE ADHERED TO FOR THIS PROJECT.
- C. MODIFICATION AND CLARIFICATION TO THESE STANDARDS ARE AS NOTED BELOW:
1. WATER METERING REQUIREMENTS FOR NEW DEVELOPMENT:
- A. SEPARATE DOMESTIC AND FIRE SERVICES (WHERE APPLICABLE) ARE REQUIRED FOR EACH DWELLING UNIT, PUBLIC, QUASI-PUBLIC, COMMERCIAL, AND/OR INDUSTRIAL OCCUPANCY LOCATED ON A SINGLE PARCEL OR LOT.
- B. IN THE EVENT THAT A BUILDING WITHIN AN INDUSTRIAL OR COMMERCIAL SUBDIVISION IS DIVIDED, SEPARATE DOMESTIC SERVICES ARE REQUIRED FOR EACH UNIT.
- C. EACH PARCEL, OR LOT OF A COMMERCIAL OR RESIDENTIAL SUBDIVISION WILL HAVE A MINIMUM OF ONE (1) METERED DOMESTIC SERVICE. WHEN A FIRE SERVICE IS REQUIRED, EACH PARCEL OR LOT WILL HAVE A MINIMUM OF ONE (1) FIRE SERVICE. THE CITY, AT ITS OPTION, MAY ALLOW A COMMUNAL FIRE SERVICE PROVIDED THE PROPERTY OWNERS FIRST ESTABLISH A PROPERTY MANAGEMENT ASSOCIATION WHICH ACCEPTS RESPONSIBILITY FOR THE PAYMENT OF WATER BILLS AND THE MAINTENANCE AND OPERATION OF THE FIRE LINES AND THE BACKFLOW PREVENTION ASSEMBLY.
2. FIRE AND DOMESTIC WATER SERVICES AS APPROVED ON THIS PLAN, ARE INTENDED SPECIFICALLY FOR THE LOT AND USE SHOWN, AND ARE NOT INTENDED TO SERVE ADDITIONAL PARCELS OR STRUCTURES WHICH MAY BE CREATED IN THE FUTURE. IN THE EVENT THAT THE PARCELS AND/OR LOTS SHOWN ON THIS PLAN ARE FURTHER DIVIDED TO CREATE ADDITIONAL PARCELS OR LOTS, THE OWNER IS REQUIRED TO PROVIDE SEPARATE FIRE AND DOMESTIC WATER SERVICES TO EACH.
3. CONNECTION TO PUBLIC FIRE HYDRANTS SHALL NOT BE MADE FOR DOMESTIC AND/OR PRIVATE FIRE SERVICE.
4. ALL SERVICE LATERALS TWO (2) INCHES AND SMALLER SHALL BE COPPER TUBING WITH APPROVED SERVICE SADDLES. CORPORATION STOPS AND ANGLE METER STOPS SHALL BE THE SAME SIZE AS THE SERVICE LATERAL. ANGLE METER STOPS AND METER SHALL BE CENTERED IN METER THE BOX.
5. UDACS PLATES NO. 1 AND NO. 3; REVISE NOTE TO READ COUPLINGS ARE NOT ALLOWED BETWEEN THE CORPORATION STOP AND THE ANGLE METER.
6. ALL METERS TO BE INSTALLED IN THE CITY OF NORTH LAS VEGAS WATER SYSTEM, INCLUDING DODAS MUST BE COMPATIBLE WITH THE SENSUS AMR PROTOCOL (A.K.A. INVENYS) AND MUST BE INSTALLED WITH THE ENCODED REGISTER. METERS THAT ARE FULLY COMPATIBLE ARE: SENSO/INVENYS'S ECR/WP MODELS (5/8" AND LARGER) NEPTUNE AUTOREAD MODELS (3" AND LARGER) & METRON/72 INNOV8 (ALL SIZES).
7. ANY PARCEL RECEIVING WATER FROM THE PUBLIC DISTRIBUTION SYSTEM FROM MULTIPLE CONNECTIONS IS REQUIRED TO UTILIZE THE SAME METER MANUFACTURER. FOR MASTER METERED MULTI-FAMILY RESIDENTIAL, THE METERS SHALL BE OF THE SAME MANUFACTURER, MODEL, AND SIZE.
8. ALL METER BOXES SHALL BE EQUIPPED WITH TRAFFIC BEARING COVERS AND INSTALLED TO FINISH DESIGN GRADE AND ELEVATION. IF SUCH IS NOT SHOWN ON THE PLANS, THE ELEVATION WILL BE ESTABLISHED BY THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
9. ANY BLOCK WALL OR OTHER FENCE SHALL BE DESIGNED AND CONSTRUCTED AROUND THE OUTSIDE OF THE EASEMENT(S), TO ALLOW THE CITY DIRECT ACCESS TO VAULT(S) AND INLET PIPING FROM THE ADJACENT RIGHT-OF-WAY.
10. NO UTILITY BOXES SHALL BE LOCATED IN DRIVEWAY APPROACHES, UNLESS APPROVED BY THE UTILITIES DIVISION.
11. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
12. THE ON-SITE WATER LINES AND APPURTENANCES ARE PRIVATE FACILITIES NOT TO BE OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS, UNLESS OTHERWISE SPECIFIED ON CIVIL IMPROVEMENTS PLANS.
13. ALL VALVES WILL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY GUTTERS, AND CURB CUTTERS.
14. A MINIMUM OF TWO (2) VALVES SHALL BE LOCATED AT EVERY MAINLINE TEE, OR THREE (3) VALVES AT EVERY MAINLINE CROSS.
15. ALL NEW FIRE HYDRANTS SHALL HAVE A 5-1/4" INCH VALVE OPENING.
16. TWO SOURCES OF WATER SUPPLY ARE REQUIRED FOR ANY DEVELOPMENT WITH ANY COMBINATION OF MORE THAN THREE (3) FIRE HYDRANTS (PUBLIC OR PRIVATE) OR FIRE SERVICES.
17. MINIMUM SEPARATIONS BETWEEN FIRE SYSTEMS AND DOMESTIC WATER MAINS SHALL BE SIX (6)-FEET HORIZONTALLY FROM EXTERIOR PIPE WALLS AND EIGHTEEN (18)-INCHES VERTICALLY. MINIMUM SEPARATION FROM SEWER LINES SHALL BE TEN (10)-FEET HORIZONTALLY.
18. PIPE DETECTOR RIBBON AND LOCATOR BALLS SHALL BE REQUIRED ABOVE ALL WATER MAINS. SERVICE LATERALS THAT ARE SIX (6) INCHES AND LARGER, AND ANY SERVICE LATERAL NOT INSTALLED PERPENDICULAR TO THE MAIN LINE.
19. ALL WATER MAINS SHALL BE FILLED, PRESSURE TESTED TO 200 PSI, DISINFECTED, FLUSHED, REFILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION BY THE CITY. CONTACT THE CITY OF NORTH LAS VEGAS UTILITY DIVISION TWENTY-FOUR (24) HOURS IN ADVANCE TO SCHEDULE SAMPLING.
20. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE TESTED AND CERTIFIED BY THE CITY OF NORTH LAS VEGAS PRIOR TO PLACING THE WATER SYSTEM IN SERVICE. NO WATER SHALL BE TAKEN FROM A SERVICE REQUIRING BACKFLOW PREVENTION UNTIL THE REDUCED PRESSURE PRINCIPLE ASSEMBLY HAS BEEN SUCCESSFULLY TESTED BY THE ONLY, CONTACT THE CITY OF NORTH LAS VEGAS TWENTY-FOUR (24) HOURS IN ADVANCE TO SCHEDULE TESTING.
21. UNITS OF ASPHALT PATCHES TO BE DETERMINED IN THE FIELD BY A CITY OF NORTH LAS VEGAS INSPECTOR. PATCHES WILL BE A MINIMUM OF TWELVE (12)-FEET MACHINE REPLACED, TO SCHEDULE UTILITY INSPECTIONS, PLEASE EMAIL UTIL-INSPECT@NORTHLASVEGAS.COM.
22. UTILITY INSPECTION REQUESTS MUST BE RECEIVED BY 2:00 P.M. FOR INSPECTIONS TO OCCUR THE FOLLOWING NORMAL WORKING DAY (MONDAY THROUGH FRIDAY). FOR AFTER HOURS UTILITY INSPECTIONS, INCLUDING WEEKENDS, CALL THE INSPECTION LINE AT 702-398-4407.
23. RECORD DRAWINGS SHALL BE PREPARED, SIGNED AND SUBMITTED TO THE CITY OF NORTH LAS VEGAS REPRESENTATIVE PRIOR TO FINAL ACCEPTANCE OF ANY WATER DISTRIBUTION FACILITIES TO BE OWNED, OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS.
- D. SHUTDOWN REQUIREMENTS AND INFORMATION:
1. CONTACT THE UTILITIES DEPARTMENT SEVEN (7) WORKING DAYS PRIOR TO ANY ANTICIPATED SHUTDOWN FOR COORDINATION PURPOSES. THE CONTRACTOR SHALL NOT OPEN/CLOSE ANY VALVES WITHIN THE CITY'S WATER DISTRIBUTION SYSTEM. THE UTILITIES DEPARTMENT CONTACT NUMBER IS 633-1285.
2. FOR COMMERCIAL PROPERTIES, PROVIDE WRITTEN NOTIFICATION AND VERBAL COORDINATION BETWEEN THE UTILITIES DEPARTMENT AND THE COMMERCIAL PROPERTY OWNER(S) A MINIMUM OF SEVEN (7) WORKING DAYS PRIOR TO ANTICIPATED SHUTDOWN. THE COMMERCIAL OWNER(S) SHALL HAVE THE ABILITY TO PROVIDE INPUT IN SCHEDULING SHUTDOWNS.
3. FOR RESIDENTIAL PROPERTIES, PROVIDE WRITTEN NOTIFICATION TO RESIDENTIAL PROPERTIES A MINIMUM OF 48 HOURS PRIOR TO ANTICIPATED SHUTDOWN.
4. WORKING DAYS ARE DEEMED TO BE MONDAY THROUGH THURSDAY FOR SHUTDOWN PURPOSES.
5. SHUTDOWNS ARE ANTICIPATED TO BE NIGHT WORK. FINAL DECISIONS SHALL BE AT THE DISCRETION OF THE UTILITIES DEPARTMENT.
6. THE SHUTDOWN RELOCATION, AND/OR ADJUSTMENT OF WATER LINES SHALL BE AS APPROVED BY THE CITY OF NORTH LAS VEGAS UTILITIES DEPARTMENT. SHUTDOWNS CANNOT BE GUARANTEED BY THE DEPARTMENT. LINE STOPS OR INSERT-A-VALVES MAY BE REQUIRED TO COMPLETE THE WORK, AT THE DISCRETION OF THE UTILITIES DEPARTMENT. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE WORK.

DEPARTMENT OF PUBLIC WORKS
GENERAL NOTES

1. INSPECTIONS ARE REQUIRED. CALL 24 HOURS IN ADVANCE, 455-4610. YOUR PERMIT, APPROVED PLANS, AND BARRICADE PLANS FOR THIS WORK MUST BE ON THE JOB SITE AT ALL TIMES.
2. EXACT LOCATION OF ALL SAW-CUT LINES SHALL BE DETERMINED IN THE FIELD BY A CLARK COUNTY INSPECTOR.
3. CURB AND GUTTER WITH A GRADE OF LESS THAN 4/10 OF ONE PERCENT SHALL BE CONSTRUCTED BY FORMING. EACH JOINT SHALL BE CHECKED FOR GRADE PRIOR TO CONSTRUCTION AND WATER TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION.
4. FINAL ASPHALTIC CONCRETE (AC) PAVEMENT SURFACES SHALL BE ONE-HALF INCH (1/2) ABOVE THE LIP OF THE GUTTER (INCLUDING OPEN GRADE).
5. ALL OFF-SITE IMPROVEMENT CONSTRUCTION SHALL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS AND STANDARD DRAWINGS CLARK COUNTY AREA NEVADA AND CLARK COUNTY SUPPLEMENT TO UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, LATEST REVISION EXCEPT FOR LUMINAIRES. REFER TO CLARK COUNTY PUBLIC WORKS QUALIFIED PRODUCTS LIST "QPL" FOR LED LUMINAIRES. QPL CAN BE FOUND ONLINE AT [HTTP://WWW.CLARKCOUNTYNV.GOV/PUBLICWORKS/PAGES/DEFAULT.aspx](http://WWW.CLARKCOUNTYNV.GOV/PUBLICWORKS/PAGES/DEFAULT.aspx)
6. PRIVATE STREETS, CURB & GUTTER AND VALLEY GUTTERS REFLECTED ON THESE PLANS ARE TO BE INSPECTED BY A CLARK COUNTY INSPECTOR.
7. WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS SHALL BE DETERMINED IN THE FIELD BY A CLARK COUNTY INSPECTOR.
8. PROPER SIGNS, BARRIERS, BARRICADES AND LIGHTS SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH THE LATEST "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS." TRAFFIC, SCHOOL, OR STREET SIGNS OF ANY KIND ARE NOT TO BE MOVED FOR ANY REASON WITHOUT FIRST COORDINATING WITH THE DEPARTMENT OF PUBLIC WORKS OFF-SITE INSPECTOR @ 455-4610.
9. THIS PLAN DOES NOT AUTHORIZE CLOSURE OF ANY ROAD OR STREET.
10. NO OPEN TRENCH SHALL BE ALLOWED ACROSS ANY STREET OR WITHIN TEN FEET (10') OF ANY TRAVEL-WAY, EXCEPT WHEN WORK IS IN ACTUAL PROGRESS. AREAS COVERED BY ACCEPTABLE STEEL PLATE ARE NOT TO BE CONSTRUCTED AS A TRENCH. NO OPEN TRENCH IS PERMITTED IN EXCESS OF 500 FEET OR LENGTH NECESSARY TO ACCOMMODATE PIPE INSTALLATION IN A SINGLE DAY, WHICHEVER IS GREATER. ALL TRENCH CROSSINGS AND BACKFILL SHALL MEET THE STANDARD SPECIFICATION UNLESS OTHERWISE STATED.
11. A TEMPORARY PATCH IS TO BE IN PLACE AT THE END OF EACH WORK DAY WHERE THE BACKFILL IN THE TRENCH HAS BEEN COMPLETED AND PRIOR TO OPENING THE WORK AREA BACK TO TRAFFIC AND IS TO BE MAINTAINED BY THE PERMITEE. A PERMANENT PATCH IS TO BE IN PLACE WITHIN THIRTY (30) DAYS AFTER THE INSTALLATION OF THE TEMPORARY PATCH.
12. COMPACTION TESTS ARE REQUIRED.

PRE-DEVELOPMENT MEETING WITH DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW DIVISION, OFF-SITE INSPECTOR IS REQUIRED. PLEASE CONTACT THE INSPECTOR AT 455-4610

CLARK COUNTY TRAFFIC NOTES

1. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HEREUNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAYING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
2. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY GROUND MOUNTED STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING COUNTY STREETS IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
3. ALL CONSTRUCTION SIGNING, BARRICAADING AND PAVEMENT MARKINGS SHALL CONFORM TO THE NEVADA WORK ZONE TRAFFIC CONTROL HANDBOOK - 1986 AND TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, CURRENT EDITION.
4. IF THE IMPROVEMENTS NECESSITATE THE OBSTRUCTION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL, OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE COUNTY TRAFFIC MANAGER.
5. THE DEVELOPER SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL PERMANENT SIGNS SHOWN ON THE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CLARK COUNTY AREA STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGNPOSTS SHALL BE INSTALLED IN ACCORDANCE WITH CLARK COUNTY AREA STANDARDS. ALL SIGNS SHALL USE CLASS VI SHEETING.
6. IF A PROPOSED STREET LIGHT STANDARD IS FIELD LOCATED TO WITHIN (5) FEET OF ANY SIGN, SHOWN HEREON TO BE MOUNTED ON A SIGN POST, CHANGE SIGN MOUNTING TO ONE ON THE STREET LIGHT STANDARD.
7. PRIOR TO CONSTRUCTION, THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE CURRENT PLANNING DIVISION OF THE DEPARTMENT OF COMPREHENSIVE PLANNING.
8. ALL TRAFFIC SIGNAL POLE ASSEMBLIES, STEEL PEDESTAL FOR CABINETS AND STREET LIGHT POLES SHALL BE GALVANIZED PER ASTM A123.
9. ALL STREET LIGHTING INSTALLATIONS SHALL CONFORM TO THE UNIFORM STANDARD DRAWINGS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, LATEST EDITION OF EACH EXCEPT AS NOTED ON THE STREET LIGHTING PLANS AND LUMINAIRES, REFER TO CLARK COUNTY PUBLIC WORKS QUALIFIED PRODUCT LIST "QPL" FOR LED LUMINAIRES. QPL CAN BE FOUND ONLINE AT [HTTP://WWW.CLARKCOUNTYNV.GOV/PUBLICWORKS/PAGES/DEFAULT.aspx](http://WWW.CLARKCOUNTYNV.GOV/PUBLICWORKS/PAGES/DEFAULT.aspx)
8. THE FOLLOWING CLARK COUNTY UNDERGROUND FACILITIES MAY BE LOCATED IN YOUR PROJECT AREA: STREET LIGHTING, TRAFFIC SIGNALS, AND FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION. **FAST** INTERCONNECT CABLE. YOU MUST CONTACT CLARK COUNTY TRAFFIC MANAGEMENT DIVISION, OPERATIONS UNIT AT 455-5000 FOR LOCATIONS AT LEAST 48 HOURS PRIOR TO WORKING IN THE AREA. CLARK COUNTY IS NOT A MEMBER OF CALL BEFORE YOU DIG (UNDERGROUND SERVICE ALERT), AND A CALL TO THAT ORGANIZATION DOES NOT RELIEVE YOU OF LIABILITY FOR CLARK COUNTY FACILITIES.
11. **FAST** INTERCONNECT CABLE POLICY IS IN EFFECT. INTERCONNECT CABLE MUST BE MAINTAINED AT ALL TIMES. DEVELOPER/CONTRACTOR SHALL PROVIDE TEMPORARY OVERHEAD INTERCONNECT CABLE WHILE PERMANENT CABLE IS BEING RELOCATED. TEMPORARY AERIAL INSTALLATION MUST BE ACCEPTABLE TO THE COUNTY TRAFFIC MANAGER AND TO **FAST**. ANY DAMAGE TO THIS CABLE IS DEEMED IN EMERGENCY BY F.A.S.T., CITY OF LAS VEGAS, CLARK COUNTY AND NOTD AND MUST BE REPAIRED IMMEDIATELY TO **FAST** ACCEPTANCE \$2500 PER DAY DAMAGES MAY BE ASSESSED AFTER 24 HOURS HAS ELAPSED FROM TIME OF BREAK OR DAMAGE.
12. ALL NEW REPLACEMENT TRAFFIC SIGNAL LOOPS SHALL BE INSTALLED USING CABLE-IN-DUCT WIRING. SHALL HAVE INDEPENDENT LEAD-IN WIRES FOR EACH LOOP FROM THE CONTROLLER TO THE PULL-BOX, AND EACH LEAD-IN SHALL BE INDIVIDUALLY TAGGED.
13. TRAFFIC SIGNAL PEDESTRIAN HEADS SHALL BE THE L.E.D. TYPE.
14. ELECTRICAL POWER SERVICE POINT LOCATION(S) FOR STREET LIGHTING AND TRAFFIC SIGNALS MUST BE INDICATED ON THE PLANS, IF CONNECTING TO AN EXISTING CIRCUIT, INDICATE LOCATION OF EXISTING SERVICE POINT FOR EACH CIRCUIT.
15. WHEN STREETLIGHTS ARE TO BE CONNECTED TO AN EXISTING CIRCUIT, THE ENGINEER MUST CERTIFY THAT THE EXISTING CIRCUIT IS CAPABLE OF HANDLING THE ADDITIONAL CIRCUIT LOAD.
16. CLARK COUNTY RESERVES THE RIGHT TO REJECT STREET LIGHT AND TRAFFIC SIGNAL POLES AND ASSEMBLIES WHICH HAVE "STRIPPED" APPEARANCE.
17. TWO WEEKS PRIOR TO BEGINNING OF CONSTRUCTION, MODIFICATION, OR RELOCATION OF ANY TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION OF THE DATE THAT WORK WILL BEGIN.
18. THREE (3) NORMAL WORKING DAYS PRIOR TO TURN-ON OR COMPLETION OF MODIFICATION(S) TO A TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION THAT WORK IS BEING COMPLETED AND THE PROPOSED DATE OF COMPLETION.

FIRE DEPARTMENT NOTES

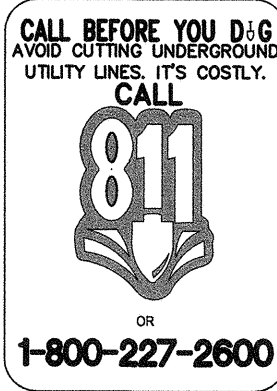
- A. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH CLARK COUNTY FIRE CODE AS AMENDED, AND THE CURRENT EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION PAMPHLET #24.
- B. FIRE HYDRANTS AND WATER SUPPLIES FOR FIRE PROTECTION SHALL BE AND MADE SERVICEABLE PRIOR TO AND DURING THE TIME OF CONSTRUCTION IN ACCORDANCE WITH SECTION 1412 OF THE CLARK COUNTY FIRE CODE, AS AMENDED.
- C. IF DURING CONSTRUCTION IT BECOMES NECESSARY TO CLOSE ANY CONTROL VALVE OR PLACE A HYDRANT OUT OF SERVICE, APPROVAL SHALL BE OBTAINED FROM THE FIRE DEPARTMENT PRIOR TO PLACING THE HYDRANT OUT OF SERVICE.
- D. PAINTING OF CURBS AND/OR STRIPING OF ASPHALT AREAS AND PROTECTION OF HYDRANTS FROM PHYSICAL INJURY SHALL BE PER THE FIRE HYDRANT INSTALLATION SPECIFICATIONS OF THE FIRE PREVENTION DIVISION.
- E. NO FIRE HYDRANT SHALL BE LOCATED WITHIN 25 FEET OF ANY STRUCTURE, OR 6 FEET OF A DRIVEWAY, POWER POLE, LIGHT STANDARD, OR ANY OTHER OBSTRUCTION. FOR WALL, FENCE AND PLANTER LOCATIONS, A PERIMETER AROUND THE HYDRANT MEASURING A MINIMUM OF 3 FEET FROM ITS EXTERIOR SHALL BE MAINTAINED CLEAR OF ALL OBSTRUCTION AT ALL TIMES.
- F. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS, WITH A MINIMUM VEHICLE LOAD OF 33,000 POUNDS PER AXLE, AND SHALL BE SURFACED AND PAVED SO AS TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES. EXCEPTION: TEMPORARY ACCESS ROADS SERVING ONLY BUILDING UNDER CONSTRUCTION SHALL NOT BE REQUIRED TO BE PAVED, BUT SHALL COMPLY WITH ALL OTHER REQUIREMENTS OF SECTION 503.2.3 OF THE CLARK COUNTY FIRE CODE.
- G. PRIOR TO ACCEPTANCE OF ANY FIRE SERVICE MAIN, A SATISFACTORY HYDROSTATIC TEST WITH PIPING JOINTS UNCOVERED MUST BE CONDUCTED. APPROVED PLANS, AN INSTALLATION PERMIT AND A CONTRACTOR'S MATERIALS AND TEST CERTIFICATE MUST BE PROVIDED AT TIME OF INSPECTION. SCHEDULE INSPECTION AT www.clarkcountynv.gov/depts/fire.
- H. FIRE HYDRANTS SHALL BE LOCATED 4' TO 7' FROM BACK OF CURB AND A MINIMUM OF 6 FEET AWAY FROM TURNS.
- I. BLUE REFLECTIVE MARKERS MUST BE INSTALLED BEFORE FINAL HYDRANT ACCEPTANCE CAN BE ATTAINED (SECTION C107 OF THE CLARK COUNTY FIRE CODE, AS AMENDED).
- J. HYDRANTS THAT ARE PROPOSED FOR INSTALLATION IN PUBLIC WATER SYSTEMS SHALL BE IN ACCORDANCE WITH APPROVED FIRE HYDRANTS AS ALLOWED BY THE WATER PURVEYOR. HYDRANTS PROPOSED FOR INSTALLATION ON PRIVATE WATER SYSTEMS SHALL BE IN ACCORDANCE WITH APPROVED FIRE HYDRANTS AS ALLOWED BY THE FIRE DEPARTMENT.

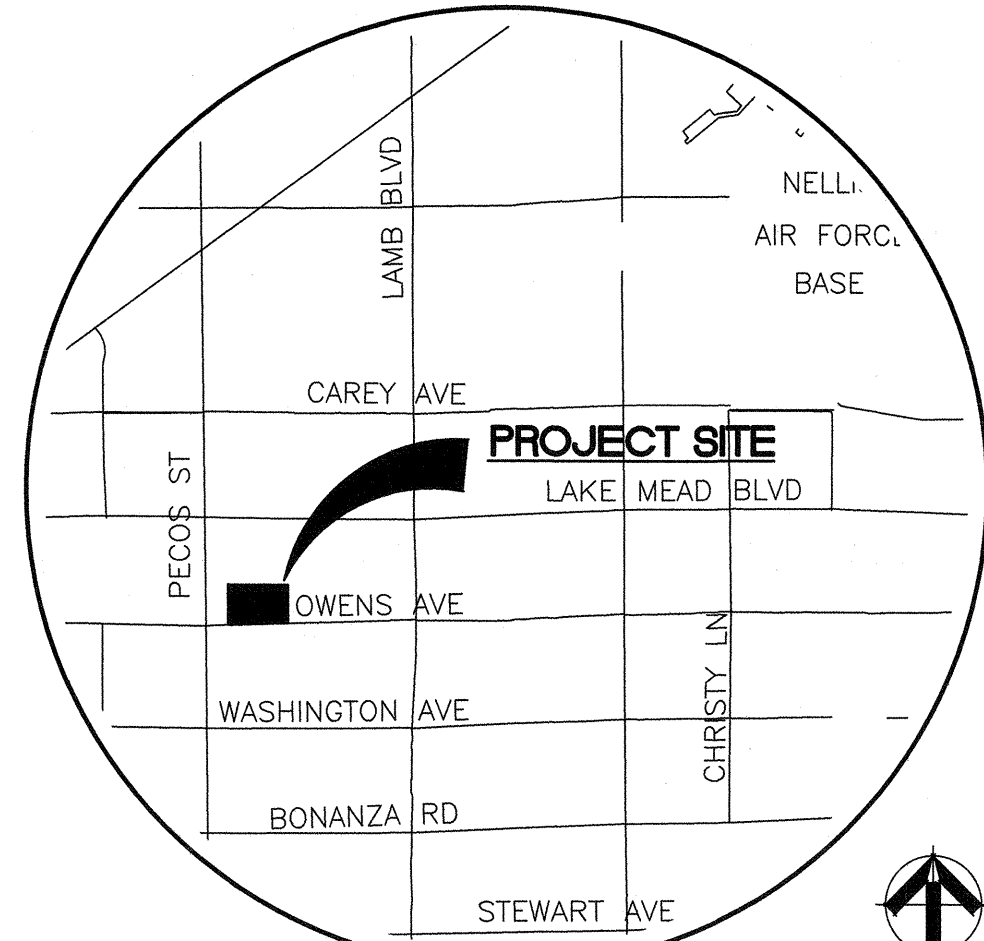
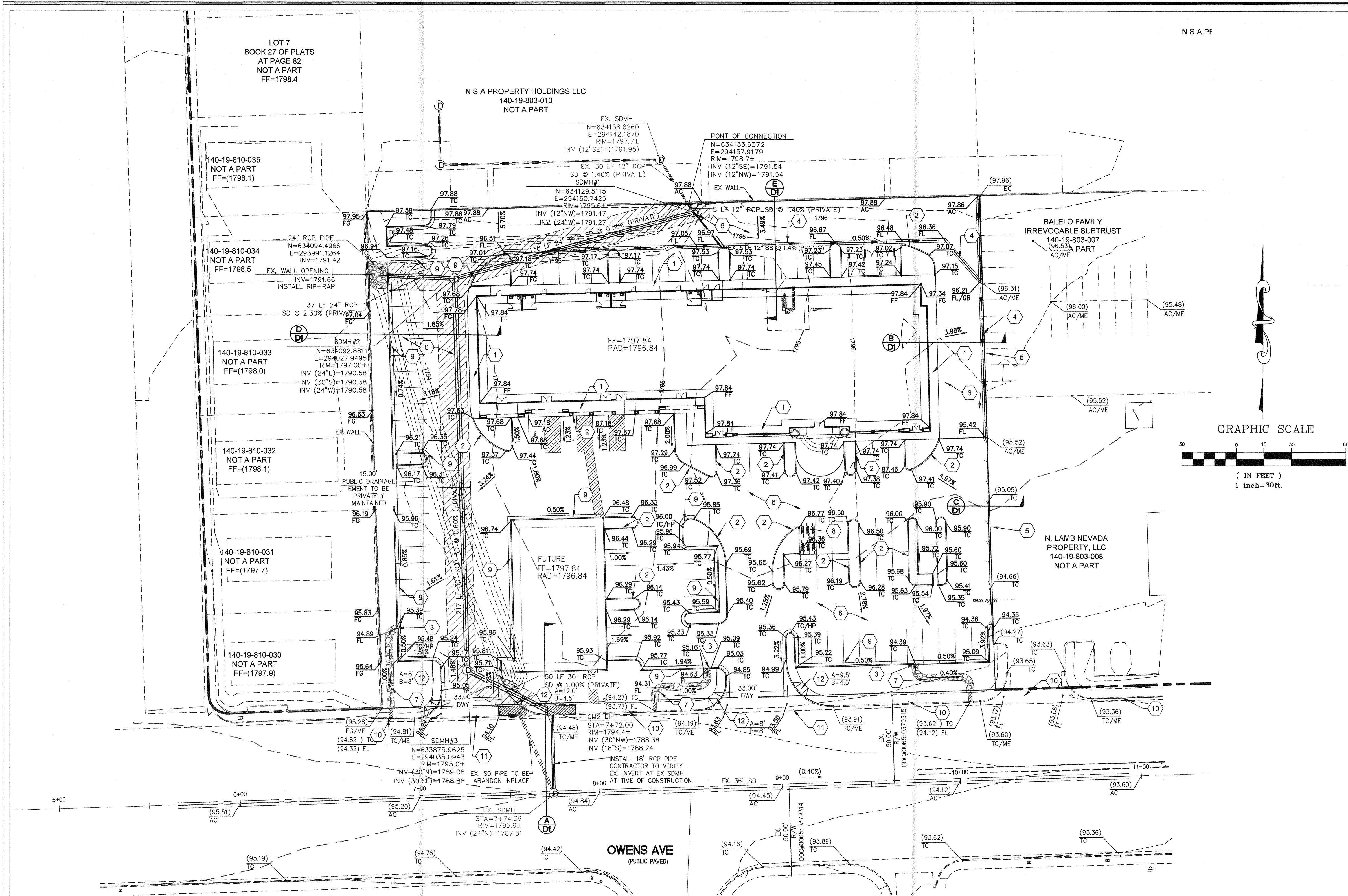
APPROVALS

BY: _____ DATE: _____
CLARK COUNTY FIRE DEPT.

APPROVAL OF THESE PLANS SHALL NOT BE A PERMIT FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS.
FIRE FLOW 1500 GPM AT 20 P.S.I. RESIDUAL.

Job No.		1813080	
FILE No.			
REUSE OF DOCUMENTS			
THIS DOCUMENT AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, IS AN INSTRUMENT OF BLUE STAMPED CIVIL ENGINEERING AND IS NOT TO BE USED IN THE FIELD OR AS PART OF ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF BLUE STAMPED CIVIL ENGINEERING			
APPROVED			
REVISIONS			
DISCREPANCY			
NO DATE			
STAMP			
BLUE DIAMOND CIVIL ENGINEERING 455 E. STEVENSON BLVD., #106 LAS VEGAS, NEVADA 89105 (702) 897-8914			
GENERAL NOTES RIVERA SHOPPING CENTER OWENS/LAMB			
CLARK COUNTY			
A.P.N. 140-19-803-006			
JOB No. 1813080			
DATE: 03/05/19			
VERT. SCALE: N/A			
HORIZ. SCALE: 1"=30'			
DRAWN BY: GA			
CHECKED BY: PDW			
SHEET 2 OF 6			





VICINITY MAP
T205/R61/ SEC 17

STORMWATER MANAGEMENT NOTES:

- THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD CONSTRUCTION DEBRIS, OR POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
- ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
- TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION II.A.5.
- AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT AREA EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMP'S WEEKLY AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
- ACCUMULATED SEDIMENT IN BMP'S SHALL BE REMOVED WITHIN 7 DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50% OR MORE.

CONSTRUCTION NOTES

- INSTALL SIDEWALK PER STD. DWG. NO. 234.
- INSTALL "A" CURB PER STD DWG NO. 219.
- INSTALL 2' CURB OPENING PER DETAIL SHEET 4.
- CONSTRUCT 2' WIDE CONCRETE VALLEY GUTTER PER DETAIL D1.
- SAW-CUT AND MATCH EXISTING AC.
- INSTALL 2" AC PAVEMENT PER THIS PAVEMENT SECTION:
TYPICAL ON-SITE PAVEMENT SECTION
FOG SEAL
2" ASPHALT CONCRETE
6" TYPE II A.B. AT 95% MAX. DENSITY
INSTALL 2" AC PAVEMENT PER THIS PAVEMENT SECTION:
TYPICAL ONSITE PAVEMENT SECTION
FOG SEAL
3" ASPHALT CONCRETE
6" TYPE II A.B. AT 95% MAX. DENSITY
- CONSTRUCT 40 LF BMP SWALE.
- BICYCLE AREA.
- INSTALL "L" CURB PER STD DWG NO. 216.
- EXISTING SIDEWALK CURB AND GUTTER TO REMAIN PROTECT IN PLACE
- INSTALL CROSS GUTTER PER STD. DWG. NO. 228.
- INSTALL SIDEWALK RAMP CASE I PER STD. DWG. NO. 235.

OWNER/DEVELOPER

IBARRA JESUS A RIVERA
& ANAYA VERENICE
LAS VEGAS, NV 89115

CIVIL ENGINEER

BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH BLVD., #188
LAS VEGAS, NV 89183
TEL: 702-287-8914

BENCHMARK

CLARK COUNTY BENCHMARK
MONUMENT ID: 702019SSE6
RIVET AND SQUARE ALUMINUM PLATE IN TOP OF CURB, ON THE NORTH SIDE OF OWENS AVE. AT THE NORTHWEST CORNER OF ROYAL ESTATES TRAILER PARK. BENCH IS ABOUT 0.25 MILES WEST OF LAMB BLVD.
ELEVATION: 1,796.367 (FEET) 547.534 (METERS)
PUBLIC WORKS SURVEY BENCHMARKS 2018 (NAVD 88).

BASIS OF BEARINGS

SOUTH 88°15'10" WEST, BEING THE BEARING OF THE CENTERLINE OF OWENS AVENUE AND THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 19, TOWNSHIP 20 SOUTH, RANGE 62 EAST, M.D.M., CLARK COUNTY, NEVADA AS RECORDED IN BOOK 124 OF PLATS AT PAGE 31, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

GRADING NOTES

- ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY IN THE PLANS OR CONDITIONS IN THE FIELD.
- ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENT HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO THE CLARK COUNTY.
- FOR AREAS THAT ARE FLATTER THAN 3:1 SLOPE, OR LESS THAN 1' ELEVATION DIFFERENCE, SCARPS ARE NOT SHOWN ON PLAN FOR CLARITY PURPOSES.
- ALL SLOPE AREAS SHALL HAVE A MINIMUM ONE FOOT SHOULDER NEXT TO WALL PRIOR TO STARTING SLOPE.
- THERE SHALL BE NO GRUBBING, GRADING OR CLEARING PRIOR TO THE APPROVAL OF THE CIVIL IMPROVEMENT PLANS AND FINAL GRADING PLANS BY THE PUBLIC WORKS DIRECTOR AND THE ISSUANCE OF A GRADING PERMIT. GRUBBING, GRADING AND CLEARING ARE TO OCCUR ONLY WITHIN THE AREAS IDENTIFIED ON THE APPROVED GRADING PLAN.
- ALL PORTIONS OF THE SITE OR LOT TO BE LEFT UNGRADED ARE TO REMAIN UNDISTURBED AREAS AND ARE NOT TO BE USED FOR STOCKPILING OF MATERIALS OR EXCESS FILL.
- DRIVEWAYS PER THE GRADING PLANS SHALL NOT EXCEED 12.5% MAX DRIVEWAY SLOPES.
- FOR ALL TRUNCATED NUMBERS ADD 2500'-FT TO THE ELEVATION.

EARTHWORK QUANTITIES

CUT (NET): 50 CY
FILL (NET): 50 CY
IMPORT: 0 CY
THIS INFORMATION SHOULD BE USED FOR BIDDING PURPOSES ONLY. ALL CONTRACTORS ARE RESPONSIBLE FOR VERIFYING THEIR OWN EARTHWORK QUANTITIES. THESE ESTIMATES ARE SUBJECT TO CHNGE BASED ON SITE SPECIFIC GEOTECHNICAL EVALUATIONS.

SOILS REPORT NOTE:

ALL GRADING SHALL CONFORM TO THE SOIL REPORT:
ENGINEER: XXX
DATE: XXXX
JOB NUMBER: XXXXX

FLOOD ZONE NOTE:

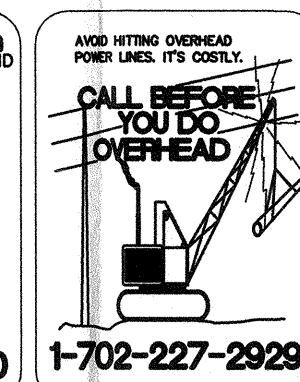
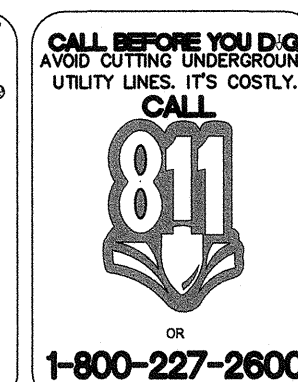
A REVIEW OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAPS (FIRM) COMMUNITY-PANEL NUMBER 32003C2179F, EFFECTIVE DATE NOVEMBER 16, 2011, INDICATES THE SITE IS LOCATED WITHIN A FEMA SHADED ZONE 'X'. A SHADED ZONE 'X' IS DESCRIBED BY FEMA AS AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1' FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM THE 1% ANNUAL CHANCE FLOOD.

LEGEND

- ROADWAY CENTERLINE
- SWALE/FLOWLINE
- PROPERTY LINE
- PROPOSED CUL WALL
- EXISTING CUL WALL
- EXISTING 'L' TYPE CURB
- EXISTING EDGE OF PAVEMENT
- 'L' TYPE CURB & GUTTER
- 'W' SIDEWALK
- 'A' TYPE CURB
- PROPOSED SAWCUT LINE
- EXISTING BUILDING FOOTPRINT
- EXISTING 1' CONTOURS
- EXISTING 5' CONTOURS

ABBREVIATIONS

- AC ASPHALTIC CONCRETE
- EG EXISTING GROUND
- EOP EDGE OF PAVEMENT
- FL FLOW LINE
- GB GRADE BREAK
- FF FINISH FLOOR
- PUE PUBLIC UTILITY EASEMENT
- ME MATCH EXISTING
- FG FINISH GRADE
- HP HIGH POINT
- R/W RIGHT-OF-WAY
- LP LOW POINT
- CONC CONCRETE



Job No.	1813080
DATE	03/06/19
VERT. SCALE	N/A
HORIZ. SCALE	1"=30'
DRAWN BY	GA
CHECKED BY	PDW
SHEET	3 OF 6

REVISIONS	DESCRIPTION	NO.	DATE

APPROVED	

REUSE OF DOCUMENTS	

BLUE DIAMOND CIVIL ENGINEERING	PHILIP D. WAKEFIELD
452 E. SILVERADO RANCH BLVD., #188	Exp: 6/30/20
LAS VEGAS, NEVADA 89183	CIVIL
(702) 287-8914	No. 15468

GRADING PLAN	RIVERA SHOPPING CENTER
	OWENS/LAMB

CLARK COUNTY	A.P.N. 140-19-803-006
--------------	-----------------------

**ADDENDUM #1 TO UPDATE #1 TO THE
TECHNICAL DRAINAGE STUDY FOR
RIVERA SHOPPING CENTER
(aka Lamb and Owens)**

Project No. 1813080

October 2019

Prepared for:

Jesus Rivera
1315 Ringe Lane
Las Vegas NV 89110

Prepared by:



BLUE DIAMOND CIVIL ENGINEERING
452 E. Silverado Ranch Blvd., #186
Las Vegas NV 89183
(702) 287-8914

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Rivera Shopping Center Date: 10/14/19

Location of Development: a) Descriptive (Cross Streets) North/South: Lamb Boulevard

East/West: Owens Avenue

b) Section: 19 Township: T20S Range: R62E

c) APN : 140-19-803-006

Name of Owner: Jesus Rivera

Telephone No.: NA Fax No.: NA E-Mail Address: NA

Address: 1315 Ringe Lane, Las Vegas, NV 89110

Contact Person-Name: Philip D. Wakefield, P.E. Telephone No.: 702-287-8914

* E-Mail Address: pwakefield@bdce-lv.com Fax No.: _____

Firm: Blue Diamond Civil Engineering

Address: 452 E. Silverado Ranch Blvd, #186, Las Vegas, NV 89183

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: 2+/- Acres Being Developed/Disturbed: 2+/- Acres

2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No

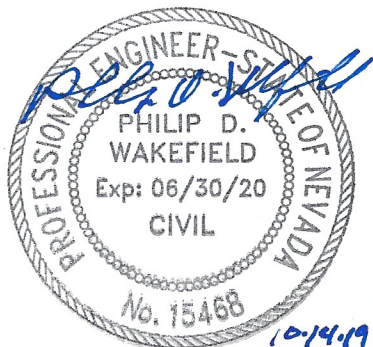
4. Proposed type of development (Residential, Commercial, Etc.): Commercial

5. Approximate upstream land area which drains to the subject site: Approximately 10 acres

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: The TDS for Lamb and Owens (PW08-28279)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The site is discharged to Owens Avenue.

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



Engineer's Seal

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

*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

October 14, 2019

Layne Weber, P.E.
Clark County Development Services
500 South Grand Central Parkway
Las Vegas, Nevada 89155

**Re: Addendum #1 to the Update #1 of the Technical Drainage Study for
Rivera Shopping Center
CC# PW19-12009**

Mr. Weber:

Blue Diamond Civil Engineering has received the Clark County review comments for the above referenced study, dated March 27, 2019. The comments in the subject memorandum have been reproduced with accompanying responses as follows:

Comment 1: Per the original drainage study (08-28279) the existing condition 10-year drylane criteria is not met with 119 cfs. The project is not allowed to make the situation worse. Note the referenced study shows the existing 36-inch storm drain in Owens is at full capacity and that the onsite flow will “overtop and travel east in Owens as surface flow” (Addendum #1, Comment 8). Revise the design to mitigate the increased 10-year flow from the site development, about 4 cfs (123 cfs – 119 cfs).

Response 1: The existing model has been reanalyzed from the original approved drainage study and has found differences in the curve number used for the existing site. The curve number in the original approved drainage study was determined to be 75. We have revised the curve number to 85 and the onsite basin peak flows in the existing condition are higher. The hydrologic parameters, figure, and HEC-1 model has been provided in the appendix. The following table shows a summary of the runoff amounts determined in the existing condition:

**10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
EXISTING RUNOFF AMOUNTS**

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
EON1	2.14	1	4
COM1*	--	120	477

*Include flows referenced from the TDS for Lamb and Owens

We have provided detention basins along the frontage of the project adjacent to Owens Avenue to mitigate the 10-year condition and not increase flows. A discharge of 1 cfs will be maintained in the future 10-year condition to match the existing 10-year condition. The hydrologic parameters, figure, and HEC-1 models have been provided in the appendix.

The following table shows a summary of the runoff amounts determined in the future condition:

**10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS**

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
FUTON1	0.78	1	3
FUTON2	0.38	1	1
FUTON3	0.98	2	3
COM1*	--	120	480

*Include flows referenced from the TDS for Lamb and Owens

Offsite street flow calculations for the 10-year and 100-year, 6-hour storm events are summarized in the following tables:

OFFSITE STREET FLOW CALCULATIONS

STREET	Q₁₀/Q₁₀₀ (cfs)	D₁₀/D₁₀₀ (ft)	V₁₀/V₁₀₀ (ft/s)	V x D
Owens Ave (Section 1) COM1	120/480	0.94/1.46	3.26/5.45	3.06/7.96

Some of the onsite sections have been modified with the revised grading plan. Onsite street flow calculations for the 10-year and 100-year, 6-hour storm events are summarized in the following tables:

ONSITE STREET FLOW CALCULATIONS

STREET	Q₁₀/Q₁₀₀ (cfs)	D₁₀/D₁₀₀ (ft)	V₁₀/V₁₀₀ (ft/s)	V x D
Section 2 25% FUTON1	0/1	0.00/0.16	0.00/1.23	0.00/0.20
Section 3 FUTON1	1/3	0.25/0.30	1.22/1.55	0.31/0.47
Section 4 25 % FUTON3	1/1	0.15/0.15	1.18/1.18	0.18/0.18
Section 5 50% FUTON3	1/2	0.26/0.32	2.46/2.83	0.64/0.91

Additional calculations have been provided in the appendix for the onsite stormdrain and drop inlet. All onsite drainage improvements have capacity to convey flows to Owens Avenue.

Comment 2: It is noted that the project requires structural calculations (for the side connection to drop inlet). Please provide an additional submittal to include: structural calculations, structural plans, grading plans (that match the drainage study) and associated geotechnical report. The structural submittal will require a fee of \$750 per 660-feet of storm drain facilities and be submitted under the Drainage Study tracking number.

Response 2: Noted.

Comment 3: Per Standard Drawing 402, drop inlets must be located a minimum of 10-feet from the nearest PC/PT of existing or future improvements.

Response 3: The drop inlet has been relocated 10 feet from the nearest PC/PT.

Comment 4: Label manhole size and pipe class on plans.

Response 4: The manhole sizes and pipe class has been labeled on the plans.

Comment 5: Revise acute angle for proposed onsite storm drain system to be 90 degrees or more.

Response 5: The proposed onsite stormdrain has been revised.

Comment 6: Label NDOT headwall, drop inlet and manhole standard drawing numbers on plans.

Response 6: The NDOT headwall, drop inlet, and manhole standard drawing numbers have been labeled on the revised plans.

Comment 7: The grading plans have been redlined. Provide highlighter marks and responses on plans to show the issues were addressed.

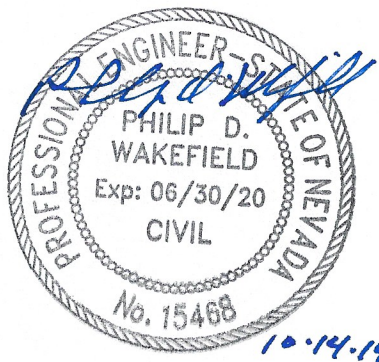
Response 7: The appropriate responses have been included on the redlined plans for your review.

I trust this satisfies your concerns regarding this project. If there are any questions, or additional information necessary, please contact this office.

Sincerely,

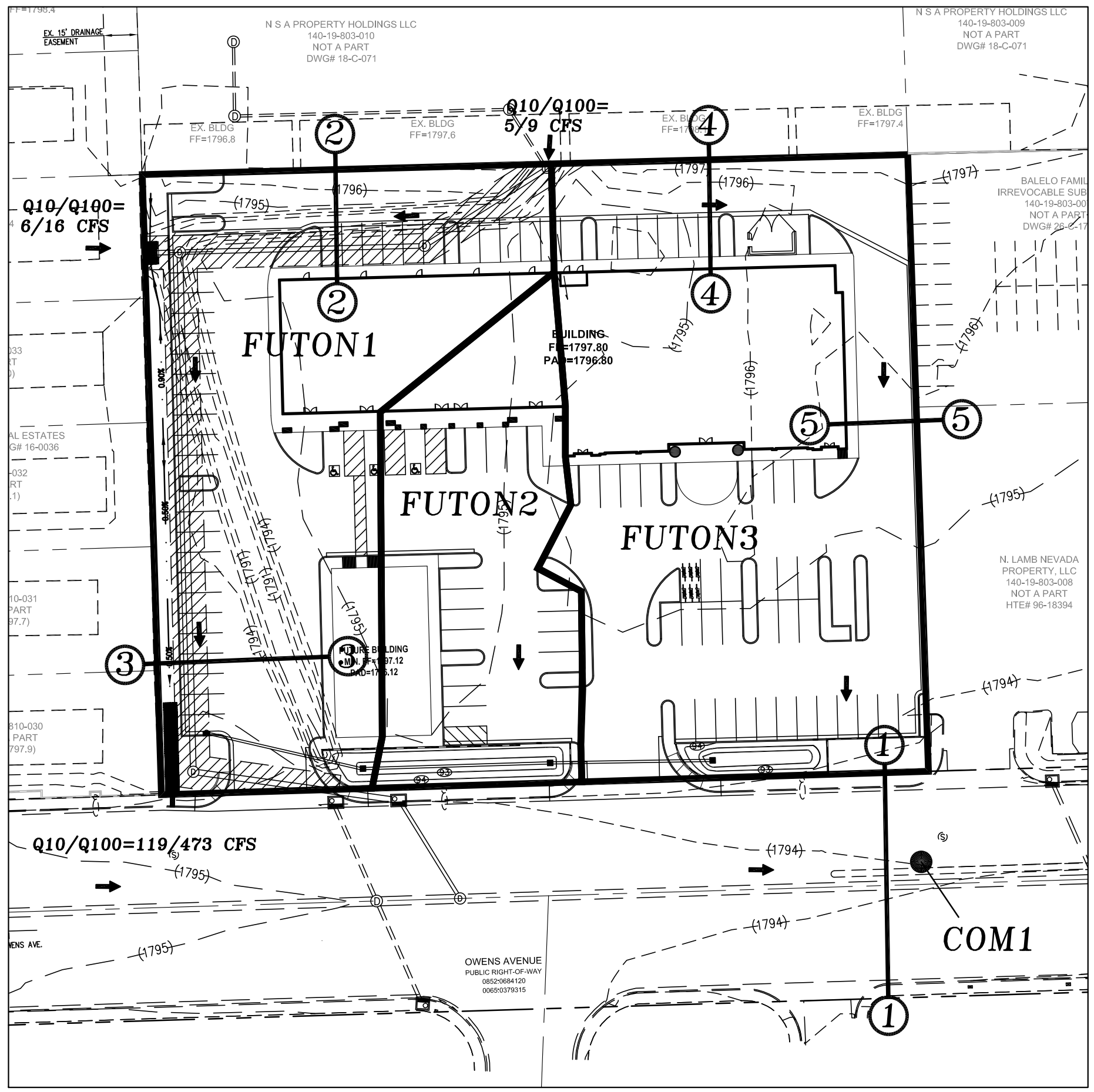
Blue Diamond Civil Engineering

Philip D. Wakefield, P.E.
Principal



APPENDIX

Revised Figures



LEGEND

DEV1

- BASIN NAME
- CONCENTRATION POINT
- FLOW DIRECTION
- BASIN BOUNDARY
- /— HYDRAULIC SECTION

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.

10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
FUTON1	0.78	1	3
FUTON2	0.38	1	1
FUTON3	0.98	2	3
COM1*	--	120	480

*Include flows referenced from the TDS for Lamb and Owens

OFFSITE STREET FLOW CALCULATIONS

STREET	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft/s)	V x D
Owens Ave (Section 1) COM1	120/480	0.94/1.46	3.26/5.45	3.06/7.96

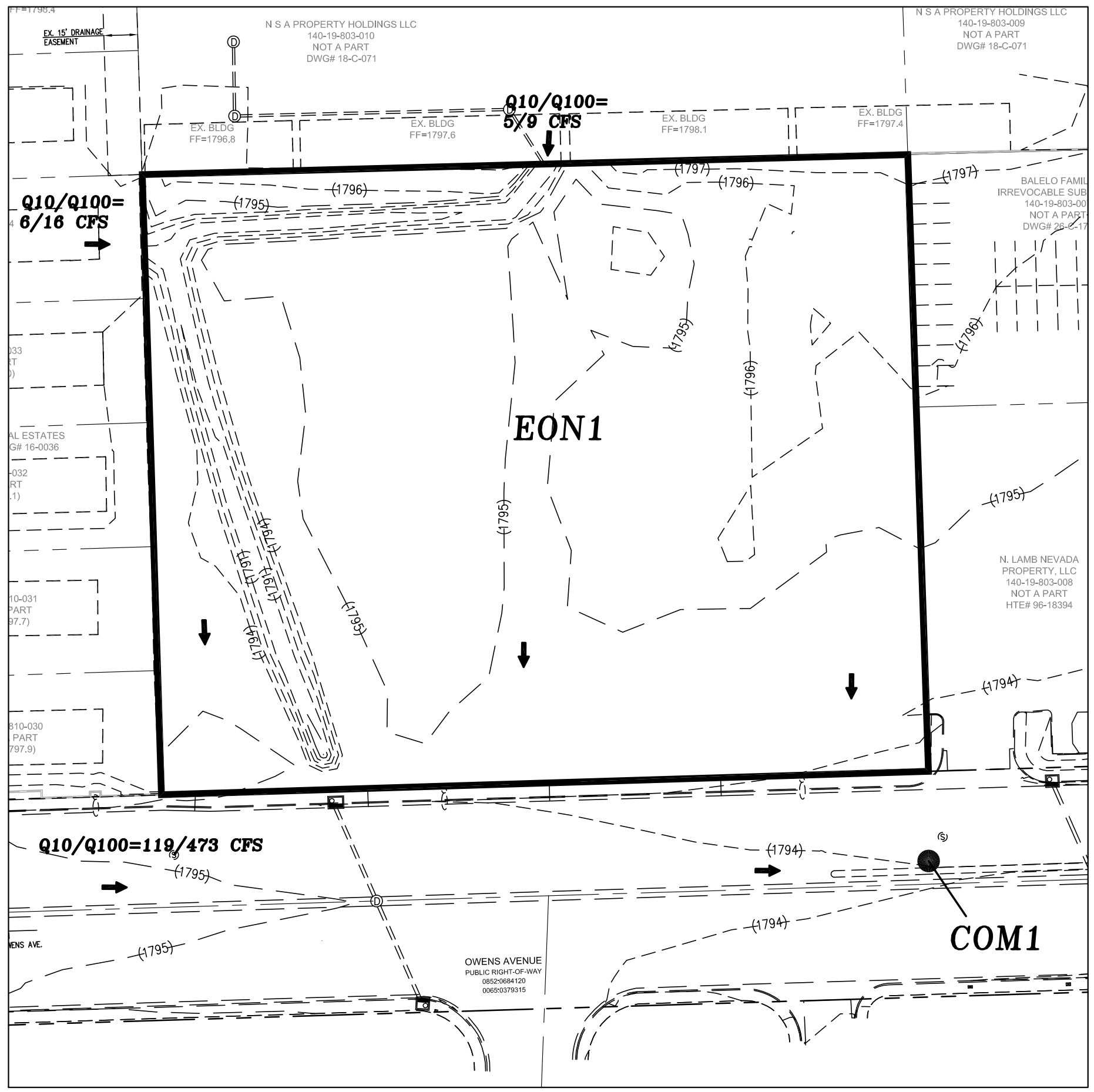
ONSITE STREET FLOW CALCULATIONS

STREET	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft/s)	V x D
Section 2 25% FUTON1	0/1	0.00/0.16	0.00/1.23	0.00/0.20
Section 3 FUTON1	1/3	0.25/0.30	1.22/1.55	0.31/0.47
Section 4 25 % FUTON3	1/1	0.15/0.15	1.18/1.18	0.18/0.18
Section 5 50% FUTON3	1/2	0.26/0.32	2.46/2.83	0.64/0.91

FIGURE 7

**DEVELOPED ONSITE
BASIN MAP**

BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH BLVD, #186
LAS VEGAS, NV 89183
(702) 287-8914



LEGEND

DEV1

- CONCENTRATION POINT
- ➔ FLOW DIRECTION
- BASIN BOUNDARY
- ⊙ HYDRAULIC SECTION

GRAPHIC SCALE

50 0 25 50

(IN FEET)

1 inch = 50 ft.

**10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
EXISTING RUNOFF AMOUNTS**

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
EON1	2.14	1	4
COM1*	--	120	477

*Include flows referenced from the TDS for Lamb and Owens

FIGURE 8

**EXISTING ONSITE
BASIN MAP**

BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH BLVD, #186
LAS VEGAS, NV 89183
(702) 287-8914

Revised Hydrologic Parameters

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (SEMIARID RANGELANDS¹)

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

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

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

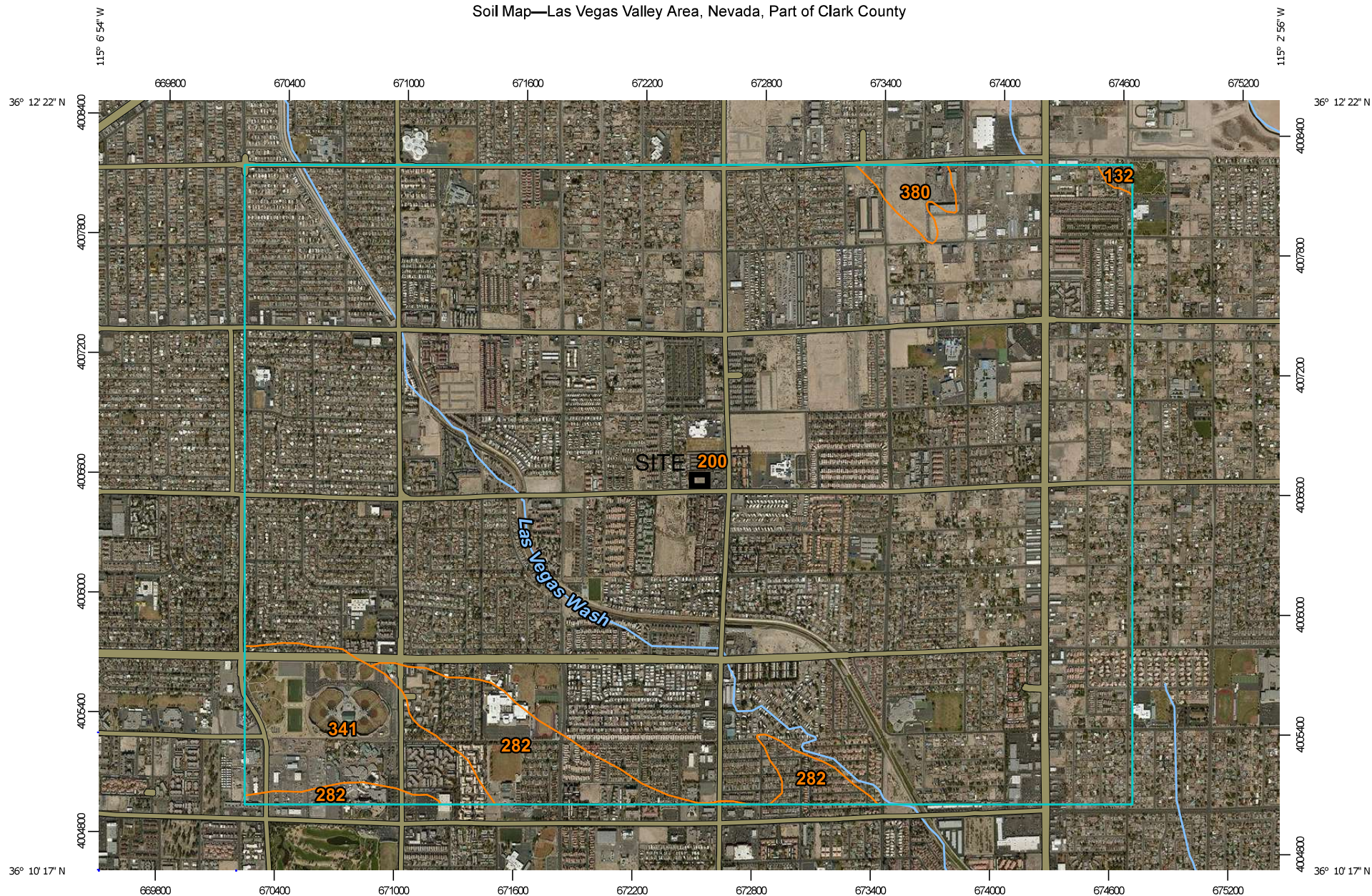
Fair: 30 to 70% ground cover.

Good: >70% ground cover.

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

Revision	Date

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



Map Scale: 1:27,200 if printed on A landscape (11" x 8.5") sheet.

0 400 800 1600 2400 Meters

0 1000 2000 4000 6000 Feet

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



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/7/2019
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.

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

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

Survey Area Data: Version 13, Sep 14, 2018

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

Date(s) aerial images were photographed: Sep 26, 2013—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
132	Bracken very gravelly fine sandy loam, 2 to 8 percent slopes	4.4	0.1%
200	Glencarb silt loam	3,203.9	90.2%
282	Land silty clay loam	154.0	4.3%
341	Paradise silt loam	162.7	4.6%
380	Skyhaven very fine sandy loam, 0 to 4 percent slopes	26.0	0.7%
Totals for Area of Interest		3,550.9	100.0%

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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

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

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

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

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—Las Vegas Valley Area, Nevada, Part of Clark County														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
132—Bracken very gravelly fine sandy loam, 2 to 8 percent slopes														
Bracken	100	A	0-5	Very gravelly fine sandy loam	GM	A-1	0- 0- 0	0- 3- 5	30-40-50	25-35-45	20-30-40	10-18-25	0-7 -14	NP
			5-50	Gypsiferous material	GP	A-1	—	—	—	—	—	—	—	—
			50-60	Weathered bedrock	—	—	—	—	—	—	—	—	—	—
200—Glencarb silt loam														
Glencarb	100	C	0-6	Silt loam	CL-ML, ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-95-100	70-80-90	20-25-30	NP-5-10
			6-60	Stratified very fine sandy loam to silty clay loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	75-80-85	25-30-35	5-10-15
282—Land silty clay loam														
Land	100	C	0-2	Silty clay loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	35-40-45	15-18-20
			2-64	Stratified silt loam to silty clay	CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	25-33-40	10-15-20

Engineering Properties—Las Vegas Valley Area, Nevada, Part of Clark County														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
341—Paradise silt loam														
Paradise	100	B	0-10	Silt loam	CL-ML, ML, CL	A-4	0- 0- 0	0- 0- 0	95-98-100	95-98-100	85-93-100	65-75-85	25-30-35	5-8 -10
			10-39	Sandy loam, loam, silt loam	ML, SM	A-4	0- 0- 0	0- 0- 0	85-93-100	85-93-100	65-78-90	45-58-70	20-23-25	NP-3 -5
			39-61	Silt loam	CL-ML, ML, CL	A-4	0- 0- 0	0- 0- 0	85-93-100	85-93-100	75-85-95	60-73-85	25-30-35	5-8 -10
380—Skyhaven very fine sandy loam, 0 to 4 percent slopes														
Skyhaven	100	C	0-1	Very fine sandy loam	ML, SM	A-4	0- 0- 0	0- 0- 0	80-90-100	75-88-100	70-83-95	40-55-70	15-20-25	NP-3 -5
			1-8	Clay loam	CL	A-6	0- 0- 0	0- 0- 0	80-90-100	75-88-100	70-83-95	55-68-80	35-38-40	15-18-20
			8-37	Gravelly silty clay loam, gravelly loam, gravelly clay loam	CL, GC	A-6	0- 0- 0	0- 3- 5	60-70-80	50-63-75	45-58-70	35-50-65	30-35-40	10-15-20
			37-41	Indurated	—	—	—	—	—	—	—	—	—	—

Data Source Information

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

Survey Area Data: Version 13, Sep 14, 2018



SOIL TYPE CALCULATED CURVE NUMBER

Soil Type #200 – (Desert Shrub)

Soil	Percent(%)	Soil Type	CN
Glencarb	100	C	85

CN = 85.0

Soil Type #200 – (Commercial)

Soil	Percent(%)	Soil Type	CN
Glencarb	100	C	94

CN = 94.0

Revised Existing Hec-1 Model

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
* RUN DATE 28MAY19 TIME 10:16:16
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
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X X XXXXXXX XXXXX X
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XXXXXXX XXXX X XXXXX X
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

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1 ID
2 ID TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER
3 ID CLARK COUNTY, NEVADA
4 ID
5 ID PREPARED FOR:
6 ID
7 ID PREPARED BY:
8 ID BLUE DIAMOND CIVIL ENGINEERING
9 ID 452 E. SILVERADO RANCH, # 186
10 ID LAS VEGAS, NV 89183
11 ID
12 ID
13 ID EXISTING 100- & 10-YEAR
14 ID FILENAME:RSC_EXA.DAT
15 ID JOB#1813080
16 ID
17 ID
18 ID
19 *DIAGRAM
20 IT 5 0 0 300
21 IO 5
22 IN 5
23 JR PREC 1.00 0.57
24 *
25 KK EON1
26 KM EXISTING ONSITE BASIN EON1
27 BA 0.0033
28 PB 2.77
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30 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
31 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
32 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
33 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
34 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
35 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
36 PC .998 .999 1.00
37 LS 0 85.0
38 UD 0.148
39 *
40 ZZ

```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

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

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

23 EON1

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*

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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
*

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* RUN DATE 28MAY19 TIME 10:16:16 *
*

* (916) 756-1104 *
*

TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER
CLARK COUNTY, NEVADA

PREPARED FOR:

PREPARED BY: BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH, # 186
LAS VEGAS, NV 89183

EXISTING 100- & 10-YEAR
FILENAME:RSC_EXA.DAT
JOB#1813080

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

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .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	RATIO 2
				1.00	.57
HYDROGRAPH AT					
+	EON1	.00	1 FLOW	4.	1.
			TIME	3.58	3.58

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

Revised Future Hec-1 Model

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 14OCT19 TIME 13:35:52 *
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*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
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X X XXXXXX XXXX X
X X X X X XX
X X X X X
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.

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1 HEC-1 INPUT PAGE 1

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

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1 ID
2 ID TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER
3 ID CLARK COUNTY, NEVADA
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9 ID 452 E. SILVERADO RANCH, # 186
10 ID LAS VEGAS, NV 89183
11 ID
12 ID
13 ID FUTURE 10-YEAR
14 ID FILENAME:RSC-10FUTB.DAT
15 ID JOB#1813080
16 ID
17 ID
18 ID
19 *DIAGRAM
20 IT 5 0 0 300
21 IO 5
22 IN 5
23 JR PREC 1.00
24 *
25 KK FUTON1
26 KM FUTURE ONSITE BASIN FUTON1
27 BA 0.0012
28 PB 1.58
29 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
30 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
31 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
32 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
33 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
34 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
35 PC .982 .985 .987 .989 .990 .993 .994 .995 .998
36 PC .998 .999 1.00
37 LS 0 94.0
38 UD 0.050
39 *
40 KK FUTON2
41 KM FUTURE ONSITE BASIN FUTON2
42 BA 0.0006
43 LS 0 94.0
44 UD 0.050
45 *
46 KK FUTON3
47 KM FUTURE ONSITE BASIN FUTON3
48 BA 0.0015
49 LS 0 94.0
50 UD 0.050
51 *

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1 HEC-1 INPUT PAGE 2

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

```

47      KK      COM1
48      KM      COMBINE FUTON1, FUTON2, AND FUTON3
49      HC      3
      *

50      KK      DET1
51      KM      DETENTION BASIN DET1
52      KO      1
53      RS      1      STOR      0
54      SV      0.0    0.001    0.009    0.054
55      SE      792.10  792.50  793.00  794.00
56      SQ      0.0    1.00    1.00    1.00
      *
57      ZZ
1
      SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE      (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.      (.) CONNECTOR      (<---) RETURN OF DIVERTED OR PUMPED FLOW

23      FUTON1
      .
37      .      FUTON2
      .
42      .      .      FUTON3
      .
47      COM1.....
      V
      V
50      DET1

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 14OCT19 TIME 13:35:52 *
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*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*
*****

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TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER CLARK COUNTY, NEVADA

PREPARED FOR:

PREPARED BY:

BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH, # 186
LAS VEGAS, NV 89183

FUTURE 10-YEAR
FILENAME:RSC-10FUTB.DAT
JOB#1813080

```

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

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

      COMPUTATION INTERVAL      .08 HOURS
      TOTAL TIME BASE      24.92 HOURS

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

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TEMPERATURE          DEGREES FAHRENHEIT

JP      MULTI-PLAN OPTION
        NPLAN          1  NUMBER OF PLANS

JR      MULTI-RATIO OPTION
        RATIOS OF PRECIPITATION
        1.00

*** **

*****
*
50 KK  *   DET1   *
*
*****

52 KO      OUTPUT CONTROL VARIABLES
          IPRNT          1  PRINT CONTROL
          IPLOT          0  PLOT CONTROL
          QSCAL          0.  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

53 RS      STORAGE ROUTING
          NSTPS          1  NUMBER OF SUBREACHES
          ITYP          TOR  TYPE OF INITIAL CONDITION
          RSVRIC          .00 INITIAL CONDITION
          X              .00 WORKING R AND D COEFFICIENT

54 SV      STORAGE          .0          .0          .0          .1

55 SE      ELEVATION        792.10      792.50      793.00      794.00

56 SQ      DISCHARGE        0.          1.          1.          1.

***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN          0. TO          1.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*****

HYDROGRAPH AT STATION      DET1
PLAN 1,  RATIO = 1.00

*****

DA MON HRMN ORD  OUTFLOW  STORAGE  STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE  STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE  STAGE
*
1      0000  1      0.      .0  792.1 * 1      0820 101      0.      .0  792.1 * 1      1640 201      0.      .0  792.1
1      0005  2      0.      .0  792.1 * 1      0825 102      0.      .0  792.1 * 1      1645 202      0.      .0  792.1
1      0010  3      0.      .0  792.1 * 1      0830 103      0.      .0  792.1 * 1      1650 203      0.      .0  792.1
1      0015  4      0.      .0  792.1 * 1      0835 104      0.      .0  792.1 * 1      1655 204      0.      .0  792.1
1      0020  5      0.      .0  792.1 * 1      0840 105      0.      .0  792.1 * 1      1700 205      0.      .0  792.1
1      0025  6      0.      .0  792.1 * 1      0845 106      0.      .0  792.1 * 1      1705 206      0.      .0  792.1
1      0030  7      0.      .0  792.1 * 1      0850 107      0.      .0  792.1 * 1      1710 207      0.      .0  792.1
1      0035  8      0.      .0  792.1 * 1      0855 108      0.      .0  792.1 * 1      1715 208      0.      .0  792.1
1      0040  9      0.      .0  792.1 * 1      0900 109      0.      .0  792.1 * 1      1720 209      0.      .0  792.1
1      0045 10      0.      .0  792.1 * 1      0905 110      0.      .0  792.1 * 1      1725 210      0.      .0  792.1
1      0050 11      0.      .0  792.1 * 1      0910 111      0.      .0  792.1 * 1      1730 211      0.      .0  792.1
1      0055 12      0.      .0  792.1 * 1      0915 112      0.      .0  792.1 * 1      1735 212      0.      .0  792.1
1      0100 13      0.      .0  792.1 * 1      0920 113      0.      .0  792.1 * 1      1740 213      0.      .0  792.1
1      0105 14      0.      .0  792.1 * 1      0925 114      0.      .0  792.1 * 1      1745 214      0.      .0  792.1
1      0110 15      0.      .0  792.1 * 1      0930 115      0.      .0  792.1 * 1      1750 215      0.      .0  792.1
1      0115 16      0.      .0  792.1 * 1      0935 116      0.      .0  792.1 * 1      1755 216      0.      .0  792.1
1      0120 17      0.      .0  792.1 * 1      0940 117      0.      .0  792.1 * 1      1800 217      0.      .0  792.1
1      0125 18      0.      .0  792.1 * 1      0945 118      0.      .0  792.1 * 1      1805 218      0.      .0  792.1
1      0130 19      0.      .0  792.2 * 1      0950 119      0.      .0  792.1 * 1      1810 219      0.      .0  792.1
1      0135 20      0.      .0  792.2 * 1      0955 120      0.      .0  792.1 * 1      1815 220      0.      .0  792.1
1      0140 21      0.      .0  792.2 * 1      1000 121      0.      .0  792.1 * 1      1820 221      0.      .0  792.1
1      0145 22      0.      .0  792.1 * 1      1005 122      0.      .0  792.1 * 1      1825 222      0.      .0  792.1
1      0150 23      0.      .0  792.1 * 1      1010 123      0.      .0  792.1 * 1      1830 223      0.      .0  792.1
1      0155 24      0.      .0  792.1 * 1      1015 124      0.      .0  792.1 * 1      1835 224      0.      .0  792.1
1      0200 25      0.      .0  792.1 * 1      1020 125      0.      .0  792.1 * 1      1840 225      0.      .0  792.1
1      0205 26      0.      .0  792.1 * 1      1025 126      0.      .0  792.1 * 1      1845 226      0.      .0  792.1
1      0210 27      0.      .0  792.1 * 1      1030 127      0.      .0  792.1 * 1      1850 227      0.      .0  792.1
1      0215 28      0.      .0  792.2 * 1      1035 128      0.      .0  792.1 * 1      1855 228      0.      .0  792.1
1      0220 29      0.      .0  792.2 * 1      1040 129      0.      .0  792.1 * 1      1900 229      0.      .0  792.1
1      0225 30      0.      .0  792.2 * 1      1045 130      0.      .0  792.1 * 1      1905 230      0.      .0  792.1
1      0230 31      0.      .0  792.1 * 1      1050 131      0.      .0  792.1 * 1      1910 231      0.      .0  792.1
1      0235 32      0.      .0  792.1 * 1      1055 132      0.      .0  792.1 * 1      1915 232      0.      .0  792.1
1      0240 33      0.      .0  792.2 * 1      1100 133      0.      .0  792.1 * 1      1920 233      0.      .0  792.1
1      0245 34      0.      .0  792.2 * 1      1105 134      0.      .0  792.1 * 1      1925 234      0.      .0  792.1
1      0250 35      0.      .0  792.1 * 1      1110 135      0.      .0  792.1 * 1      1930 235      0.      .0  792.1
1      0255 36      0.      .0  792.1 * 1      1115 136      0.      .0  792.1 * 1      1935 236      0.      .0  792.1
1      0300 37      0.      .0  792.2 * 1      1120 137      0.      .0  792.1 * 1      1940 237      0.      .0  792.1
1      0305 38      0.      .0  792.3 * 1      1125 138      0.      .0  792.1 * 1      1945 238      0.      .0  792.1
1      0310 39      1.      .0  792.4 * 1      1130 139      0.      .0  792.1 * 1      1950 239      0.      .0  792.1
1      0315 40      1.      .0  792.5 * 1      1135 140      0.      .0  792.1 * 1      1955 240      0.      .0  792.1
1      0320 41      1.      .0  792.9 * 1      1140 141      0.      .0  792.1 * 1      2000 241      0.      .0  792.1

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1	0325	42	1.	.0	793.2	*	1	1145	142	0.	.0	792.1	*	1	2005	242	0.	.0	792.1
1	0330	43	1.	.0	793.5	*	1	1150	143	0.	.0	792.1	*	1	2010	243	0.	.0	792.1
1	0335	44	1.	.0	793.8	*	1	1155	144	0.	.0	792.1	*	1	2015	244	0.	.0	792.1
1	0340	45	1.	.0	793.9	*	1	1200	145	0.	.0	792.1	*	1	2020	245	0.	.0	792.1
1	0345	46	1.	.1	793.9	*	1	1205	146	0.	.0	792.1	*	1	2025	246	0.	.0	792.1
1	0350	47	1.	.1	793.9	*	1	1210	147	0.	.0	792.1	*	1	2030	247	0.	.0	792.1
1	0355	48	1.	.0	793.8	*	1	1215	148	0.	.0	792.1	*	1	2035	248	0.	.0	792.1
1	0400	49	1.	.0	793.8	*	1	1220	149	0.	.0	792.1	*	1	2040	249	0.	.0	792.1
1	0405	50	1.	.0	793.7	*	1	1225	150	0.	.0	792.1	*	1	2045	250	0.	.0	792.1
1	0410	51	1.	.0	793.6	*	1	1230	151	0.	.0	792.1	*	1	2050	251	0.	.0	792.1
1	0415	52	1.	.0	793.5	*	1	1235	152	0.	.0	792.1	*	1	2055	252	0.	.0	792.1
1	0420	53	1.	.0	793.3	*	1	1240	153	0.	.0	792.1	*	1	2100	253	0.	.0	792.1
1	0425	54	1.	.0	793.2	*	1	1245	154	0.	.0	792.1	*	1	2105	254	0.	.0	792.1
1	0430	55	1.	.0	793.2	*	1	1250	155	0.	.0	792.1	*	1	2110	255	0.	.0	792.1
1	0435	56	1.	.0	793.1	*	1	1255	156	0.	.0	792.1	*	1	2115	256	0.	.0	792.1
1	0440	57	1.	.0	793.0	*	1	1300	157	0.	.0	792.1	*	1	2120	257	0.	.0	792.1
1	0445	58	1.	.0	792.9	*	1	1305	158	0.	.0	792.1	*	1	2125	258	0.	.0	792.1
1	0450	59	1.	.0	792.7	*	1	1310	159	0.	.0	792.1	*	1	2130	259	0.	.0	792.1
1	0455	60	1.	.0	792.5	*	1	1315	160	0.	.0	792.1	*	1	2135	260	0.	.0	792.1
1	0500	61	0.	.0	792.1	*	1	1320	161	0.	.0	792.1	*	1	2140	261	0.	.0	792.1
1	0505	62	0.	.0	792.2	*	1	1325	162	0.	.0	792.1	*	1	2145	262	0.	.0	792.1
1	0510	63	0.	.0	792.1	*	1	1330	163	0.	.0	792.1	*	1	2150	263	0.	.0	792.1
1	0515	64	0.	.0	792.1	*	1	1335	164	0.	.0	792.1	*	1	2155	264	0.	.0	792.1
1	0520	65	0.	.0	792.1	*	1	1340	165	0.	.0	792.1	*	1	2200	265	0.	.0	792.1
1	0525	66	0.	.0	792.1	*	1	1345	166	0.	.0	792.1	*	1	2205	266	0.	.0	792.1
1	0530	67	0.	.0	792.1	*	1	1350	167	0.	.0	792.1	*	1	2210	267	0.	.0	792.1
1	0535	68	0.	.0	792.1	*	1	1355	168	0.	.0	792.1	*	1	2215	268	0.	.0	792.1
1	0540	69	0.	.0	792.1	*	1	1400	169	0.	.0	792.1	*	1	2220	269	0.	.0	792.1
1	0545	70	0.	.0	792.1	*	1	1405	170	0.	.0	792.1	*	1	2225	270	0.	.0	792.1
1	0550	71	0.	.0	792.1	*	1	1410	171	0.	.0	792.1	*	1	2230	271	0.	.0	792.1
1	0555	72	0.	.0	792.1	*	1	1415	172	0.	.0	792.1	*	1	2235	272	0.	.0	792.1
1	0600	73	0.	.0	792.1	*	1	1420	173	0.	.0	792.1	*	1	2240	273	0.	.0	792.1
1	0605	74	0.	.0	792.1	*	1	1425	174	0.	.0	792.1	*	1	2245	274	0.	.0	792.1
1	0610	75	0.	.0	792.1	*	1	1430	175	0.	.0	792.1	*	1	2250	275	0.	.0	792.1
1	0615	76	0.	.0	792.1	*	1	1435	176	0.	.0	792.1	*	1	2255	276	0.	.0	792.1
1	0620	77	0.	.0	792.1	*	1	1440	177	0.	.0	792.1	*	1	2300	277	0.	.0	792.1
1	0625	78	0.	.0	792.1	*	1	1445	178	0.	.0	792.1	*	1	2305	278	0.	.0	792.1
1	0630	79	0.	.0	792.1	*	1	1450	179	0.	.0	792.1	*	1	2310	279	0.	.0	792.1
1	0635	80	0.	.0	792.1	*	1	1455	180	0.	.0	792.1	*	1	2315	280	0.	.0	792.1
1	0640	81	0.	.0	792.1	*	1	1500	181	0.	.0	792.1	*	1	2320	281	0.	.0	792.1
1	0645	82	0.	.0	792.1	*	1	1505	182	0.	.0	792.1	*	1	2325	282	0.	.0	792.1
1	0650	83	0.	.0	792.1	*	1	1510	183	0.	.0	792.1	*	1	2330	283	0.	.0	792.1
1	0655	84	0.	.0	792.1	*	1	1515	184	0.	.0	792.1	*	1	2335	284	0.	.0	792.1
1	0700	85	0.	.0	792.1	*	1	1520	185	0.	.0	792.1	*	1	2340	285	0.	.0	792.1
1	0705	86	0.	.0	792.1	*	1	1525	186	0.	.0	792.1	*	1	2345	286	0.	.0	792.1
1	0710	87	0.	.0	792.1	*	1	1530	187	0.	.0	792.1	*	1	2350	287	0.	.0	792.1
1	0715	88	0.	.0	792.1	*	1	1535	188	0.	.0	792.1	*	1	2355	288	0.	.0	792.1
1	0720	89	0.	.0	792.1	*	1	1540	189	0.	.0	792.1	*	2	0000	289	0.	.0	792.1
1	0725	90	0.	.0	792.1	*	1	1545	190	0.	.0	792.1	*	2	0005	290	0.	.0	792.1
1	0730	91	0.	.0	792.1	*	1	1550	191	0.	.0	792.1	*	2	0010	291	0.	.0	792.1
1	0735	92	0.	.0	792.1	*	1	1555	192	0.	.0	792.1	*	2	0015	292	0.	.0	792.1
1	0740	93	0.	.0	792.1	*	1	1600	193	0.	.0	792.1	*	2	0020	293	0.	.0	792.1
1	0745	94	0.	.0	792.1	*	1	1605	194	0.	.0	792.1	*	2	0025	294	0.	.0	792.1
1	0750	95	0.	.0	792.1	*	1	1610	195	0.	.0	792.1	*	2	0030	295	0.	.0	792.1
1	0755	96	0.	.0	792.1	*	1	1615	196	0.	.0	792.1	*	2	0035	296	0.	.0	792.1
1	0800	97	0.	.0	792.1	*	1	1620	197	0.	.0	792.1	*	2	0040	297	0.	.0	792.1
1	0805	98	0.	.0	792.1	*	1	1625	198	0.	.0	792.1	*	2	0045	298	0.	.0	792.1
1	0810	99	0.	.0	792.1	*	1	1630	199	0.	.0	792.1	*	2	0050	299	0.	.0	792.1
1	0815	100	0.	.0	792.1	*	1	1635	200	0.	.0	792.1	*	2	0055	300	0.	.0	792.1

PEAK FLOW	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)				
		(CFS)				
+	1.	3.25	0.	0.	0.	0.
		(INCHES)	1.010	1.010	1.010	1.010
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(AC-FT)	(HR)				
	0.	3.75	0.	0.	0.	0.

PEAK STAGE	TIME		6-HR	24-HR	72-HR	24.92-HR
+	(FEET)	(HR)				
	793.94	3.75	792.49	792.19	792.19	792.19

CUMULATIVE AREA = .00 SQ MI

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
HYDROGRAPH AT				
+	FUTON1	.00	1 FLOW	1.

				TIME	3.50
HYDROGRAPH AT					
+	FUTON2	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	FUTON3	.00	1	FLOW	2.
				TIME	3.50
3 COMBINED AT					
+	COM1	.00	1	FLOW	4.
				TIME	3.50
ROUTED TO					
+	DET1	.00	1	FLOW	1.
				TIME	3.25
				** PEAK STAGES IN FEET **	
			1	STAGE	793.94
				TIME	3.75

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

```

1*****
*
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)
*       JUN 1998
*       VERSION 4.1
*
*   RUN DATE 14OCT19 TIME 13:35:43
*
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*****
*
*   U.S. ARMY CORPS OF ENGINEERS
*   HYDROLOGIC ENGINEERING CENTER
*   609 SECOND STREET
*   DAVIS, CALIFORNIA 95616
*   (916) 756-1104
*
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X   X   XXXXXX   XXXXX   X
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   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
2   ID          TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER
3   ID          CLARK COUNTY, NEVADA
4   ID
5   ID          PREPARED FOR:
6   ID
7   ID          PREPARED BY:
8   ID          BLUE DIAMOND CIVIL ENGINEERING
9   ID          452 E. SILVERADO RANCH, # 186
10  ID          LAS VEGAS, NV 89183
11  ID
12  ID
13  ID          FUTURE 100-YEAR
14  ID          FILENAME:RSC-100FUTB.DAT
15  ID          JOB#1813080
16  ID
17  ID
18  ID
19  *DIAGRAM
20  IT          5          0          0          300
21  IO          5
22  IN          5
23  JR          PREC      1.00
24  *
25  KK          FUTON1
26  KM          FUTURE ONSITE BASIN FUTON1
27  BA          0.0012
28  PB          2.77
29  PC          .000      .020      .057      .070      .087      .108      .124      .130      .130      .130
30  PC          .130      .130      .130      .133      .140      .142      .148      .158      .172      .181
31  PC          .190      .197      .199      .200      .201      .204      .214      .229      .241      .249
32  PC          .251      .256      .270      .278      .281      .283      .295      .322      .352      .409
33  PC          .499      .590      .710      .744      .781      .812      .819      .835      .851      .856
34  PC          .860      .868      .876      .888      .910      .926      .937      .950      .970      .976
35  PC          .982      .985      .987      .989      .990      .993      .994      .995      .995      .998
36  LS          0          94.0
37  UD          0.050
38  *
39  KK          FUTON2
40  KM          FUTURE ONSITE BASIN FUTON2
41  BA          0.0006
42  LS          0          94.0
43  UD          0.050
44  *
45  KK          FUTON3
46  KM          FUTURE ONSITE BASIN FUTON3
47  BA          0.0015
48  LS          0          94.0
49  UD          0.050
50  *

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1 HEC-1 INPUT PAGE 2

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

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47      KK      COM1
48      KM      COMBINE FUTON1, FUTON2, AND FUTON3
49      HC      3
          *
50      ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
LINE    (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.      (.) CONNECTOR    (<---) RETURN OF DIVERTED OR PUMPED FLOW
23      FUTON1
          .
          .
37      .      FUTON2
          .
          .
42      .      .      FUTON3
          .      .
          .      .
47      COM1.....

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*      FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*      JUN 1998 *
*      VERSION 4.1 *
*      RUN DATE 14OCT19 TIME 13:35:43 *
*****

```

```

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

```

TECHNICAL DRAINAGE STUDY FOR RIVERA SHOPPING CENTER CLARK COUNTY, NEVADA

PREPARED FOR:

PREPARED BY: BLUE DIAMOND CIVIL ENGINEERING
452 E. SILVERADO RANCH, # 186
LAS VEGAS, NV 89183

FUTURE 100-YEAR
FILENAME:RSC-100FUTB.DAT
JOB#1813080

```

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

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

          COMPUTATION INTERVAL .08 HOURS
          TOTAL TIME BASE 24.92 HOURS

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

JP          MULTI-PLAN OPTION
          NPLAN      1 NUMBER OF PLANS

JR          MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          1.00
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	
HYDROGRAPH AT					
+	FUTON1	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	FUTON2	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	FUTON3	.00	1	FLOW	3.
				TIME	3.50
3 COMBINED AT					
+	COM1	.00	1	FLOW	7.
				TIME	3.50

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

Detention Basin Parameters

DETENTION BASIN PARAMETERS

BASIN FUTON1/FUTON2/FUTON3

Elevation	Surface Area	Volume (FT3)	Volume (Acre-ft)	Outflow
1792.1	0	0	0	
1792.5	280.85	56.17	0.001	1
1793	998.55	376.02	0.009	1
1794	2946.86	2348.725	0.054	1

Revised Hydraulic Calculations

Worksheet for Add1: 10 Yr Owens Ave (Section 1)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 ft/ft
Discharge 120.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+93.00, 0.13)	0.016
(0+93.00, 0.13)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for Add1: 10 Yr Owens Ave (Section 1)

Results

Normal Depth		0.94	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		36.81	ft ²
Wetted Perimeter		93.02	ft
Hydraulic Radius		0.40	ft
Top Width		91.22	ft
Normal Depth		0.94	ft
Critical Depth		0.91	ft
Critical Slope		0.00495	ft/ft
Velocity		3.26	ft/s
Velocity Head		0.17	ft
Specific Energy		1.11	ft
Froude Number		0.90	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.94	ft
Critical Depth	0.91	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00495	ft/ft

Cross Section for Add1: 10 Yr Owens Ave (Section 1)

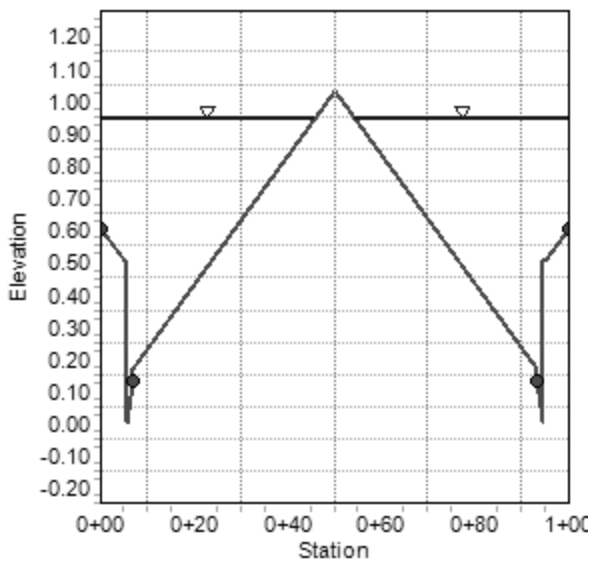
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	0.94	ft
Discharge	120.00	ft ³ /s

Cross Section Image



Worksheet for Add1: 100 Yr Owens Ave (Section 1)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 ft/ft
Discharge 480.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+93.00, 0.13)	0.016
(0+93.00, 0.13)	(1+00.00, 0.60)	0.013

Options

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

Worksheet for Add1: 100 Yr Owens Ave (Section 1)

Results

Normal Depth		1.46	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		88.08	ft ²
Wetted Perimeter		102.83	ft
Hydraulic Radius		0.86	ft
Top Width		100.00	ft
Normal Depth		1.46	ft
Critical Depth		1.47	ft
Critical Slope		0.00380	ft/ft
Velocity		5.45	ft/s
Velocity Head		0.46	ft
Specific Energy		1.92	ft
Froude Number		1.02	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.46	ft
Critical Depth	1.47	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00380	ft/ft

Cross Section for Add1: 100 Yr Owens Ave (Section 1)

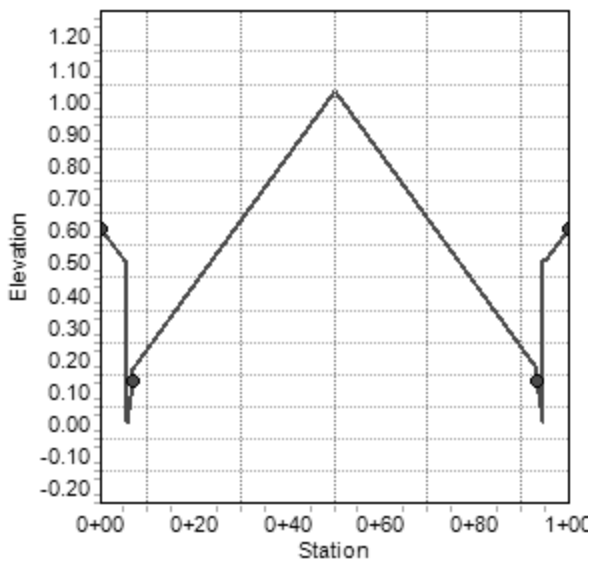
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	1.46	ft
Discharge	480.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)

Elevation (ft)

Roughness Segment Definitions

Start Station

Ending Station

Roughness Coefficient

(0+00.00, 1.24)

(0+42.00, 0.50)

0.016

Options

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

Results

Normal Depth		0.16	ft
Elevation Range	0.00 to 1.24 ft		
Flow Area		0.82	ft²
Wetted Perimeter		10.10	ft
Hydraulic Radius		0.08	ft
Top Width		10.10	ft
Normal Depth		0.16	ft
Critical Depth		0.14	ft
Critical Slope		0.00896	ft/ft
Velocity		1.23	ft/s

Worksheet for Add1: 100 Yr Section 2

Results

Velocity Head	0.02	ft
Specific Energy	0.18	ft
Froude Number	0.76	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.16	ft
Critical Depth	0.14	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00896	ft/ft

Cross Section for Add1: 100 Yr Section 2

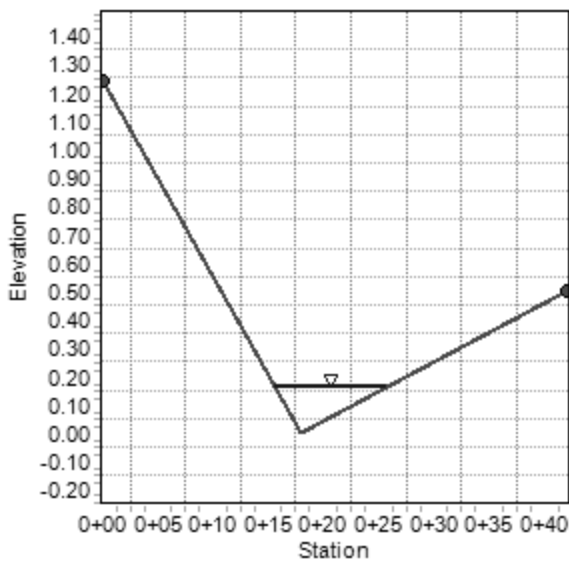
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.16	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Worksheet for Add1: 10 Yr Section 3

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00850 ft/ft
Discharge 1.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.00	0.00
0+01.50	0.13
0+01.50	0.17
0+60.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+60.00, 0.50)	0.016

Options

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

Results

Normal Depth 0.25 ft
Elevation Range 0.00 to 0.50 ft
Flow Area 0.82 ft²
Wetted Perimeter 15.66 ft
Hydraulic Radius 0.05 ft
Top Width 15.37 ft
Normal Depth 0.25 ft

Worksheet for Add1: 10 Yr Section 3

Results

Critical Depth	0.25	ft
Critical Slope	0.00987	ft/ft
Velocity	1.22	ft/s
Velocity Head	0.02	ft
Specific Energy	0.27	ft
Froude Number	0.94	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.25	ft
Channel Slope	0.00850	ft/ft
Critical Slope	0.00987	ft/ft

Cross Section for Add1: 10 Yr Section 3

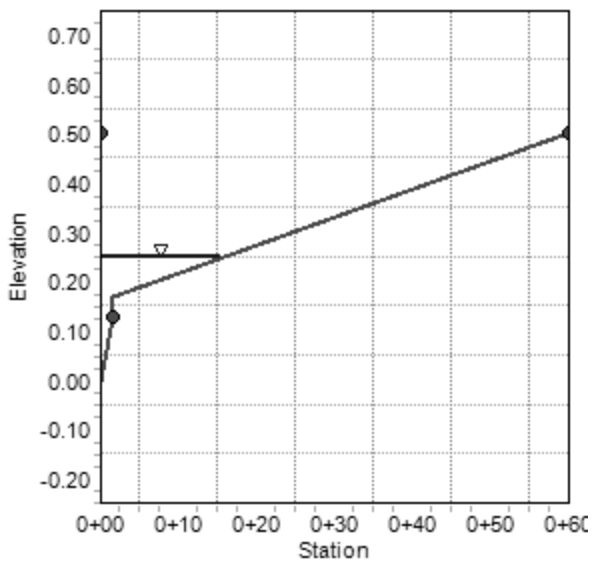
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00850	ft/ft
Normal Depth	0.25	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)	Elevation (ft)
100	100
200	100
300	100
400	100
500	100
600	100
700	100
800	100
900	100
1000	100
1100	100
1200	100
1300	100
1400	100
1500	100
1600	100
1700	100
1800	100
1900	100
2000	100
2100	100
2200	100
2300	100
2400	100
2500	100
2600	100
2700	100
2800	100
2900	100
3000	100
3100	100
3200	100
3300	100
3400	100
3500	100
3600	100
3700	100
3800	100
3900	100
4000	100
4100	100
4200	100
4300	100
4400	100
4500	100
4600	100
4700	100
4800	100
4900	100
5000	100
5100	100
5200	100
5300	100
5400	100
5500	100
5600	100
5700	100
5800	100
5900	100
6000	100
6100	100
6200	100
6300	100
6400	100
6500	100
6600	100
6700	100
6800	100
6900	100
7000	100
7100	100
7200	100
7300	100
7400	100
7500	100
7600	100
7700	100
7800	100
7900	100
8000	100
8100	100
8200	100
8300	100
8400	100
8500	100
8600	100
8700	100
8800	100
8900	100
9000	100
9100	100
9200	100
9300	100
9400	100
9500	100
9600	100
9700	100
9800	100
9900	100
10000	100

Roughness Segment Definitions

(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+60.00, 0.50)	0.016

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

Normal Depth	0.30	ft
Elevation Range	0.00 to 0.50	ft
Flow Area	1.93	ft²
Wetted Perimeter	25.47	ft
Hydraulic Radius	0.08	ft
Top Width	25.12	ft
Normal Depth	0.30	ft

Worksheet for Add1: 100 Yr Section 3

Results

Critical Depth	0.30	ft
Critical Slope	0.00874	ft/ft
Velocity	1.55	ft/s
Velocity Head	0.04	ft
Specific Energy	0.34	ft
Froude Number	0.99	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.30	ft
Channel Slope	0.00850	ft/ft
Critical Slope	0.00874	ft/ft

Cross Section for Add1: 100 Yr Section 3

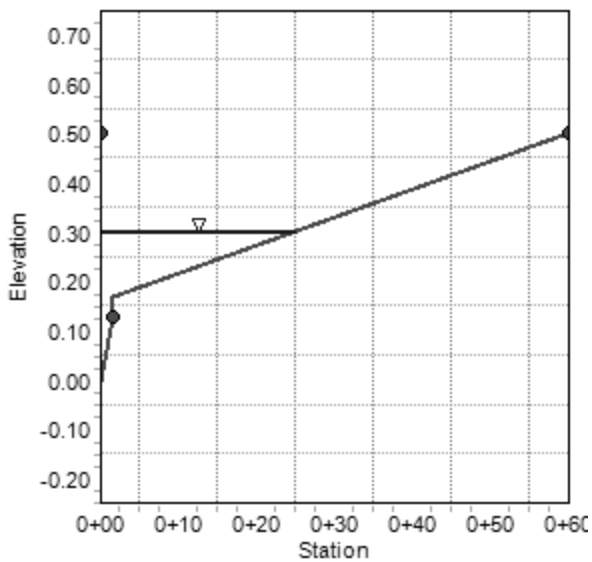
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00850	ft/ft
Normal Depth	0.30	ft
Discharge	3.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Elevation (ft)

Roughness Segment Definitions

0.016

Options

Results

Page 1 of 2

Worksheet for Add1: 10 & 100 Yr Section 4

Results

Velocity Head	0.02	ft
Specific Energy	0.17	ft
Froude Number	0.75	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.15	ft
Critical Depth	0.14	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00915	ft/ft

Cross Section for Add1: 10 & 100 Yr Section 4

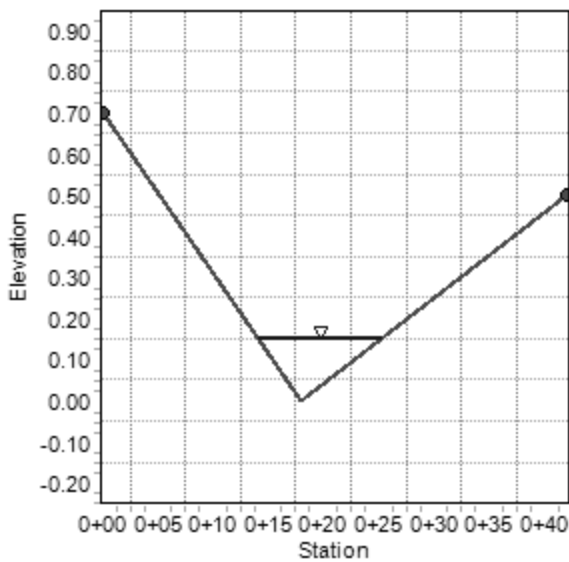
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.15	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Project Description

Input Data

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

Roughness Segment Definitions

(0+00.00, 1.00)	(0+26.00, 0.50)	0.016
-----------------	-----------------	-------

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

Normal Depth		0.26	ft
Elevation Range	0.00 to 1.00 ft		
Flow Area		0.41	ft²
Wetted Perimeter		4.38	ft
Hydraulic Radius		0.09	ft
Top Width		4.08	ft
Normal Depth		0.26	ft

Worksheet for Add1: 10 Yr Section 5

Results

Critical Depth	0.29	ft
Critical Slope	0.00853	ft/ft
Velocity	2.46	ft/s
Velocity Head	0.09	ft
Specific Energy	0.35	ft
Froude Number	1.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.29	ft
Channel Slope	0.01680	ft/ft
Critical Slope	0.00853	ft/ft

Cross Section for Add1: 10 Yr Section 5

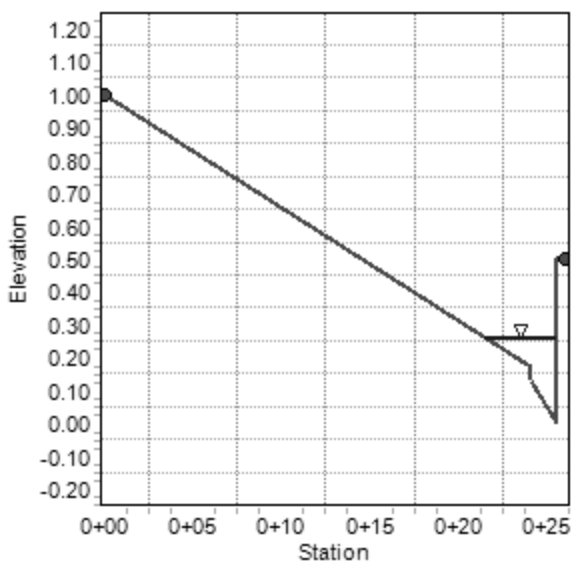
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01680	ft/ft
Normal Depth	0.26	ft
Discharge	1.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)	Elevation (ft)
100	100
200	100
300	100
400	100
500	100
600	100
700	100
800	100
900	100
1000	100
1100	100
1200	100
1300	100
1400	100
1500	100
1600	100
1700	100
1800	100
1900	100
2000	100
2100	100
2200	100
2300	100
2400	100
2500	100
2600	100
2700	100
2800	100
2900	100
3000	100
3100	100
3200	100
3300	100
3400	100
3500	100
3600	100
3700	100
3800	100
3900	100
4000	100
4100	100
4200	100
4300	100
4400	100
4500	100
4600	100
4700	100
4800	100
4900	100
5000	100
5100	100
5200	100
5300	100
5400	100
5500	100
5600	100
5700	100
5800	100
5900	100
6000	100
6100	100
6200	100
6300	100
6400	100
6500	100
6600	100
6700	100
6800	100
6900	100
7000	100
7100	100
7200	100
7300	100
7400	100
7500	100
7600	100
7700	100
7800	100
7900	100
8000	100
8100	100
8200	100
8300	100
8400	100
8500	100
8600	100
8700	100
8800	100
8900	100
9000	100
9100	100
9200	100
9300	100
9400	100
9500	100
9600	100
9700	100
9800	100
9900	100
10000	100

Roughness Segment Definitions

(0+00.00, 1.00)	(0+26.00, 0.50)	0.016
-----------------	-----------------	-------

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

Normal Depth		0.32	ft
Elevation Range	0.00 to 1.00 ft		
Flow Area		0.71	ft²
Wetted Perimeter		6.20	ft
Hydraulic Radius		0.11	ft
Top Width		5.83	ft
Normal Depth		0.32	ft

Worksheet for Add1: 100 Yr Section 5

Results

Critical Depth	0.36	ft
Critical Slope	0.00780	ft/ft
Velocity	2.83	ft/s
Velocity Head	0.12	ft
Specific Energy	0.44	ft
Froude Number	1.43	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.36	ft
Channel Slope	0.01680	ft/ft
Critical Slope	0.00780	ft/ft

Cross Section for Add1: 100 Yr Section 5

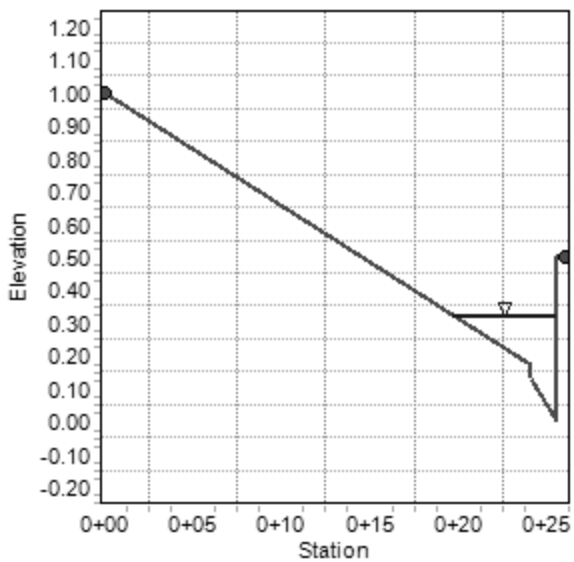
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01680	ft/ft
Normal Depth	0.32	ft
Discharge	2.00	ft ³ /s

Cross Section Image



Worksheet for Add1: 24" Pipe @ S=0.005

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.00	ft ³ /s

Results

Discharge	16.00	ft ³ /s
Normal Depth	2.00	ft
Flow Area	3.14	ft ²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	1.44	ft
Percent Full	100.0	%
Critical Slope	0.00662	ft/ft
Velocity	5.09	ft/s
Velocity Head	0.40	ft
Specific Energy	2.40	ft
Froude Number	0.00	
Maximum Discharge	17.21	ft ³ /s
Discharge Full	16.00	ft ³ /s
Slope Full	0.00500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for Add1: 24" Pipe @ S=0.005

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	1.44	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00662	ft/ft

Cross Section for Add1: 24" Pipe @ S=0.005

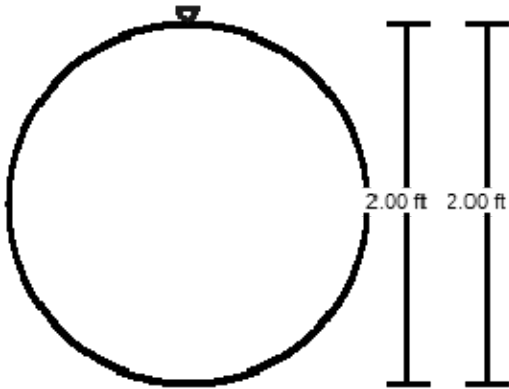
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00500 ft/ft
Normal Depth	2.00 ft
Diameter	2.00 ft
Discharge	16.00 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Add1: 30" Pipe @ S=0.006

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00600	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	31.77	ft³/s

Results

Discharge	31.77	ft³/s
Normal Depth	2.50	ft
Flow Area	4.91	ft²
Wetted Perimeter	7.85	ft
Hydraulic Radius	0.63	ft
Top Width	0.00	ft
Critical Depth	1.92	ft
Percent Full	100.0	%
Critical Slope	0.00684	ft/ft
Velocity	6.47	ft/s
Velocity Head	0.65	ft
Specific Energy	3.15	ft
Froude Number	0.00	
Maximum Discharge	34.18	ft³/s
Discharge Full	31.77	ft³/s
Slope Full	0.00600	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for Add1: 30" Pipe @ S=0.006

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	1.92	ft
Channel Slope	0.00600	ft/ft
Critical Slope	0.00684	ft/ft

Cross Section for Add1: 30" Pipe @ S=0.006

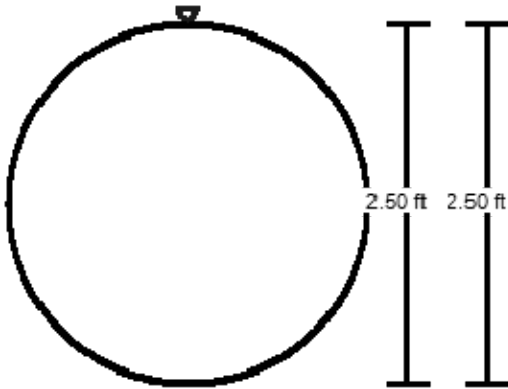
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00600 ft/ft
Normal Depth	2.50 ft
Diameter	2.50 ft
Discharge	31.77 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Add1: 24" Pipe @ S=0.166

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.16600	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	92.17	ft ³ /s

Results

Discharge	92.17	ft ³ /s
Normal Depth	2.00	ft
Flow Area	3.14	ft ²
Wetted Perimeter	6.28	ft
Hydraulic Radius	0.50	ft
Top Width	0.00	ft
Critical Depth	2.00	ft
Percent Full	100.0	%
Critical Slope	0.16190	ft/ft
Velocity	29.34	ft/s
Velocity Head	13.38	ft
Specific Energy	15.38	ft
Froude Number	0.00	
Maximum Discharge	99.14	ft ³ /s
Discharge Full	92.17	ft ³ /s
Slope Full	0.16600	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for Add1: 24" Pipe @ S=0.166

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	2.00	ft
Channel Slope	0.16600	ft/ft
Critical Slope	0.16190	ft/ft

Cross Section for Add1: 24" Pipe @ S=0.166

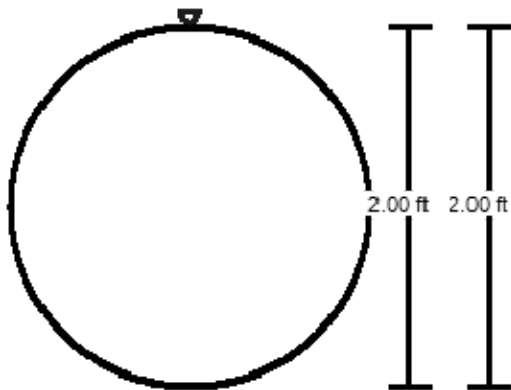
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.16600 ft/ft
Normal Depth	2.00 ft
Diameter	2.00 ft
Discharge	92.17 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Add1: 12" Pipe @ S=0.005

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	1.00	ft
Diameter	1.00	ft
Discharge	2.52	ft³/s

Results

Discharge	2.52	ft³/s
Normal Depth	1.00	ft
Flow Area	0.79	ft²
Wetted Perimeter	3.14	ft
Hydraulic Radius	0.25	ft
Top Width	0.00	ft
Critical Depth	0.68	ft
Percent Full	100.0	%
Critical Slope	0.00770	ft/ft
Velocity	3.21	ft/s
Velocity Head	0.16	ft
Specific Energy	1.16	ft
Froude Number	0.00	
Maximum Discharge	2.71	ft³/s
Discharge Full	2.52	ft³/s
Slope Full	0.00500	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for Add1: 12" Pipe @ S=0.005

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	0.68	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00770	ft/ft

Cross Section for Add1: 12" Pipe @ S=0.005

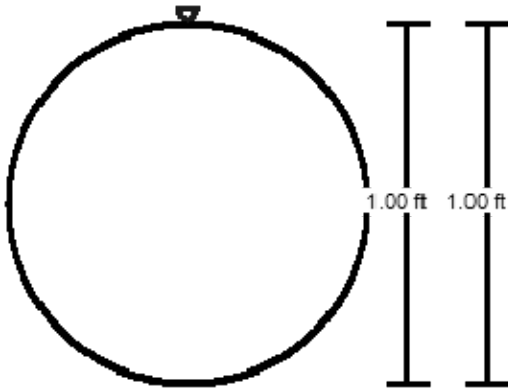
Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00500 ft/ft
Normal Depth	1.00 ft
Diameter	1.00 ft
Discharge	2.52 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Add1: 30" Nyoplast Drain Basin

Project Description

Solve For Spread

Input Data

Discharge		3.00	ft ³ /s
Gutter Width		1.50	ft
Gutter Cross Slope		0.01	ft/ft
Road Cross Slope		0.01	ft/ft
Local Depression		0.00	in
Local Depression Width		0.00	ft
Grate Width		1.50	ft
Grate Length		3.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%
Curb Opening Length		2.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

Options

Calculation Option Use Both

Results

Spread	33.12	ft
Depth	0.33	ft
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Open Grate Area	2.03	ft ²
Active Grate Weir Length	4.50	ft

Cross Section for Add1: 30" Nyoplast Drain Basin

Project Description

Solve For Spread

Input Data

Discharge		3.00	ft ³ /s
Spread		33.12	ft
Gutter Width		1.50	ft
Gutter Cross Slope		0.01	ft/ft
Road Cross Slope		0.01	ft/ft
Local Depression		0.00	in
Local Depression Width		0.00	ft
Grate Width		1.50	ft
Grate Length		3.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%
Curb Opening Length		2.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

Cross Section Image



V: 1
H: 1

Comment Letter



Department of Public Works

500 S Grand Central Pky • Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

Denis Cederburg, P.E., Director • E-Mail: dlc@ClarkCountyNV.gov

Drainage Study Comment Letter

Date: March 27, 2019
Firm: Blue Diamond Civil
Engineer: Philip D. Wakefield, P.E.
Address: 452 E. Silverado Ranch Boulevard, Suite 186, Las Vegas, NV 89183
Phone: (702) 287-8914
Fax: (702)
E-mail: pwakefield@bdce-lv.com

Subject: Technical Drainage Study for Rivera Shopping Center
Location: NW of Owens Avenue and Lamb Boulevard
APN: 140-19-803-006
Sec, Township, Range: S19, T20S, R62E
Flood Zone & Panel: Shaded Zone X, 2179F, Dated November 16, 2011
Application Number: pw19-12009

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	03/08/2019	03/27/2019	WG	

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is Required
	Boulder City	Adjacent to or Impacts Jurisdiction
	City of Mesquite	Adjacent to or Impacts Jurisdiction
	City of Henderson	Adjacent to or Impacts Jurisdiction
X	City of Las Vegas	Adjacent to or Impacts Jurisdiction
	City of North Las Vegas	Adjacent to or Impacts Jurisdiction
	Nevada Department of Transportation	Adjacent to or Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corps of Engineers	Impacts a USACE Facility
	Clark County Regional Flood Control District	Regional Significance, Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

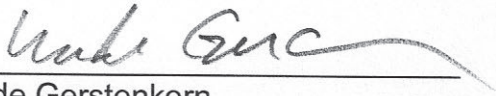
Responses to the following comments must be addressed and provided with the next submittal. Incomplete responses may result in further review and time delays to the drainage study approval. CCPW Development Review will not be held responsible for project delays due to incomplete responses.

CCPW – Development Review Comments:

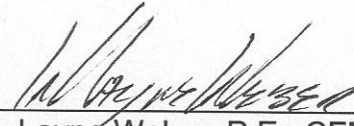
1. Per the original drainage study (08-28279) the existing condition 10-year drylane criteria is not met with 119 cfs. The project is not allowed to make the situation worse. Note the referenced study shows that the existing 36-inch storm drain in Owens is at full capacity and that the onsite flow will "overtop and travel east in Owens as surface flow" (Addendum #1, Comment 8). Revise the design to mitigate the increased 10-year flow from the site development, about 4 cfs (123 cfs – 119 cfs).
2. It is noted that the project requires structural calculations (for the side connection to drop inlet). Please provide an additional submittal to include: structural calculations, structural plans, grading plans (that match the drainage study) and associated geotechnical report. The structural submittal will require a fee of \$750 per 660-feet of storm drain facilities and be submitted under the Drainage Study tracking number.
3. Per Standard Drawing 402, drop inlets must be located a minimum of 10-feet from the nearest PC/PT of existing or future improvements.
4. Label manhole size and pipe class on plans.
5. Revise acute angle for proposed onsite storm drain system to be 90 degrees or more.
6. Label NDOT headwall, drop inlet and manhole standard drawing numbers on plans.
7. The grading plans have been redlined. Provide highlighter marks and responses on plans to show the issues were addressed.

The drainage/grading plans have been red-lined and require modifications prior to the next submittal. Failure to resubmit the red-lined grading plan will require an additional \$400 review fee.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.



Wade Gerstenkorn
Associate
Development Review
wade@ClarkCountyNV.gov



W. Layne Weber, P.E., CFM
Principal Engineer
Development Review
wlweber@ClarkCountyNV.gov

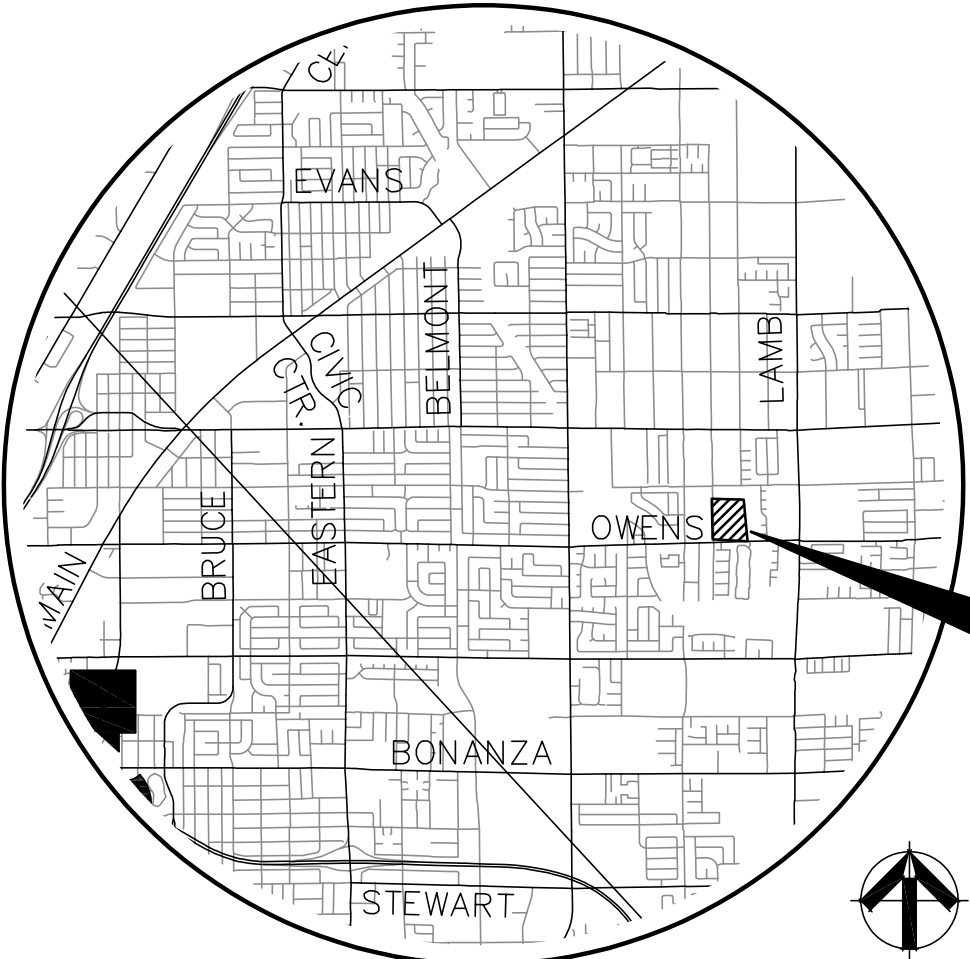
Project Plans

RIVERA SHOPPING CENTER
OWENS/LAMB
CLARK COUNTY, NEVADA
140-19-803-006

LEGEND	
	ROADWAY CENTERLINE
	SWALE/FLOWLINE
	PROPERTY LINE
	PROPOSED CMU WALL
	EXISTING CMU WALL
	EXISTING FENCE
	PROPOSED FENCE
	EXISTING 'L' TYPE CURB
	PROPOSED EDGE OF PAVEMENT
	EXISTING EDGE OF PAVEMENT
	'L' TYPE CURB & GUTTER W/ SIDEWALK
	'A' TYPE CURB
	'ROLL' TYPE CURB
	SETBACK LINE
	EXISTING SAWCUT LINE
	PROPOSED SAWCUT LINE
	BUILDING FOOTPRINT
	EXISTING BUILDING FOOTPRINT
	EXISTING 1' CONTOURS
	EXISTING 5' CONTOURS
	PROPOSED CONTOURS
	EXISTING SEWER LINE
	EXISTING GAS LINE
	EXISTING WATER LINE
	PROPOSED SEWER LINE
	PROPOSED WATER LINE
	EXISTING STREET LIGHT
	PROPOSED STREET LIGHT
	EXISTING AREA LIGHT
	EXISTING FIRE HYDRANT
	PROPOSED FIRE HYDRANT
	EXISTING WATER VALVE/GATE VALVE
	PROPOSED WATER VALVE/GATE VALVE
	EXISTING WATER METER
	PROPOSED WATER METER
	EXISTING WATER RPPA
	PROPOSED WATER RPPA
	EXISTING WATER DCDA
	PROPOSED WATER RPPA
	EXISTING SEWER MANHOLE
	PROPOSED SEWER MANHOLE
	EXISTING ELECTRIC VAULT
	EXISTING TELEPHONE MANHOLE
	EXISTING TELEPHONE PULL BOX
	EXISTING STREET LIGHT VAULT
	EXISTING ELECTRIC METER
	EXISTING ELECTRIC TRANSFORMER
	EXISTING ELEVATION
	PROPOSED ELEVATION
	GRADE AND FLOW DIRECTION
	CONSTRUCTION NOTES
	EXISTING SIGN
	PROPOSED SIGN
	SITE VISIBILITY ZONE/ ACCESSIBLE ROUTE
	CONCRETE
	EXISTING CONCRETE
	SCARP/SLOPE DOWN

ABBREVIATIONS

AC	ASPHALTIC CONCRETE	LP	LOW POINT
AP	ASPHALTIC CONCRETE	L/S	LANDSCAPE
AB	AGGREGATE BASE	LT	LEFT
BCR	BEGIN CURB RETURN	LVVWD	LAS VEGAS VALLEY WATER DISTRICT
BSW	BACK OF SIDEWALK	ME	MATCH EXISTING
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING	MH	MAN HOLE
CL	CENTERLINE	NAP	NOT A PART
CO	CLEAN OUT	NTS	NOT TO SCALE
CONC	CONCRETE	OFF	OFFSET
DCDA	DOUBLE-CHECK DETECTOR ASSEMBLY	POC	POINT OF CONNECTION
DI	DROP INLET	PL	PROPERTY LINE
DG	DESIGN GRADE AT CENTERLINE	R/W	RIGHT OF WAY
DRNG.	DRAINAGE	RT	RIGHT
ECR	END CURB RETURN	S	SLOPE
EG	EXISTING GROUND/GRADE	SD	STORM DRAIN
EL	ELECTRIC	SSMH	SANITARY SEWER MANHOLE
EP	EDGE OF PAVEMENT	SS	SANITARY SEWER
ESMT	EASEMENT	SSCO	SANITARY SEWER CLEANOUT
EX	EXISTING	STA	STATION
FF	FINISH FLOOR	STLT	STREETLIGHT
FG	FINISH GRADE	SW	SIDEWALK
FL	FLOWLINE	TC	TOP OF CURB
FO	FIBER OPTIC	TDC	TOP OF DEPRESSED CURB
FS	FINISHED SURFACE	TE	TRASH ENCLOSURE
G	GAS	TW	TOP OF WALL
GB	GRADE BREAK	TWTL	TWO WAY LEFT TURN LANE
HP	HIGH POINT	TYP	TYPICAL
INST.	INSTRUMENT	USD	UNIFORM STANDARD DRAWING
INV	INVERT	W	WATER
		WL	WATER LATERAL
		SVZ	SIGHT VISIBILITY ZONE



VICINITY MAP
T20S/ R62E/ SEC 19
SCALE: NONE

OWNER/DEVELOPER

IBARRA JESUS A RIVERA
& ANAYA BERENICE
1315 RINGLE LN
LAS VEGAS, NV 89110

CIVIL ENGINEER

BLUE DIAMOND CIVIL ENGINEERING
9816 GILESPIE STREET, SUITE 120
LAS VEGAS, NV, 89183
TEL: 702-287-8914

BENCHMARK

CLARK COUNTY BENCHMARK NO. 7C0219SSE6
RIVET AND SQUARE ALUMINUM PLATE IN TOP OF CURB, ON
THE NORTH SIDE OF OWENS AVE. AT THE NORTHWEST
CORNER OF ROYAL ESTATES TRAILER PARK. BENCH IS
ABOUT 0.25 MILES WEST OF LAMB BLVD.

ELEVATION: METERS = 547.534
U.S. SURVEY FEET = 1796.37 NAVD 88 v.2018

BASIS OF BEARINGS

SOUTH 88°15'19" WEST, BEING THE BEARING OF THE
CENTERLINE OF OWENS AVENUE AND THE SOUTH LINE
OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 19,
TOWNSHIP 20 SOUTH, RANGE 62 EAST, M.D.M., CLARK
COUNTY, NEVADA AS RECORDED IN BOOK 124 OF PLATS
AT PAGE 31, OFFICIAL RECORDS OF CLARK COUNTY,
NEVADA.

LEGAL DESCRIPTION

BEING A PORTION OF THE SOUTHEAST QUARTER (SE 1/4) OF THE
SOUTHEAST QUARTER (SE 1/4) OF SECTION 19, TOWNSHIP 20 SOUTH,
RANGE 62 EAST, M.D.M., CLARK COUNTY, NEVADA.

DEVIATIONS FROM STANDARDS

NONE



SHEET INDEX

1. C1.01... COVER SHEET
2. C1.02... NOTE SHEET
3. C2.01... HORIZONTAL CONTROL
4. C3.01... GRADING PLAN
5. C4.01... UTILITY PLAN
6. C4.02... FIRE ACCESS PLAN
7. C5.01... DETAIL SHEET 1
8. C5.02... DETAIL SHEET 2
9. C5.03... DETAIL SHEET 3

APPROVALS

CLNV BUILDING AND FIRE SAFETY (WATER ONLY) DATE

CLARK COUNTY WATER RECLAMATION DISTRICT DATE

COWRD PROJECT CONTROL NUMBER IS XX.XXX
SIGNATURE ON THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT
FOR OR AN APPROVAL OF ANY VIOLATION OF CLARK COUNTY WATER
RECLAMATION DISTRICT RULES, REGULATIONS, OR DESIGN AND
CONSTRUCTION STANDARDS.

CLARK COUNTY FIRE PREVENTION BUREAU DATE

SOUTHWEST GAS CORPORATION DATE

COX COMMUNICATIONS LAS VEGAS, INC. DATE

CENTRAL TELEPHONE COMPANY, D/B/A CENTURYLINK DATE

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

NV ENERGY DATE

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

Job No.

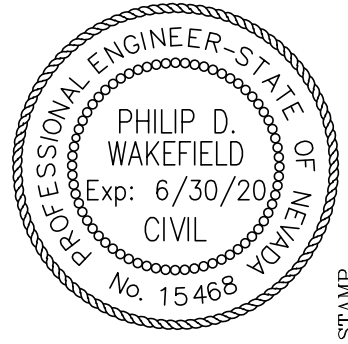
FILE No.

REUSE OF DOCUMENTS
THIS DOCUMENT AND THE IDEAS AND DESIGNS
INCORPORATED HEREIN, AS AN INSTRUMENT OF
PROFESSIONAL SERVICE, IS THE PROPERTY OF
BLUE DIAMOND CIVIL ENGINEERING AND IS NOT
TO BE USED, IN THE WHOLE OR IN PART, FOR
ANY OTHER PROJECT WITHOUT THE WRITTEN
AUTHORIZATION OF BLUE DIAMOND CIVIL
ENGINEERING.

APPROVED

REVISIONS
DESCRIPTION

NO DATE



BLUE DIAMOND
CIVIL ENGINEERING
9816 GILESPIE STREET, SUITE 120
LAS VEGAS, NEVADA 89183
(702) 897-8914



COVER SHEET
RIVERA SHOPPING CENTER
OWENS/LAMB
CLARK COUNTY, NEVADA
A.P.N. 140-19-803-006

JOB No. 1813080

DATE: 10/14/19

VERT. SCALE: N/A

HORIZ. SCALE: N/A

DRAWN BY: CM

CHECKED BY: PDW

SHEET

C1.01

DEVELOPMENT REVIEW TRAFFIC NOTES

1. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HEREUNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
2. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY GROUND MOUNTED STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING COUNTY STREETS IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
3. ALL CONSTRUCTION SIGNING, BARRICADING AND PAVEMENT MARKINGS SHALL CONFORM TO THE NEVADA WORK ZONE TRAFFIC CONTROL HANDBOOK – 1986 AND TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, CURRENT EDITION.
4. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL, CURB, OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE COUNTY TRAFFIC MANAGER.
5. THE DEVELOPER SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL PERMANENT SIGNS SHOWN ON THESE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CLARK COUNTY AREA STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGNPOSTS SHALL BE INSTALLED IN ACCORDANCE WITH CLARK COUNTY AREA STANDARDS. ALL SIGNS SHALL USE CLASS VI SHEETING.
6. IF A PROPOSED STREET LIGHT STANDARD IS FIELD LOCATED TO WITHIN FIVE (5) FEET OF ANY SIGN SHOWN HEREON TO BE MOUNTED ON A SIGN POST, CHANGE SIGN MOUNTING TO ONE ON THE STREETLIGHT STANDARD.
7. PRIOR TO CONSTRUCTION, THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE CURRENT PLANNING DIVISION OF THE DEPARTMENT OF COMPREHENSIVE PLANNING.
8. ALL TRAFFIC SIGNAL POLE ASSEMBLIES, STEEL PEDESTAL FOR CABINETS AND STREET LIGHT POLES SHALL BE GALVANIZED PER ASTM A.123.
9. ALL STREET LIGHTING INSTALLATIONS SHALL CONFORM TO THE UNIFORM STANDARD DRAWINGS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY AREA, NEVADA, LATEST EDITION OF EACH EXCEPT AS NOTED ON THE STREET LIGHTING PLANS AND LED LUMINAIRES. REFER TO CLARK COUNTY PUBLIC WORKS QUALIFIED PRODUCTS LIST "QPL" FOR LED LUMINAIRES. QPL CAN BE FOUND ONLINE AT <http://www.clarkcountynv.gov/public-works/pages/default.aspx>
10. THE FOLLOWING CLARK COUNTY UNDERGROUND FACILITIES MAY BE LOCATED IN YOUR PROJECT AREA: STREET LIGHTING, TRAFFIC SIGNALS, AND FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.) INTERCONNECT CABLE. YOU MUST CONTACT CLARK COUNTY TRAFFIC MANAGEMENT DIVISION, OPERATIONS UNIT AT 455-6000 FOR LOCATIONS AT LEAST 48 HOURS PRIOR TO WORKING IN THE AREA. CLARK COUNTY IS NOT A MEMBER OF "CALL BEFORE YOU DIG" (UNDERGROUND SERVICE ALERT) AND A CALL TO THAT ORGANIZATION DOES NOT RELIEVE YOU OF LIABILITY FOR CLARK COUNTY FACILITIES.
11. F.A.S.T. INTERCONNECT CABLE POLICY IS IN EFFECT. INTERCONNECT CABLE MUST BE MAINTAINED AT ALL TIMES. DEVELOPER/CONTRACTOR SHALL PROVIDE TEMPORARY OVERHEAD INTERCONNECT CABLE, WHILE PERMANENT CABLE IS BEING RELOCATED. TEMPORARY AERIAL INSTALLATION MUST BE ACCEPTABLE TO THE COUNTY TRAFFIC MANAGER AND TO F.A.S.T. ANY DAMAGE TO THIS CABLE IS DEEMED IN EMERGENCY BY F.A.S.T., CITY OF LAS VEGAS, CLARK COUNTY AND NDOT AND MUST BE REPAIRED IMMEDIATELY TO F.A.S.T. ACCEPTANCE \$2,500 PER DAY DAMAGES MAY BE ASSESSED AFTER 24 HOURS HAS ELAPSED FROM TIME OF BREAK OR DAMAGE.
12. ALL NEW OR REPLACEMENT TRAFFIC SIGNAL LOOPS SHALL BE INSTALLED USING CABLE-IN-DUCT WIRING, SHALL HAVE INDEPENDENT LEAD-IN WIRES FOR EACH LOOP FROM THE CONTROLLER TO THE PULL-BOX, AND EACH LEAD-IN SHALL BE INDIVIDUALLY TAGGED.
13. TRAFFIC SIGNAL PEDESTRIAN HEADS SHALL BE THE L.E.D. TYPE.
14. ELECTRICAL POWER SERVICE POINT LOCATION(S) FOR STREET LIGHTING AND TRAFFIC SIGNALS MUST BE INDICATED ON THE PLANS. IF CONNECTING TO AN EXISTING CIRCUIT, INDICATE LOCATION OF EXISTING SERVICE POINT FOR EACH CIRCUIT.
15. WHEN STREET LIGHTS ARE TO BE CONNECTED TO AN EXISTING CIRCUIT, THE ENGINEER MUST CERTIFY THAT THE EXISTING CIRCUIT IS CAPABLE OF HANDLING THE ADDITIONAL CIRCUIT LOAD.
16. CLARK COUNTY RESERVES THE RIGHT TO REJECT STREET LIGHT AND TRAFFIC SIGNAL POLES AND ASSEMBLIES WHICH HAVE A "STRIPED" APPEARANCE.
17. TWO WEEKS PRIOR TO BEGINNING OF CONSTRUCTION, MODIFICATION OR RELOCATION OF ANY TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION OF THE DATE THAT WORK WILL BEGIN.
18. THREE (3) NORMAL WORKING DAYS PRIOR TO TURN-ON OR COMPLETION OF MODIFICATION(S) TO A TRAFFIC SIGNAL SYSTEM, WRITTEN NOTICE SHALL BE SUBMITTED TO THE CLARK COUNTY TRAFFIC MANAGEMENT DIVISION THAT WORK IS BEING COMPLETED AND THE PROPOSED DATE OF COMPLETION.

CLARK COUNTY WATER RECLAMATION DISTRICT (CCWRD)

GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS, LATEST EDITION AND THE UNIFORM STANDARDS FOR PUBLIC WORKS OFFSITE IMPROVEMENTS, CLARK COUNTY AREA, LATEST EDITION.
2. ANY CONFLICTS BETWEEN THESE DOCUMENTS AND THE STANDARDS REFERENCED IN NOTE 1 MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER OF RECORD PRIOR TO PERFORMING ANY WORK.
3. ALL REVISIONS OF THE APPROVED PLANS MUST BE SUBMITTED TO THE CLARK COUNTY WATER RECLAMATION DISTRICT (DISTRICT) FOR REVIEW AND BE APPROVED PRIOR TO PROCEEDING WITH THE WORK. ALL WORK CONSTRUCTED WITHOUT THE APPROVAL OF THE DISTRICT MUST BE REMOVED AT THE CONTRACTORS EXPENSE
4. ALL SANITARY SEWERS SHALL BE PVC SDR-35 SOLID WALL UNLESS OTHERWISE NOTED.
5. ALL SANITARY SEWER MAINS 8-INCHES AND LARGER AND ALL STUBS 8-INCHES AND LARGER ENTIRELY WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE PUBLIC UNLESS OTHERWISE NOTED. ALL ON-SITE SEWER INFRASTRUCTURE SHALL BE PRIVATE UNLESS OTHERWISE NOTED.
6. ALL SANITARY SEWER MAINS SHALL BE THE SAME MATERIAL, SIZE, & SLOPE BETWEEN MANHOLES.
7. ALL SEWER MAINS SHALL BE IN THEIR OWN TRENCHES. THERE WILL BE NO SHARED TRENCHES ALLOWED.
8. THE MINIMUM SLOPES FOR ALL PIPES SHALL BE IN ACCORDANCE WITH THE DESIGN AND CONSTRUCTION STANDARDS.
9. ALL SANITARY SEWER MANHOLES MUST BE LOCATED SUCH THAT THEY ARE ACCESSIBLE IN ACCORDANCE WITH THE DESIGN AND CONSTRUCTION STANDARDS.
10. A DEBRIS TRAP MUST BE INSTALLED IN THE EXISTING SYSTEM AT THE POINT OF CONNECTION IN ACCORDANCE WITH THE DESIGN AND CONSTRUCTION STANDARDS.
11. ALL EXISTING MANHOLE CORROSION PROTECTION SYSTEMS MUST BE RESTORED TO THEIR ORIGINAL CONDITION, IF MODIFIED.
12. LOCATOR RIBBON AND MARKER BALLS SHALL BE PLACED ABOVE ALL NEW SEWER MAINS AND LATERALS IN ACCORDANCE WITH THE DESIGN AND CONSTRUCTION STANDARDS.
13. ALL EXISTING GRADE MUST BE RAISED TO WITHIN 18-INCHES OF FINAL GRADE PRIOR TO ANY SEWER TRENCHING.
14. PRIVATE SANITARY SEWER NOT REVIEWED OR APPROVED BY CCWRD.

I CERTIFY THAT THE ONLY DEVIATIONS FROM THE DESIGN AND CONSTRUCTION STANDARDS THAT ARE APPROVED BY THE CCWRD ARE LISTED BELOW.

- NONE

PHILIP D. WAKEFIELD, P.E. #15468

DATE

WASTEWATER FLOW CALCULATIONS

CLARK COUNTY WATER RECLAMATION DISTRICT APPROVAL

CLARK COUNTY WATER RECLAMATION DISTRICT

DATE

CCWRD PIPES # **19-XXXX**

SIGNATURE ON THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR OR AN APPROVAL OF ANY VIOLATION OF CLARK COUNTY WATER RECLAMATION DISTRICT RULES, REGULATIONS, OR DESIGN AND CONSTRUCTION STANDARDS.

CLARK COUNTY FIRE PREVENTION BUREAU GENERAL NOTES

- A. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE CLARK COUNTY FIRE CODE AS AMENDED, AND THE 2007 EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION PAMPHLET #24.
- B. FIRE HYDRANTS AND WATER SUPPLIES FOR FIRE PROTECTION SHALL BE AND MADE SERVICEABLE PRIOR TO AND DURING THE TIME OF CONSTRUCTION IN ACCORDANCE WITH SECTION 1412 OF THE CLARK COUNTY FIRE CODE, AS AMENDED.
- C. IF DURING CONSTRUCTION IT BECOMES NECESSARY TO CLOSE ANY CONTROL VALVE OR PLACE A HYDRANT OUT OF SERVICE, APPROVAL SHALL BE OBTAINED FROM THE FIRE PREVENTION BUREAU PRIOR TO PLACING THE HYDRANT OUT OF SERVICE.
- D. PAINTING OF CURBS AND/OR STRIPING OF ASPHALT AREAS AND PROTECTION OF HYDRANTS FROM PHYSICAL INJURY SHALL BE PER THE FIRE HYDRANT INSTALLATION SPECIFICATIONS OF THE FIRE PREVENTION BUREAU.
- E. NO FIRE HYDRANT SHALL BE LOCATED WITHIN 25 FEET OF ANY STRUCTURE, OR 5 FEET OF A DRIVEWAY, POWER POLE, LIGHT STANDARD, OR ANY OTHER OBSTRUCTION, FOR WALL, FENCE, AND PLANTER LOCATIONS. A PERIMETER AROUND THE HYDRANT MEASURING A MINIMUM OF 3 FEET FROM ITS EXTERIOR SHALL BE MAINTAINED CLEAR OF ALL OBSTRUCTIONS AT ALL TIMES.
- F. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS, WITH A MINIMUM VEHICLE LOAD OF 18,000 POUNDS PER AXLE, AND SHALL BE SURFACED AND PAVED SO AS TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES. EXCEPTION, TEMPORARY ACCESS ROADS SERVING ONLY BUILDINGS UNDER CONSTRUCTION SHALL NOT BE REQUIRED TO BE PAVED, BUT SHALL COMPLY WITH ALL OTHER REQUIREMENTS OF SECTION 503.2.3 OF THE CLARK COUNTY FIRE CODE.
- G. PRIOR TO ACCEPTANCE OF ANY FIRE SERVICE MAIN, A SATISFACTORY HYDROSTATIC TEST WITH PIPING JOINTS UNCOVERED MUST BE CONDUCTED. APPROVED PLANS, AN INSTALLATION PERMIT AND A CONTRACTOR'S MATERIALS AND TEST CERTIFICATE MUST BE PROVIDED AT TIME OF INSPECTION. SCHEDULE INSPECTION AT www.clarkcountynv.gov/Depts/development_services/fire_prevention.
- H. FIRE HYDRANTS SHALL BE LOCATED 4' TO 7' FROM BACK OF CURB AND A MINIMUM OF 6 FEET AWAY FROM TURNS.
- I. BLUE REFLECTIVE MARKERS MUST BE INSTALLED BEFORE FINAL HYDRANT ACCEPTANCE CAN BE ATTAINED (SECTION C107 OF THE CLARK COUNTY FIRE CODE, AS AMENDED).
- J. HYDRANTS THAT ARE PROPOSED FOR INSTALLATION IN PUBLIC WATER SYSTEMS SHALL BE IN ACCORDANCE WITH APPROVED FIRE HYDRANTS AS ALLOWED BY THE WATER PURVEYOR. HYDRANTS PROPOSED FOR INSTALLATION ON PRIVATE WATER SYSTEMS SHALL BE IN ACCORDANCE WITH APPROVED FIRE HYDRANTS AS ALLOWED BY THE FIREPREVENTION BUREAU.

DEVELOPMENT REVIEW CONSTRUCTION NOTES

1. INSPECTIONS ARE REQUIRED. CALL 24 HOURS IN ADVANCE, (702) 455-4610. THE PERMIT, APPROVED PLANS, AND BARRICADE PLANS FOR THIS WORK MUST BE ON THE JOB SITE AT ALL TIMES.
2. EXACT LOCATION OF ALL SAW-CUT LINES SHALL BE DETERMINED IN THE FIELD BY A CLARK COUNTY INSPECTOR.
3. CURB AND GUTTER WITH A GRADE OF LESS THAN 4/10 OF ONE PERCENT SHALL BE CONSTRUCTED BY FORMING. EACH JOINT SHALL BE CHECKED FOR GRADE PRIOR TO CONSTRUCTION AND WATER TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION.
4. FINAL ASPHALTIC CONCRETE (AC) PAVEMENT SURFACES SHALL BE ONE-HALF (1/2") INCH ABOVE THE LIP OF THE GUTTER (INCLUDING OPEN GRADE).
5. ALL OFF-SITE IMPROVEMENT CONSTRUCTION SHALL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS AND STANDARD DRAWINGS CLARK COUNTY AREA NEVADA AND CLARK COUNTY SUPPLEMENT TO UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, LATEST REVISION EXCEPT FOR LUMINAIRES. REFER TO CLARK COUNTY PUBLIC WORKS QUALIFIED PRODUCTS LIST "QPL" FOR LED LUMINAIRES. QPL CAN BE FOUND ONLINE AT <http://www.clarkcountynv.gov/public-works/pages/default.aspx>
6. PRIVATE STREETS, CURB, & GUTTER AND VALLEY GUTTERS REFLECTED ON THESE PLANS ARE TO BE INSPECTED BY A CLARK COUNTY INSPECTOR.
7. WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS SHALL BE DETERMINED IN THE FIELD BY CLARK COUNTY INSPECTOR.
8. PROPER SIGNS, BARRIERS, BARRICADES AND LIGHTS SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH THE LATEST "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", TRAFFIC, SCHOOL, OR STREET SIGNS OF ANY KIND ARE NOT TO BE MOVED FOR ANY REASON WITHOUT FIRST COORDINATING WITH THE DEPARTMENT OF PUBLIC WORKS INSPECTOR AT (702) 455-4610.
9. THIS PLAN DOES NOT AUTHORIZE CLOSURE OF ANY ROAD OR STREET.
10. NO OPEN TRENCH SHALL BE ALLOWED ACROSS ANY STREET OR WITHIN TEN (10') FEET OF ANY TRAVEL-WAY, EXCEPT WHEN WORK IS IN ACTUAL PROGRESS. WHEN COVERED BY ACCEPTABLE MATERIALS, THE TRENCH SHALL BE CONSTRUED AS A TRENCH. NO OPEN TRENCH IS PERMITTED IN EXCESS OF 500 FEET OR LENGTH NECESSARY TO ACCOMMODATE PIPE INSTALLATION IN A SINGLE DAY, WHICH EVER IS GREATER. ALL TRENCH CROSSLINGS AND BACKFILL SHALL MEET THE STANDARD SPECIFICATION UNLESS OTHERWISE STATED.
11. A TEMPORARY PATCH IS TO BE IN PLACE AT THE END OF EACH WORK DAY WHERE THE BACKFILL IN THE TRENCH HAS BEEN COMPLETED AND PRIOR TO OPENING THE WORK AREA BACK TO TRAFFIC AND IS TO BE MAINTAINED BY THE PERMITEE. A PERMANENT PATCH IS TO BE IN PLACE WITHIN THIRTY (30) DAYS AFTER THE INSTALLATION OF THE TEMPORARY PATCH.
12. COMPACTION TESTS ARE REQUIRED.

CLARK COUNTY STORMWATER MANAGEMENT NOTES

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

ONLY STANDARD SPECIFICATION AND STANDARD DRAWINGS FOR WATER LINE CONSTRUCTION

- A. ALL WATER IMPROVEMENTS SHOWN ON THESE CONSTRUCTION DRAWINGS SHALL CONFORM TO THE STANDARDS DESCRIBED BELOW, AND IN ORDER OF PRECEDENCE SHOWN:
1. CITY OF NORTH LAS VEGAS MUNICIPAL WATER SERVICE DISTRICT SERVICE RULES AND REGULATIONS, LATEST EDITION.
2. UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS, CLARK COUNTY NEVADA, LATEST EDITION.
3. UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, LATEST EDITION.
- B. EXCEPTIONS TO THESE STANDARDS ARE NOTED BELOW:
1. NO WATER MAIN MAY BE SHUT DOWN TO MAKE CONNECTIONS WITHOUT PRIOR APPROVAL OF THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
2. MATERIALS USED FOR WATER DISTRIBUTION FACILITIES SHALL BE INCLUDED ON THE "CITY OF NORTH LAS VEGAS APPROVED MATERIALS LIST," LATEST REVISION, OR SPECIFICALLY IDENTIFIED AND APPROVED ON THESE PLANS.
3. ALL WATER METERS TWO (2) INCHES AND SMALLER SHALL BE INSTALLED BY THE CITY OF NORTH LAS VEGAS. NOTE THAT ALL LOCATIONS MUST BE CLEARLY IDENTIFIED AND MARKED AT THE SITE. THE SERVICE LINES, LATERALS, METER BOXES AND SIDEWALKS OR COLLARS MUST ALL BE INSTALLED AND SET AT GRADE OR THE METER WILL NOT BE SET.
4. THE CITY OF NORTH LAS VEGAS' TRENCH BACKFILL POLICY, DATED AUGUST 15, 1996, SHALL BE ADHERED TO FOR THIS PROJECT.
- C. MODIFICATION AND CLARIFICATION TO THESE STANDARDS ARE AS NOTED BELOW:
1. WATER METERING REQUIREMENTS FOR NEW DEVELOPMENT:
- a. SEPARATE DOMESTIC AND FIRE SERVICES (WHERE APPLICABLE) ARE REQUIRED FOR EACH DWELLING UNIT, PUBLIC, QUASI-PUBLIC, COMMERCIAL, AND/OR INDUSTRIAL OCCUPANCY LOCATED ON A SINGLE PARCEL OR LOT.
- b. IN THE EVENT THAT A BUILDING WITHIN AN INDUSTRIAL OR COMMERCIAL SUBDIVISION IS DIVIDED, SEPARATE DOMESTIC SERVICES ARE REQUIRED FOR EACH UNIT.
- c. EACH PARCEL OR LOT OF A COMMERCIAL OR RESIDENTIAL SUBDIVISION WILL HAVE A MINIMUM OF ONE (1) METERED DOMESTIC SERVICE. WHEN A FIRE SERVICE IS REQUIRED, EACH PARCEL OR LOT WILL HAVE A MINIMUM OF ONE (1) FIRE SERVICE. THE CITY AT ITS OPTION, MAY ALLOW A COMMUNAL FIRE SERVICE PROVIDED THE PROPERTY OWNERS FIRST ESTABLISH A PROPERTY MANAGEMENT ASSOCIATION WHICH ACCEPTS RESPONSIBILITY FOR THE PAYMENT OF WATER BILLS AND THE MAINTENANCE AND OPERATION OF THE FIRE LINES AND THE BACKFLOW PREVENTION ASSEMBLY.
2. FIRE AND DOMESTIC WATER SERVICES AS APPROVED ON THIS PLAN, ARE INTENDED SPECIFICALLY FOR THE LOT AND USE SHOWN, AND ARE NOT INTENDED TO SERVE ADDITIONAL PARCELS OR STRUCTURES WHICH MAY BE CREATED IN THE FUTURE. IN THE EVENT THAT THE PARCELS AND/OR LOTS SHOWN ON THIS PLAN ARE FURTHER DIVIDED TO CREATE ADDITIONAL PARCELS OR LOTS, THE OWNER IS REQUIRED TO PROVIDE SEPARATE FIRE AND DOMESTIC WATER SERVICES TO EACH.
3. CONNECTION TO PUBLIC FIRE HYDRANTS SHALL NOT BE MADE FOR DOMESTIC AND/OR PRIVATE FIRE SERVICE.
4. ALL SERVICE LATERALS TWO (2) INCHES AND SMALLER SHALL BE COPPER TUBING WITH APPROVED SERVICE SADDLES. CORPORATION STOPS AND ANGLE METER STOPS SHALL BE THE SAME SIZE AS THE SERVICE LATERAL. ANGLE METER STOPS AND METER SHALL BE CENTERED IN METER THE BOX.
5. UDACS PLATES NO. 1 AND NO. 3: REUSE NOTE TO READ "COUPLINGS ARE NOT ALLOWED BETWEEN THE CORPORATION STOP AND THE ANGLE METER".
6. ALL METERS TO BE INSTALLED IN THE CITY OF NORTH LAS VEGAS WATER SYSTEM, INCLUDING DCDS MUST BE COMPATIBLE WITH THE SENSUS AMR PROTOCOL (A.K.A. INVENSY) AND MUST BE INSTALLED WITH THE ENCODED REGISTER. METERS THAT ARE FULLY COMPATIBLE ARE: SENSU/INVENSY ECR/MP MODELS (5/8" AND LARGER) NEPTUNE, AUTOREAD MODELS (3" AND LARGER) & METRON/T2 INNOVB (ALL SIZES).
7. ANY PARCEL RECEIVING WATER FROM THE PUBLIC DISTRIBUTION SYSTEM FROM MULTIPLE CONNECTIONS IS REQUIRED TO UTILIZE THE SAME METER MANUFACTURER. FOR MASTER METERED MULTI-FAMILY RESIDENTIAL, THE METERS SHALL BE OF THE SAME MANUFACTURER, MODEL, AND SIZE.
8. ALL METER BOXES SHALL BE EQUIPPED WITH TRAFFIC BEARING COVERS AND INSTALLED TO FINISH DESIGN GRADE AND ELEVATION. IF SUCH IS NOT SHOWN ON THE PLANS, THE ELEVATION WILL BE ESTABLISHED BY THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
9. ANY BLOCK WALL OR OTHER FENCE SHALL BE DESIGNED AND CONSTRUCTED AROUND THE OUTSIDE OF THE EASEMENT(S), TO ALLOW THE CITY DIRECT ACCESS TO VAULT(S) AND INLET PIPING FROM THE ADJACENT RIGHT-OF-WAY.
10. NO UTILITY BOXES SHALL BE LOCATED IN DRIVEWAY APPROACHES, UNLESS APPROVED BY THE UTILITIES DIVISION.
11. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
12. THE ON-SITE WATER LINES AND APPURTENANCES ARE PRIVATE FACILITIES NOT TO BE OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS, UNLESS OTHERWISE SPECIFIED ON CIVIL IMPROVEMENTS PLANS.
13. ALL VALVES WILL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY GUTTERS, AND CURB GUTTERS.
14. A MINIMUM OF TWO (2) VALVES SHALL BE LOCATED AT EVERY MAINLINE TEE, OR THREE (3) VALVES AT EVERY MAINLINE CROSS.
15. ALL NEW FIRE HYDRANTS SHALL HAVE A 5-1/4 INCH VALVE OPENING.
16. TWO SOURCES OF WATER SUPPLY ARE REQUIRED FOR ANY DEVELOPMENT WITH ANY COMBINATION OF MORE THAN THREE (3) FIRE HYDRANTS (PUBLIC OR PRIVATE) OR FIRE SERVICES.
17. MINIMUM SEPARATIONS BETWEEN FIRE SYSTEMS AND DOMESTIC WATER MAINS SHALL BE SIX (6)-FEET HORIZONTALLY FROM EXTERIOR PIPE WALLS AND EIGHTEEN (18)-INCHES VERTICALLY. MINIMUM SEPARATION FROM SEWER LINES SHALL BE TEN (10)-FEET HORIZONTALLY.
18. PIPE DETECTOR RIBBON AND LOCATOR BALLS SHALL BE REQUIRED ABOVE ALL WATER MAINS. SERVICE LATERALS THAT ARE SIX (6) INCHES AND LARGER, AND ANY SERVICE LATERAL NOT INSTALLED PERPENDICULAR TO THE MAIN LINE.
19. WATER MAINS SHALL BE FILLED, PRESSURE TESTED TO 200 PSI, DISINFECTED, FLUSHED, REFILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION BY THE CITY. CONTACT THE CITY OF NORTH LAS VEGAS UTILITY DIVISION TWENTY-FOUR (24) HOURS IN ADVANCE TO SCHEDULE SAMPLING.
20. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE TESTED AND CERTIFIED BY THE CITY OF NORTH LAS VEGAS PRIOR TO PLACING THE WATER SYSTEM IN SERVICE. NO WATER SHALL BE TAKEN FROM A SERVICE REQUIRING BACKFLOW PREVENTION UNTIL THE REDUCED PRESSURE PRINCIPLE ASSEMBLY HAS BEEN SUCCESSFULLY TESTED BY THE ONLY. CONTACT THE CITY OF NORTH LAS VEGAS TWENTY-FOUR (24) HOURS IN ADVANCE TO SCHEDULE TESTING.
21. LIMITS OF ASPHALT PATCHES TO BE DETERMINED IN THE FIELD BY A CITY OF NORTH LAS VEGAS INSPECTOR. PATCHES WILL BE A MINIMUM OF TWELVE (12)-FEET MACHINE REPLACED.
22. TO SCHEDULE UTILITY INSPECTIONS, PLEASE EMAIL UTIL-INSPECT@CITYOFNORTHLASVEGAS.COM. UTILITY INSPECTION REQUESTS MUST BE RECEIVED BY 2:00 P.M. FOR INSPECTIONS TO OCCUR THE FOLLOWING NORMAL WORKING DAY (MONDAY THROUGH FRIDAY). FOR AFTER HOURS UTILITY INSPECTIONS, INCLUDING WEEKENDS, CALL THE INSPECTION LINE AT 702-390-4407.
23. RECORD DRAWINGS SHALL BE PREPARED, SIGNED AND SUBMITTED TO THE CITY OF NORTH LAS VEGAS REPRESENTATIVE PRIOR TO FINAL ACCEPTANCE OF ANY WATER DISTRIBUTION FACILITIES TO BE OWNED, OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS.
- D. SHUTDOWN REQUIREMENTS AND INFORMATION:
1. CONTACT THE UTILITIES DEPARTMENT SEVEN (7) WORKING DAYS PRIOR TO ANY ANTICIPATED SHUTDOWN FOR COORDINATION PURPOSES. THE CONTRACTOR SHALL NOT OPEN/CLOSE ANY VALVES WITHIN THE CITY'S WATER DISTRIBUTION SYSTEM. THE UTILITIES DEPARTMENT CONTACT NUMBER IS 633-1285.
2. FOR COMMERCIAL PROPERTIES, PROVIDE WRITTEN NOTIFICATION AND VERBAL COORDINATION BETWEEN THE UTILITIES DEPARTMENT AND THE COMMERCIAL PROPERTY OWNER(S) A MINIMUM OF SEVEN (7) WORKING DAYS PRIOR TO ANTICIPATED SHUTDOWN. THE COMMERCIAL OWNER(S) SHALL HAVE THE ABILITY TO PROVIDE INPUT IN SCHEDULING SHUTDOWNS.
3. FOR RESIDENTIAL PROPERTIES, PROVIDE WRITTEN NOTIFICATION TO RESIDENTIAL PROPERTIES A MINIMUM OF 48 HOURS PRIOR TO ANTICIPATED SHUTDOWN.
4. WORKING DAYS ARE DEEMED TO BE MONDAY THROUGH THURSDAY FOR SHUTDOWN PURPOSES.
5. SHUTDOWNS ARE ANTICIPATED TO BE NIGHT WORK. FINAL DECISIONS SHALL BE AT THE DISCRETION OF THE UTILITIES DEPARTMENT.
6. THE SHUTDOWN RELOCATION, AND/OR ADJUSTMENT OF WATER LINES SHALL BE AS APPROVED BY THE CITY OF NORTH LAS VEGAS UTILITIES DEPARTMENT. SHUTDOWNS CANNOT BE GUARANTEED BY THE DEPARTMENT. LINE STOPS OR INSERT-A-VALVES MAY BE REQUIRED TO COMPLETE THE WORK, AT THE DISCRETION OF THE UTILITIES DEPARTMENT. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE WORK.

CLARK COUNTY FIRE PREVENTION BUREAU APPROVED

SIGNATURE

APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS. FIRE FLOW XXXX GPM AT 20 P.S.I. RESIDUAL.

Job No.

FILE No.

REUSE OF DOCUMENTS THIS DRAWING AND THE INFORMATION HEREON, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF THE ENGINEER. IT IS NOT TO BE REPRODUCED, COPIED, OR IN ANY MANNER, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF BLUE DIAMOND CIVIL.

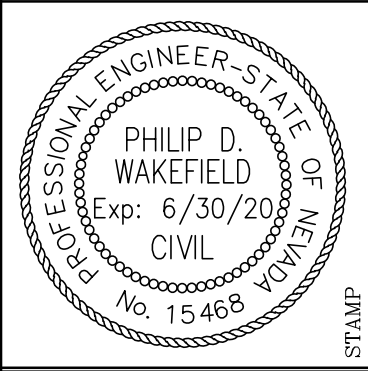
APPROVED

REVISIONS

DISCUSSION

DATE

NO



BLUE DIAMOND CIVIL ENGINEERING 8016 GILLESPIE STREET, SUITE 120 LAS VEGAS, NEVADA 89103 (702) 897-8914



NOTE SHEET RIVERA SHOPPING CENTER OWENS/LAMB

A.P.N. 140-19-803-006 CLARK COUNTY, NEVADA

JOB No. 1813080

DATE: 10/14/19

VERT. SCALE: N/A

HORIZ. SCALE: N/A

DRAWN BY: CM

CHECKED BY: PDW

SHEET

C1.02



BENCHMARK

CLARK COUNTY BENCHMARK NO. 700219SS565 RIVET AND SQUARE ALUMINUM PLATE IN TOP OF CURB, ON THE NORTH SIDE OF OWENS AVE. AT THE NORTHWEST CORNER OF ROYAL ESTATES TRAILER PARK. BENCH IS ABOUT 0.25 MILES WEST OF LAMB BLVD.

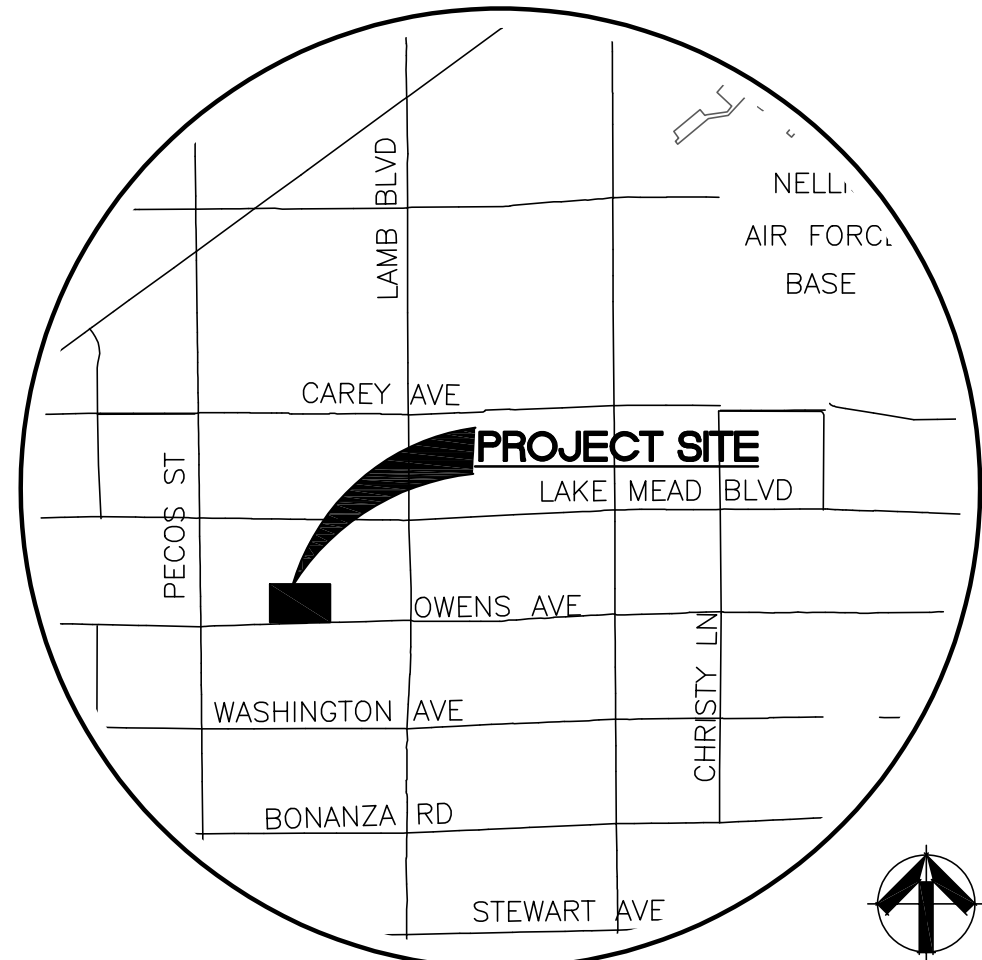
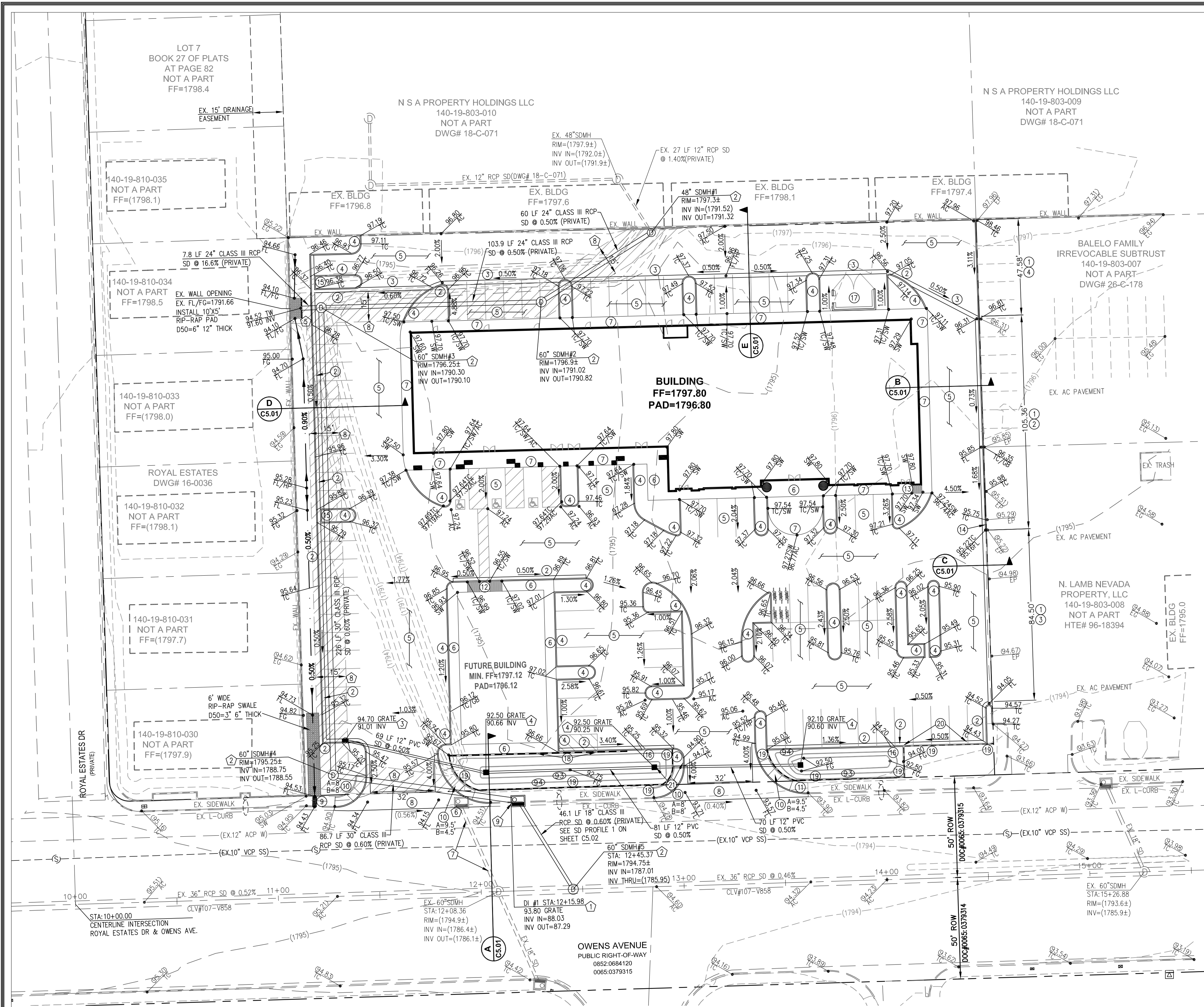
ELEVATION: METERS = 547.534 U.S. SURVEY FEET = 1796.37 NAVD 88 v.2018

BASIS OF BEARINGS

SOUTH 88°15'19" WEST, BEING THE BEARING OF THE CENTERLINE OF OWENS AVENUE AND THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 19, TOWNSHIP 20 SOUTH, RANGE 62 EAST, M.D.M., CLARK COUNTY, NEVADA AS RECORDED IN BOOK 124 OF PLATS AT PAGE 31, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

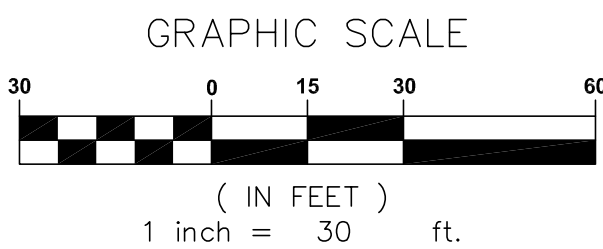
UTILITY DISCLAIMER

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VICINITY MAP
T20S/ R62E/ SEC 19

SCALE: NONE



GRADING NOTES

- ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY IN THE PLANS OR CONDITIONS IN THE FIELD.
- ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENT HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO THE CLARK COUNTY.
- FOR AREAS THAT ARE FLATTER THAN 3:1 SLOPE, OR LESS THAN 1' ELEVATION DIFFERENCE, SCARPS ARE NOT SHOWN ON PLAN FOR CLARITY PURPOSES.
- ALL SLOPE AREAS SHALL HAVE A MINIMUM ONE FOOT SHOULDER NEXT TO WALL PRIOR TO STARTING SLOPE.
- THERE SHALL BE NO GRUBBING, GRADING OR CLEARING PRIOR TO THE APPROVAL OF THE CIVIL IMPROVEMENT PLANS AND FINAL GRADING PLANS BY THE PUBLIC WORKS DIRECTOR AND THE ISSUANCE OF A GRADING PERMIT. GRUBBING, GRADING AND CLEARING ARE TO OCCUR ONLY WITHIN THE AREAS IDENTIFIED ON THE APPROVED GRADING PLAN.
- ALL PORTIONS OF THE SITE OR LOT TO BE LEFT UNGRADED ARE TO REMAIN UNDISTURBED AREAS AND ARE NOT TO BE USED FOR STOCKPILING OF MATERIALS OR EXCESS FILL.
- DRIVEWAYS PER THE GRADING PLANS SHALL NOT EXCEED 12.5% MAX DRIVEWAY SLOPES.
- FOR ALL TRUNCATED NUMBERS ADD 1700'-FT TO THE ELEVATION.

CONSTRUCTION NOTES

- SAWCUT EXISTING AC PAVEMENT AT PROPERTY LINE
- CONSTRUCT "L" TYPE CURB PER CCAUSD #216
- CONSTRUCT 2' CONCRETE VALLEY GUTTER PER DETAIL ON SHEET C5.01
- CONSTRUCT "A" TYPE CURB PER CCAUSD #219
- CONSTRUCT ON SITE AC PAVEMENT PER DETAIL ON SHEET C5.01
- CONSTRUCT ON SITE CONCRETE SIDEWALK PER DETAIL ON SHEET C5.01
- CONSTRUCT ON SITE INTEGRAL SIDEWALK & CURB PER DETAIL ON SHEET C5.01
- CONSTRUCT 8' CROSS GUTTER PER CCAUSD #228
- CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
- CONSTRUCT SIDEWALK RAMP USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD #235 CASE 1
- CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234
- CONSTRUCT PEDESTRIAN RAMP A PER DETAIL ON SHEET C5.01
- CONSTRUCT PEDESTRIAN RAMP B PER DETAIL ON SHEET C5.01
- CONSTRUCT CURB END PER DETAIL ON SHEET C5.01
- CONSTRUCT 1.5' U-GUTTER PER DETAIL ON SHEET C5.01
- CONSTRUCT TRASH ENCLOSURE PER ARCH PLANS
- CONSTRUCT 87.5 LF 2' MAX CMU STANDARD RETAINING WALL
- CONSTRUCT 6" CMU SOLID GROUTED FLOOD WALL. TOP OF WALL SHALL BE A MINIMUM OF 1' ABOVE EXISTING STREET BACK OF SIDEWALK
- CONSTRUCT 41 LF 1.5' CONCRETE VALLEY GUTTER PER DETAIL ON SHEET C5.01 TRANSITION FLOWLINE TO MATCH L-CURB FLOWLINE LAST 5' OF VALLEY GUTTER
- INSTALL SUMP PUMP WITH PVC OUTLET PIPE TO DISCHARGE THROUGH CURB. SEE SHEET C5.02 FOR "PIPE THROUGH CURB" DETAIL. (SEE PLUMBING PLANS FOR PUMP DETAILS)

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FILED WITH CLARK COUNTY
PW 19-XXXXXX

PHILIP D. WAKEFIELD, P.E. #15468 DATE

CLARK COUNTY
DEPARTMENT OF PUBLIC WORKS
DEVELOPMENT REVIEW
ACCEPTANCE OF PLANS FOR FILING

BY ACCEPTANCE OF THESE PLANS FOR FILING SHALL NOT BE CONSTRUED TO BE A PERMIT FOR OR AN APPROVAL OF ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS AND / OR SPECIFICATIONS. CLARK COUNTY SHALL BE HELD FREE FROM DAMAGES WHICH MAY RESULT FROM THE CONSTRUCTION OF THE IMPROVEMENTS FROM THE ENGINEERING DESIGN DEPICTED HEREIN.

NOTE: POWER POLES AND / OR OTHER EXISTING FACILITIES NOT IN PROPER LOCATION BASED ON PROPOSED IMPROVEMENTS SHOWN HEREON WILL BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.

BENCHMARK

CLARK COUNTY BENCHMARK NO. 7C0219SSE6
RIVET AND SQUARE ALUMINUM PLATE IN TOP OF CURB, ON THE NORTH SIDE OF OWENS AVE. AT THE NORTHWEST CORNER OF ROYAL ESTATES TRAILER PARK. BENCH IS ABOUT 0.25 MILES WEST OF LAMB BLVD.

ELEVATION: METERS = 547.534
U.S. SURVEY FEET = 1796.37 NAVD 88 v.2018

BASIS OF BEARINGS

SOUTH 88°15'19" WEST, BEING THE BEARING OF THE CENTERLINE OF OWENS AVENUE AND THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 19, TOWNSHIP 20 SOUTH, RANGE 62 EAST, M.D.M., CLARK COUNTY, NEVADA AS RECORDED IN BOOK 124 OF PLATS AT PAGE 31, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

EARTHWORK QUANTITIES

CUT (NET): 50 CY
FILL (NET): 50 CY
IMPORT: 0 CY

THIS INFORMATION SHOULD BE USED FOR BIDDING PURPOSES ONLY. ALL CONTRACTORS ARE RESPONSIBLE FOR VERIFYING THEIR OWN EARTHWORK QUANTITIES. THESE ESTIMATES ARE SUBJECT TO CHANGE BASED ON SITE SPECIFIC GEOTECHNICAL EVALUATIONS.

FLOODZONE

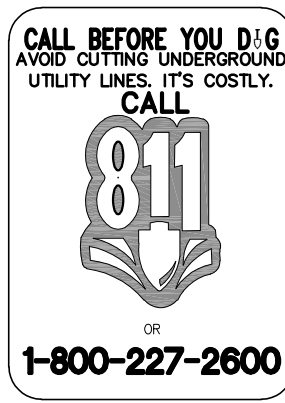
THIS SITE IS LOCATED WITHIN A FEMA ZONE "X", WHICH IS DEFINED AS "AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD" FIRM MAP NUMBER 32003C2179F EFFECTIVE DATE NOVEMBER 16, 2011

SOILS REPORT NOTE:

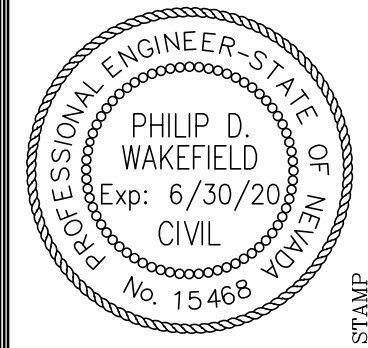
ALL GRADING SHALL CONFORM TO THE SOIL REPORT:
ENGINEER: BLACK MOUNTAIN GEOTECH
DATE: MARCH 26, 2019
JOB NUMBER: 19031

UTILITY DISCLAIMER

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

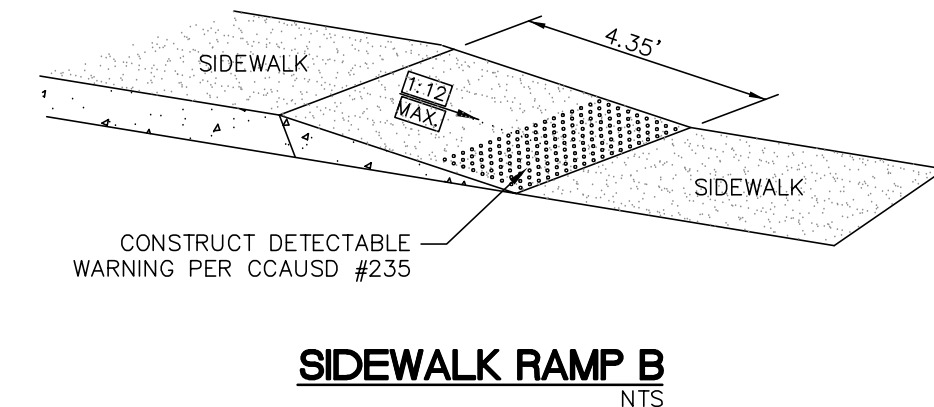
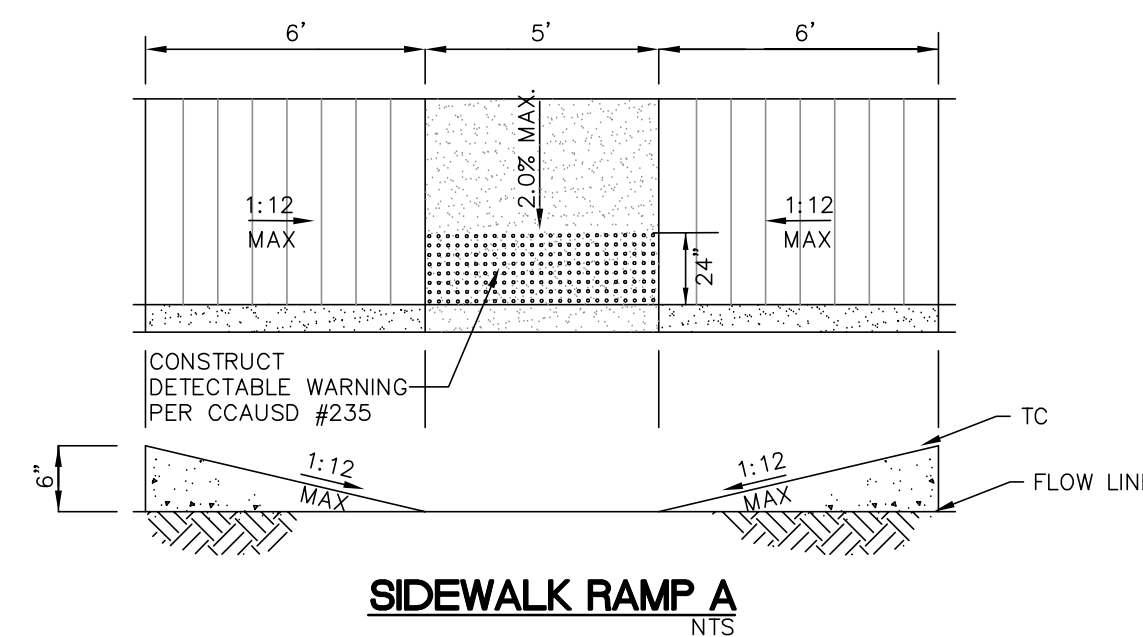
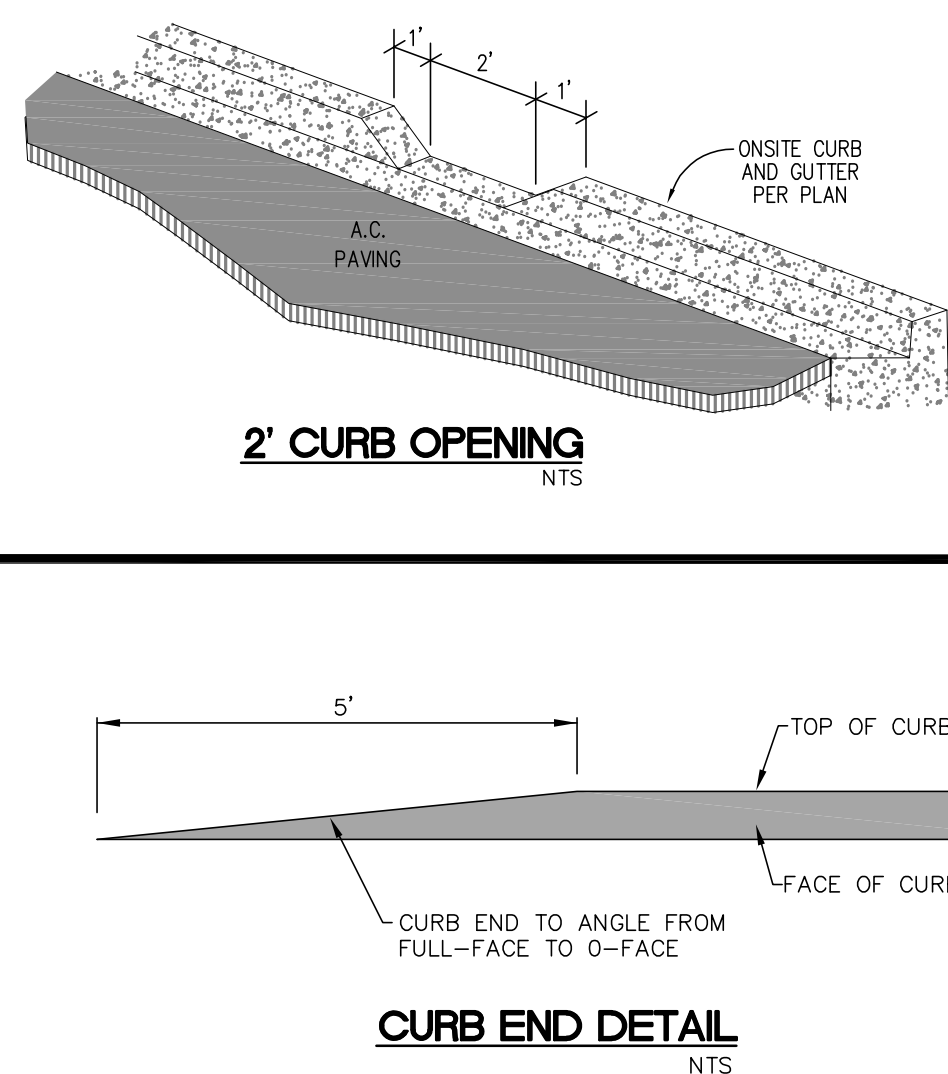
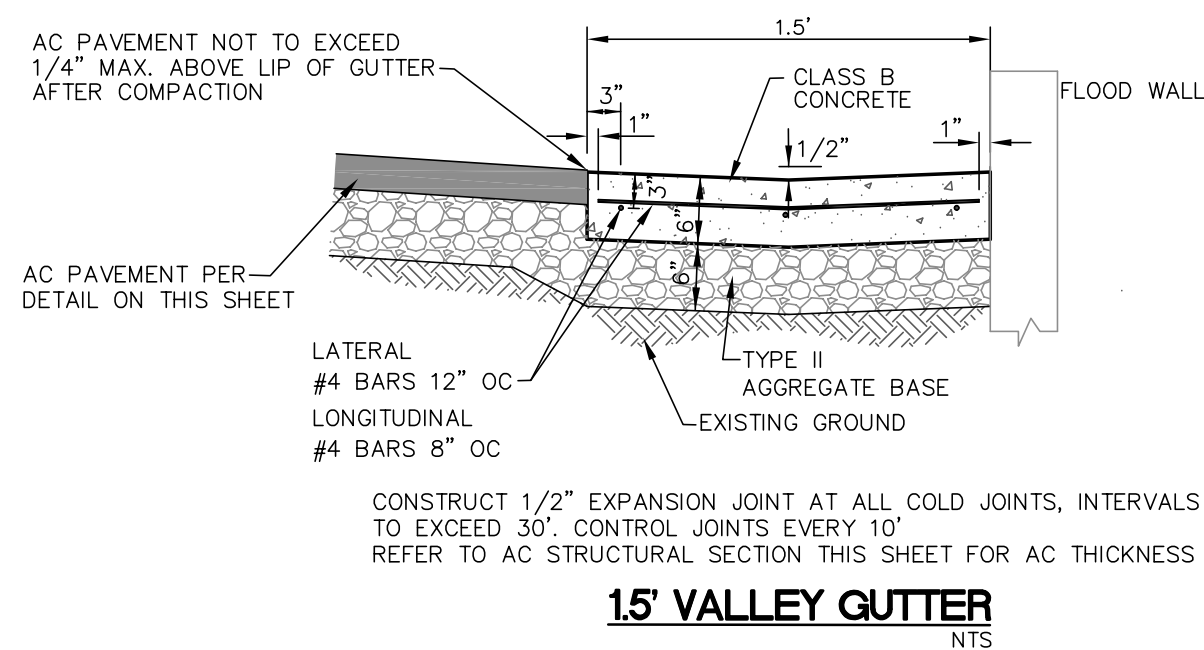
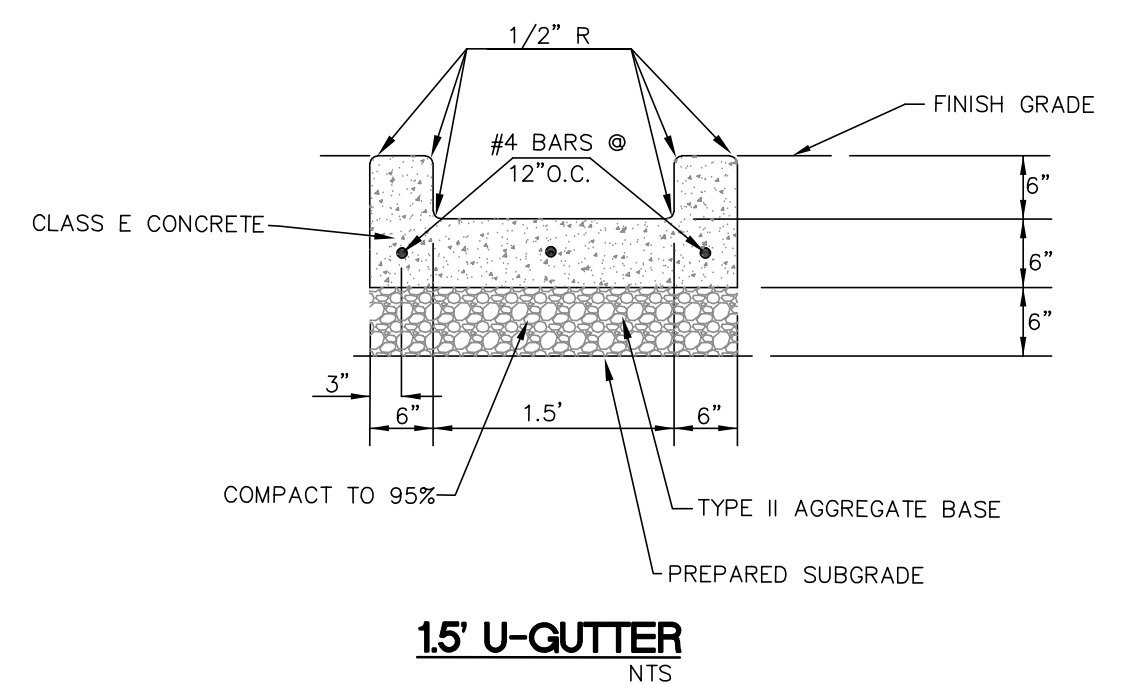
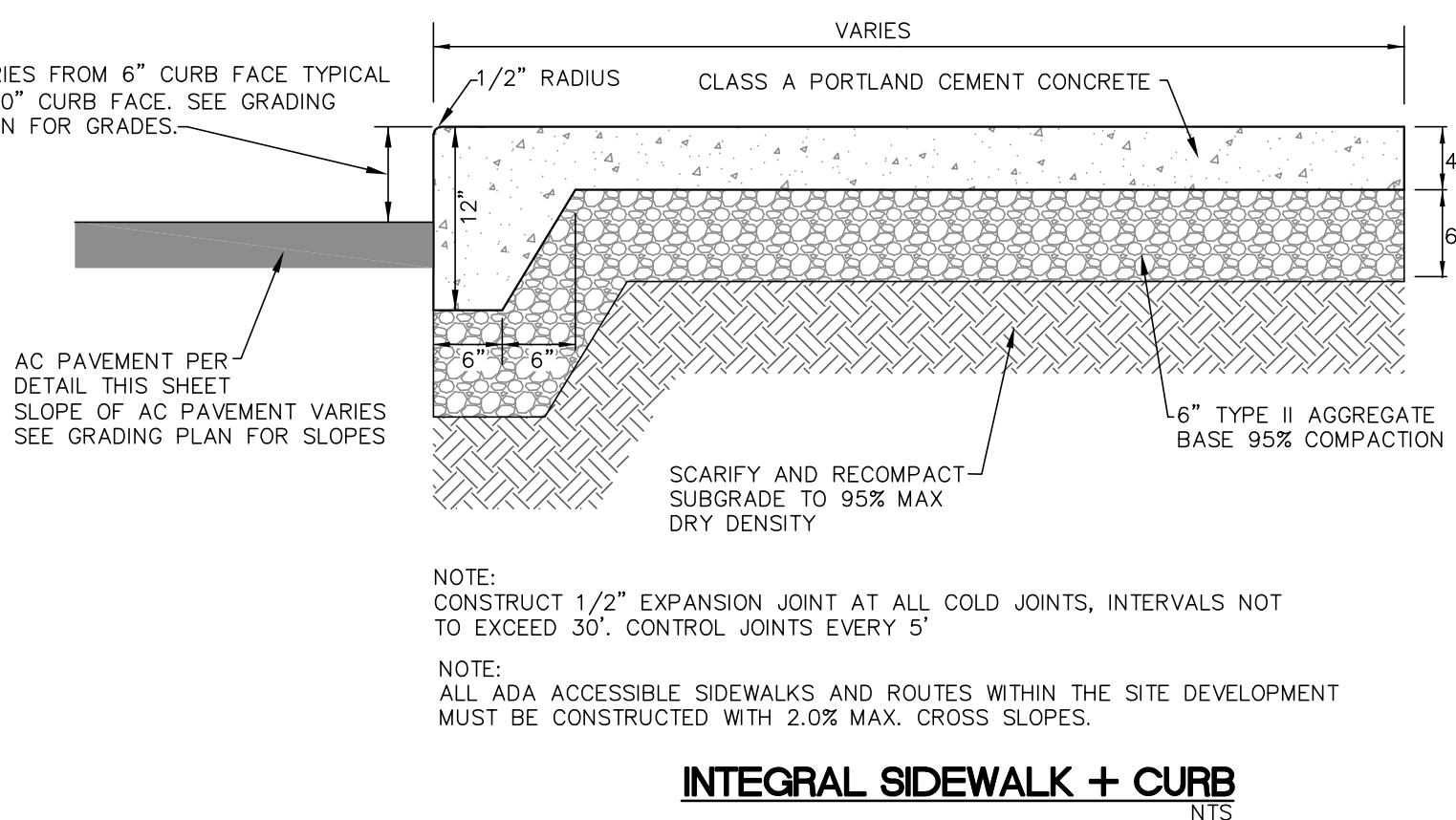
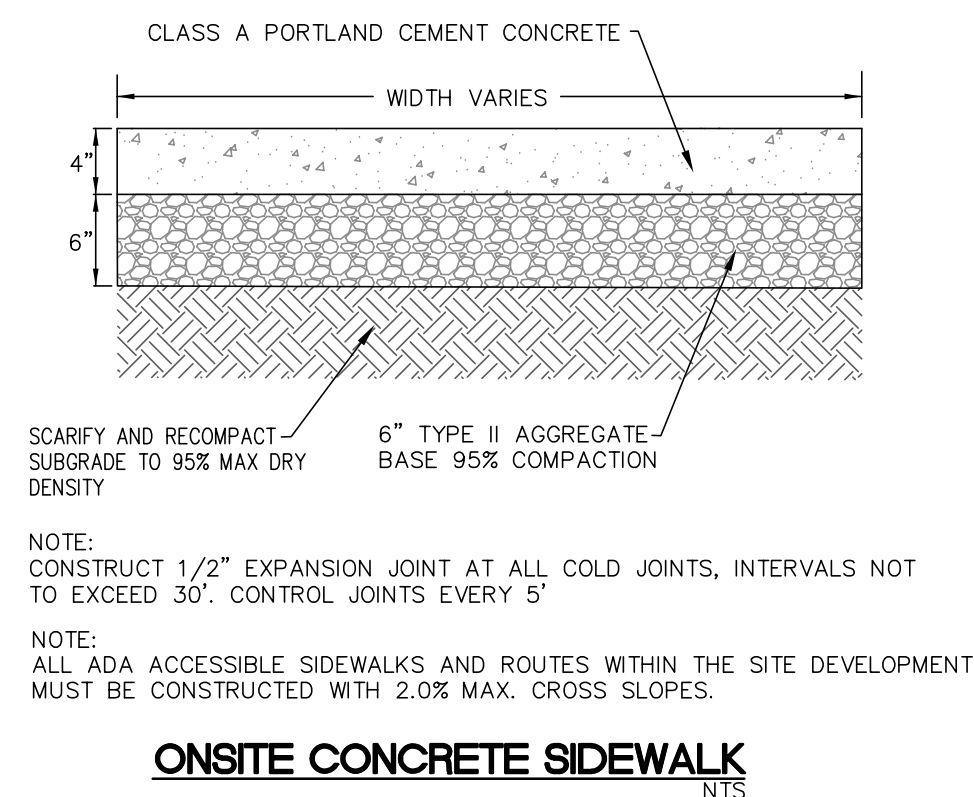
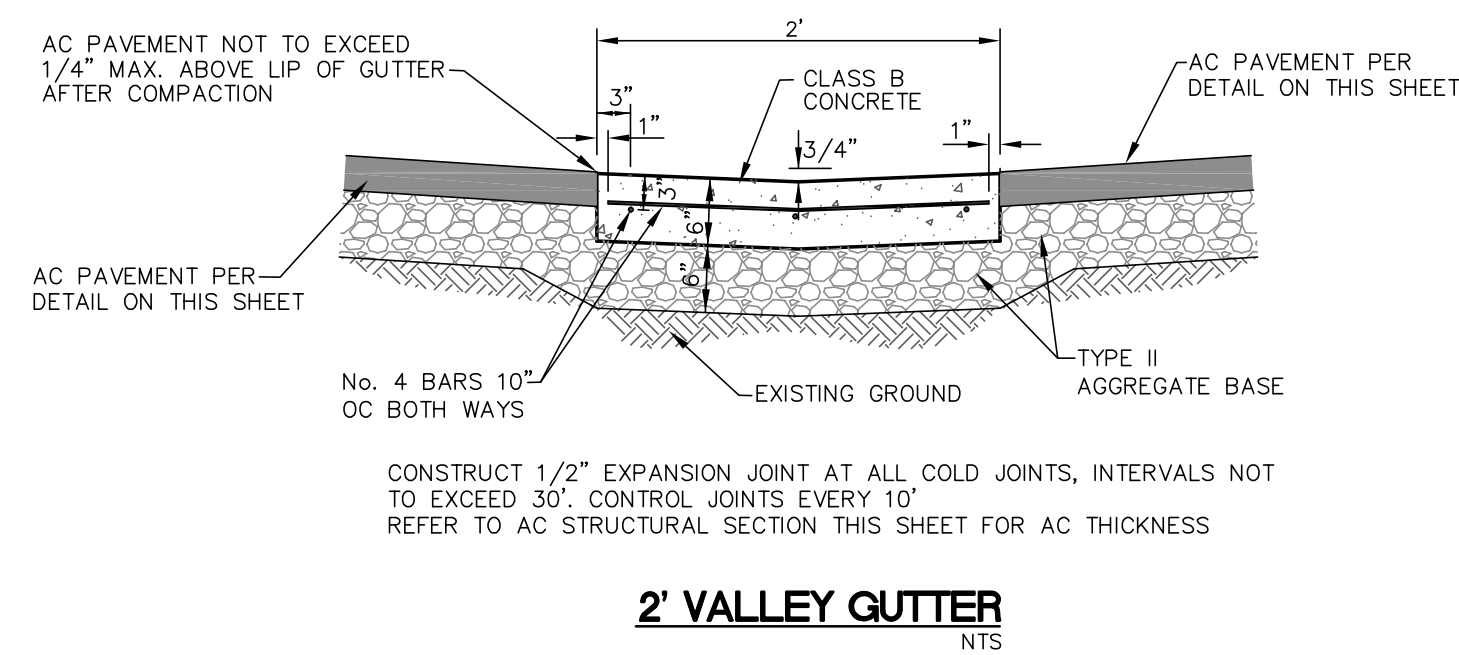
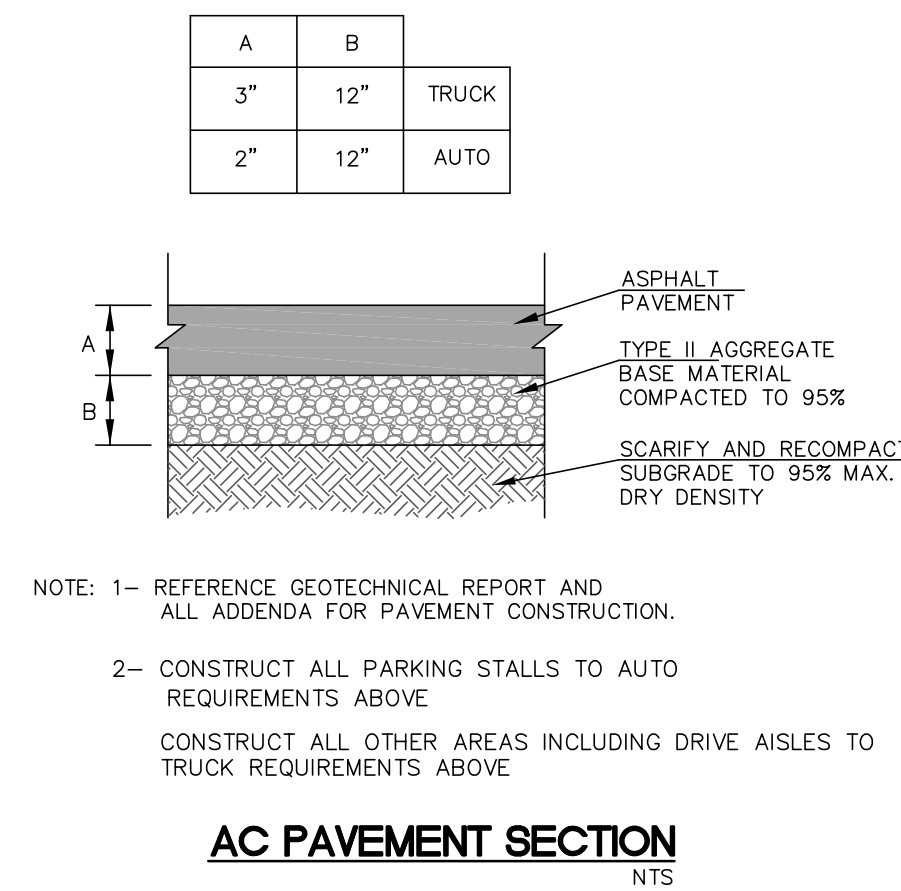
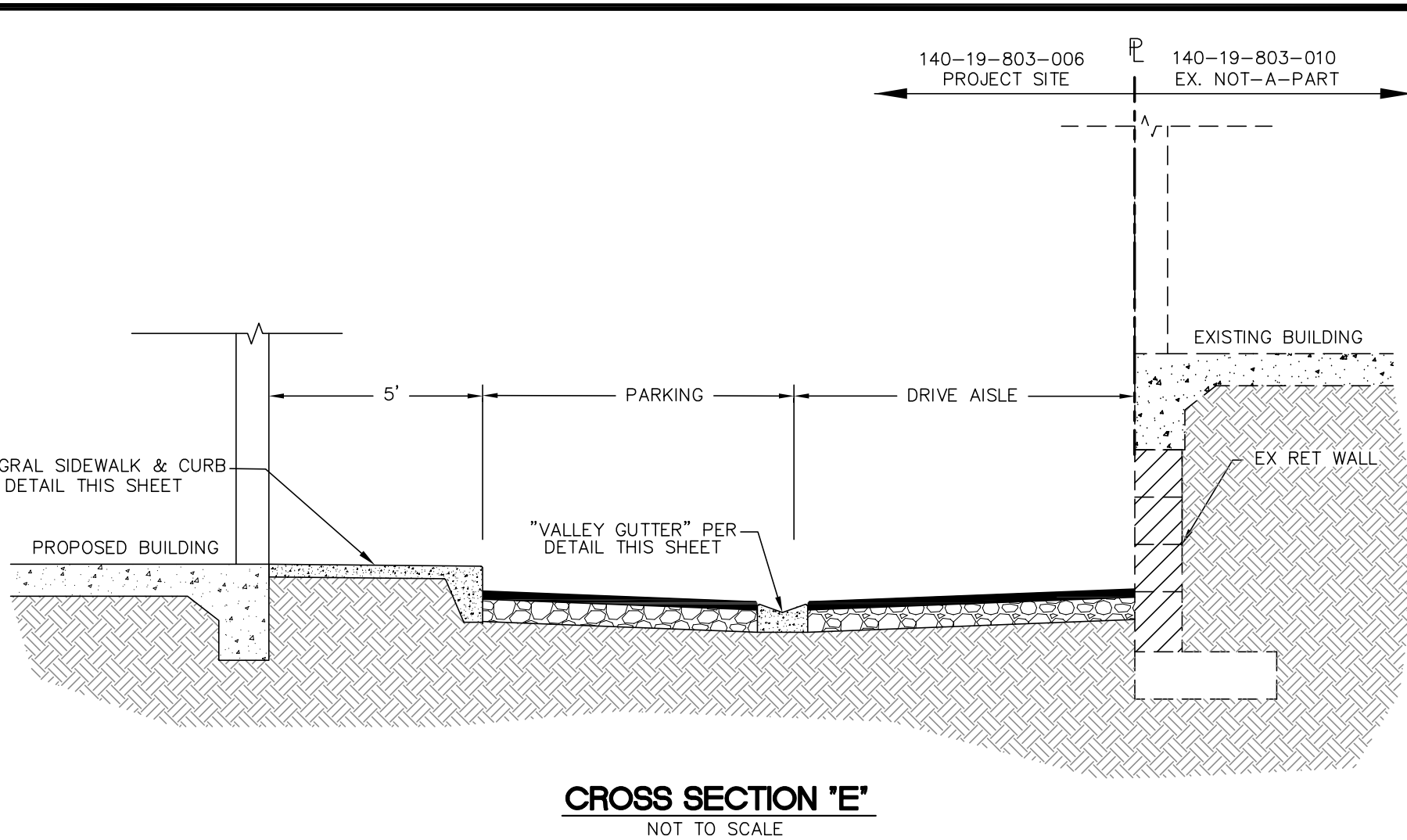
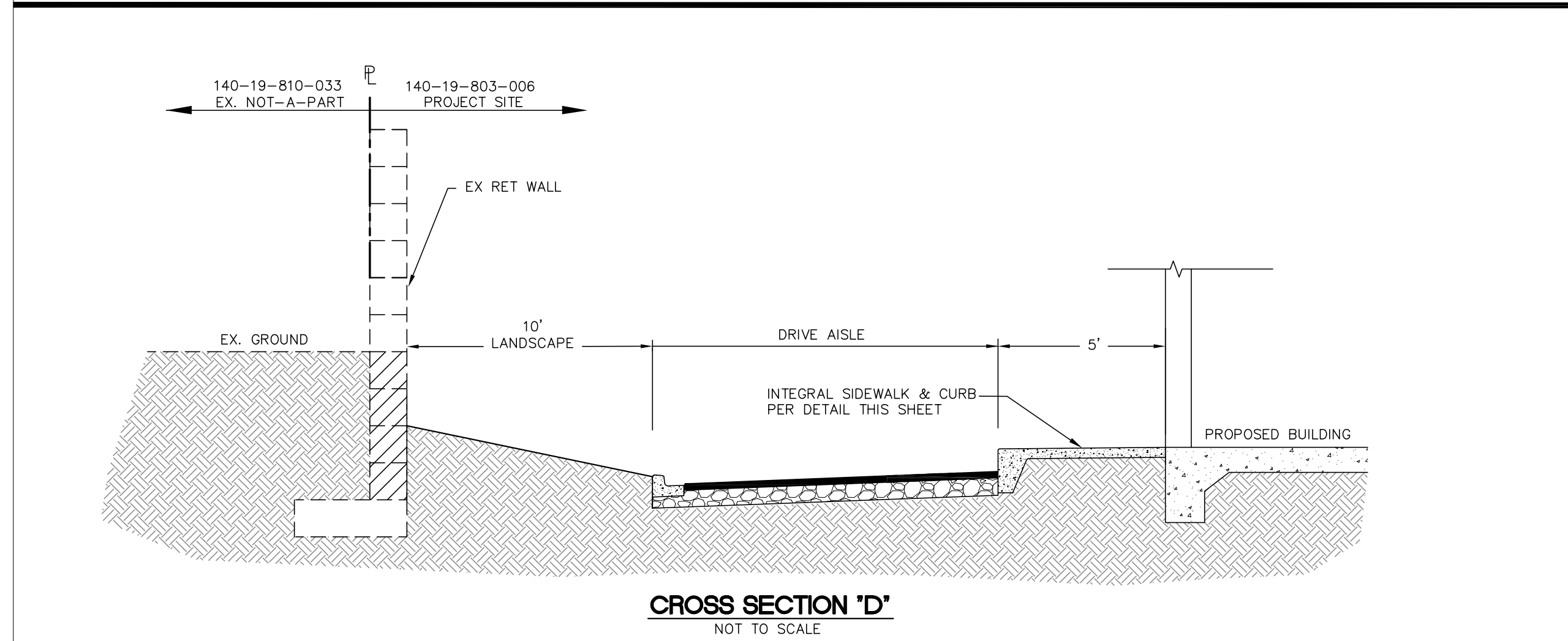
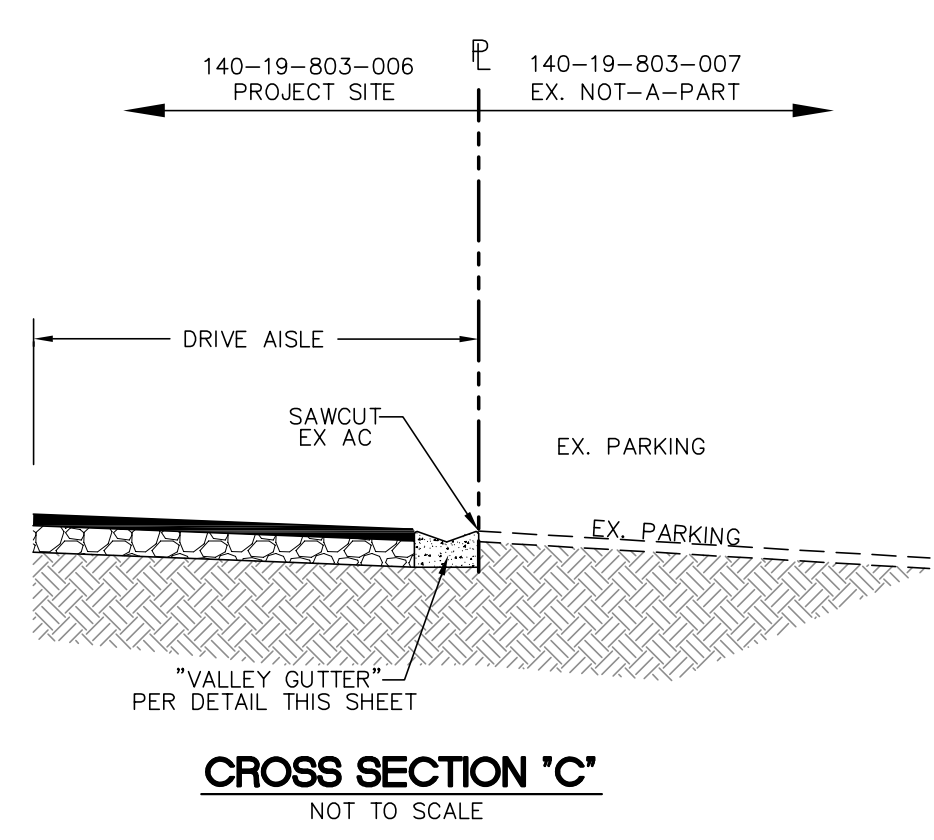
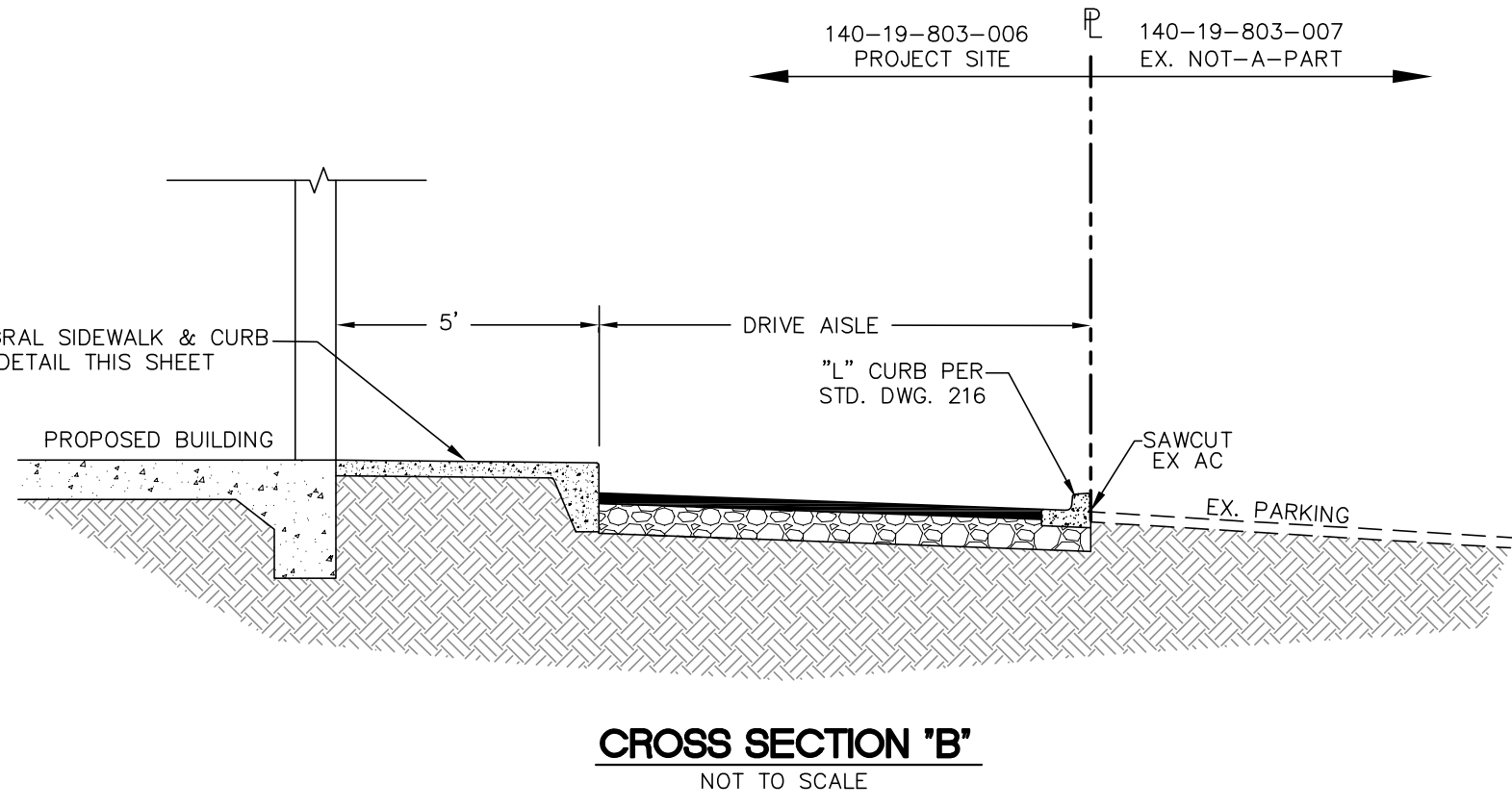


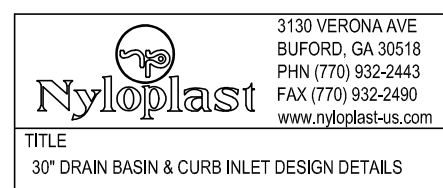
Job No.	1813080
FILE No.	10/14/19
REUSE OF DOCUMENTS	N/A
DESCRIPTION	VERT. SCALE: 1"=30'
APPROVED	HORIZ. SCALE: CM
REVISIONS	DRAWN BY: PDW
DATE	CHECKED BY:
NO	SHEET
	C3.01
	GRADING PLAN
	RIVERA SHOPPING CENTER
	OWENS/LAMB
	A.P.N. 140-19-803-006
	CLARK COUNTY, NEVADA



BLUE DIAMOND
CIVIL ENGINEERING
8016 GLASSER STREET, SUITE 120
LAS VEGAS, NEVADA 89183
(702) 897-8914

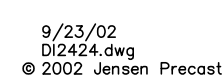


[illegible]



DROP INLET			
MODEL NO.	A	B	*WEIGHT
DI242436	36"	42"	1900 LBS.
DI242448	48"	54"	2500 LBS.

*BOX ONLY

[illegible]

DETAIL SHEET 2
 RIVERA SHOPPING CENTER
 OWENS/LAMB
 CLARK COUNTY, NEVADA
 A.P.N. 140-19-803-006

JOB No.	1813080
DATE:	10/14/19
VERT. SCALE:	N/A
HORIZ. SCALE:	N/A
DRAWN BY:	CM
CHECKED BY:	PDW
SHEET	
C5.02	

QUANTITIES SHOWN BELOW ARE FOR ONE HEADWALL.

RCP/ HDPE SIZE DIA.	LENGTH OF REINFORCING BARS																			
	SINGLE RCP/HDPE					SINGLE OR DOUBLE RCP/HDPE										DOUBLE RCP/HDPE				
	0°-45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°-45°	0°	15°	30°	45°		
	NO. 4	NO. 5	NO. 5	NO. 5	NO. 5	NO. 4	NO. 4	NO. 4	NO. 4	NO. 4	NO. 4	NO. 4	NO. 4	NO. 4	NO. 5	NO. 5	NO. 5	NO. 5		
12"	602'-9"	204'-9"	205'-2"	205'-4"	205'-7"	201'-7"	101'-5"	102'-1"	101'-4"	102'-2"	101'-1"	102'-5"	702'-9"	207'-	207'-6"	207'-11"	208'-9"			
15"	603'-1"	206'-	206'-6"	206'-8"	207'-	202'-1"	101'-11"	102'-8"	101'-10"	102'-9"	101'-7"	103'-	703'-1"	208'-6"	209'-2"	209'-7"	2010'-7"			
18"	603'-4"	207'-	207'-8"	207'-10"	208'-2"	402'-5"	202'-3"	203'-1"	202'-2"	203'-2"	201'-11"	203'-5"	703'-4"	209'-9"	2010'-6"	2011'-	2012'-1"			
21"	603'-8"	208'-	208'-9"	208'-11"	209'-5"	402'-9"	202'-7"	203'-6"	202'-6"	203'-7"	202'-3"	203'-10"	703'-8"	2011'-2"	2012'-	2012'-7"	2013'-10"			
24"	803'-11"	209'-	209'-10"	2010'-1"	2010'-7"	403'-2"	203'-	204'-	202'-11"	204'-1"	202'-8"	204'-4"	903'-11"	2012'-7"	2013'-7"	2014'-2"	2015'-8"			
27"	804'-2"	2010'-	2010'-11"	2011'-2"	2011'-9"	403'-6"	203'-4"	204'-4"	203'-3"	204'-5"	203'-	204'-8"	904'-2"	2014'-1"	2015'-1"	2015'-10"	2017'-6"			
30"	804'-6"	2011'-3"	2012'-3"	2012'-7"	2013'-2"	404'-	203'-10"	205'-	203'-9"	205'-1"	203'-6"	205'-4"	904'-6"	2015'-9"	2016'-11"	2017'-9"	2019'-7"			
33"	804'-10"	2012'-3"	2013'-4"	2013'-8"	2014'-4"	404'-3"	204'-1"	205'-3"	204'-	205'-4"	203'-9"	205'-7"	904'-10"	2017'-3"	2018'-6"	2019'-5"	2021'-5"			
36"	1005'-1"	2013'-3"	2014'-5"	2014'-9"	2015'-7"	604'-8"	304'-6"	305'-9"	304'-5"	305'-10"	304'-2"	306'-1"	1105'-1"	2018'-8"	2020'-	2021'-	2023'-2"			

QUANTITIES SHOWN BELOW ARE FOR TWO HEADWALLS.

RCP/ HDPE SIZE DIA.	RCP/ HDPE AREA SQ. FT.	SINGLE RCP/HDPE										DOUBLE RCP/HDPE										X	Y	L	h
		0° SKEW					15° SKEW					30° SKEW					45° SKEW								
		CONC CU YD		STEEL LB			CONC CU YD		STEEL LB			CONC CU YD		STEEL LB			CONC CU YD		STEEL LB						
12"	0.79	1.00	46	1.09	49	1.10	49	1.14	50	1.41	59	1.52	62	1.58	64	1.73	67	10"	1'- 2"	4'	3'				
15"	1.23	1.32	55	1.45	58	1.47	59	1.52	60	1.80	70	1.93	73	2.01	75	2.18	79	10 1/4"	1'- 2 1/4"	5'	3'- 3 1/2"				
18"	1.77	1.62	69	1.77	73	1.80	74	1.85	75	2.15	85	2.31	89	2.40	91	2.60	96	10 1/2"	1'- 2 1/2"	5'- 9"	3'- 7"				
21"	2.41	1.95	77	2.13	82	2.16	83	2.23	85	2.59	95	2.79	101	2.90	103	3.13	108	10 3/4"	1'- 2 3/4"	6'- 6"	3'- 10 1/2"				
24"	3.14	2.27	96	2.48	102	2.52	103	2.60	105	3.01	116	3.24	122	3.37	125	3.64	131	11"	1'- 3"	7'- 3"	4'- 2"				
27"	3.98	2.62	105	2.86	111	2.90	112	2.99	114	3.48	128	3.75	134	3.89	137	4.21	144	11 1/4"	1'- 3 1/4"	8'-	4'- 5"				
30"	4.91	3.08	117	3.37	123	3.41	124	3.44	127	4.07	141	4.38	148	4.55	152	4.90	159	11 1/2"	1'- 3 1/2"	9'-	4'- 9"				
33"	5.94	3.50	125	3.82	132	3.87	134	3.98	137	4.62	153	4.98	160	5.17	164	5.56	172	11 3/4"	1'- 3 3/4"	9'-9"	5'- 1/2"				
36"	7.07	3.93	161	4.29	169	4.34	171	4.47	174	5.19	190	5.59	200	5.80	204	6.24	213	1'	1'- 4"	10'- 6"	5'- 4"				

NOTES:

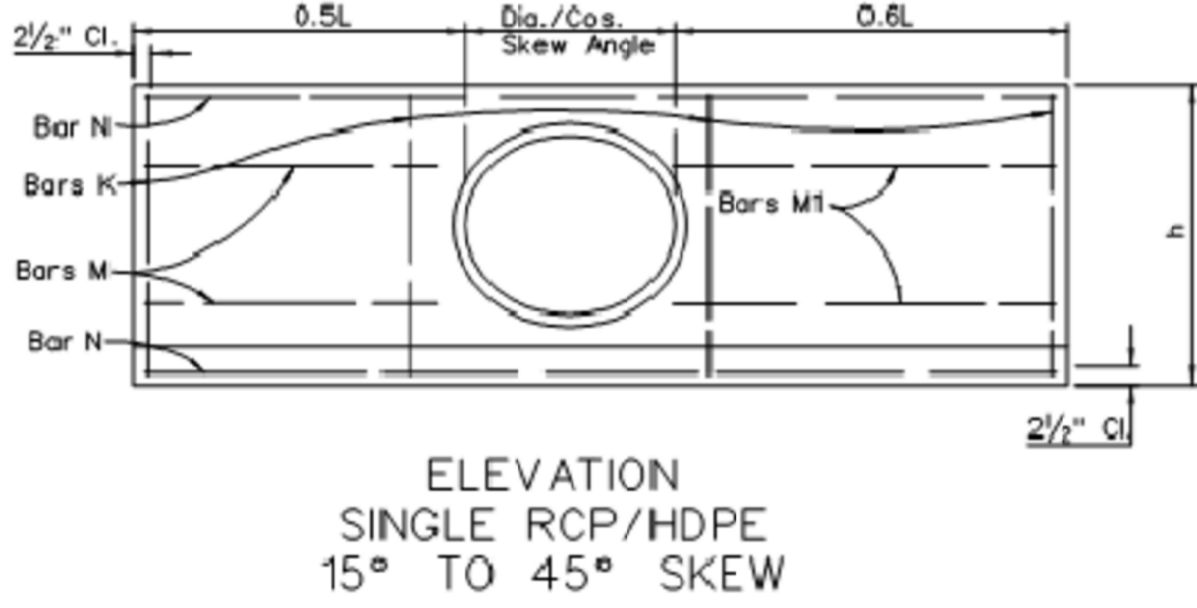
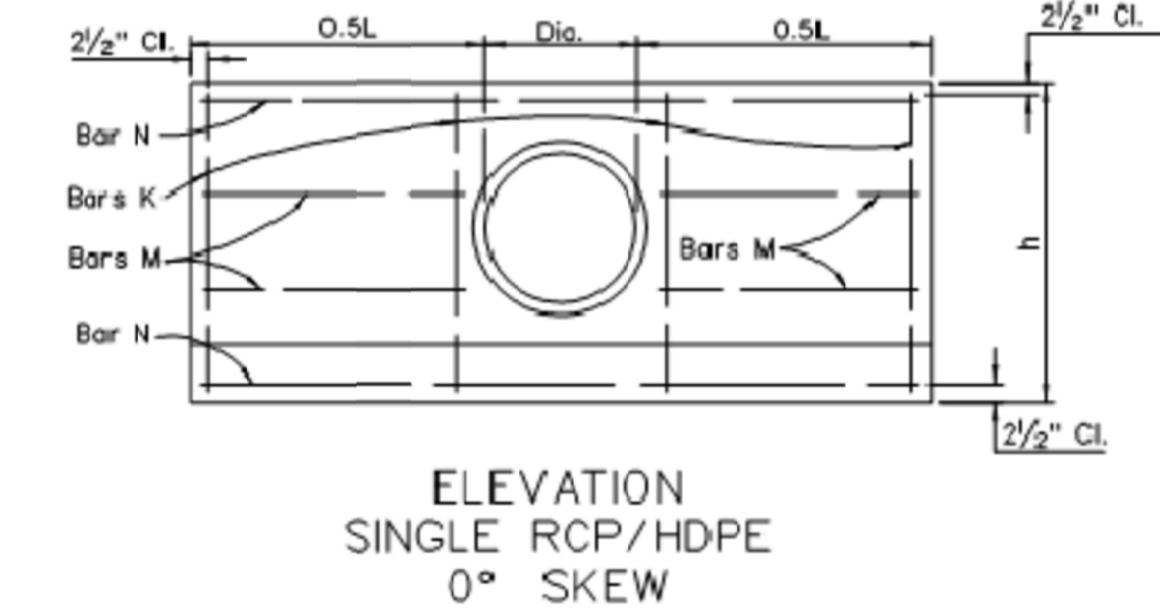
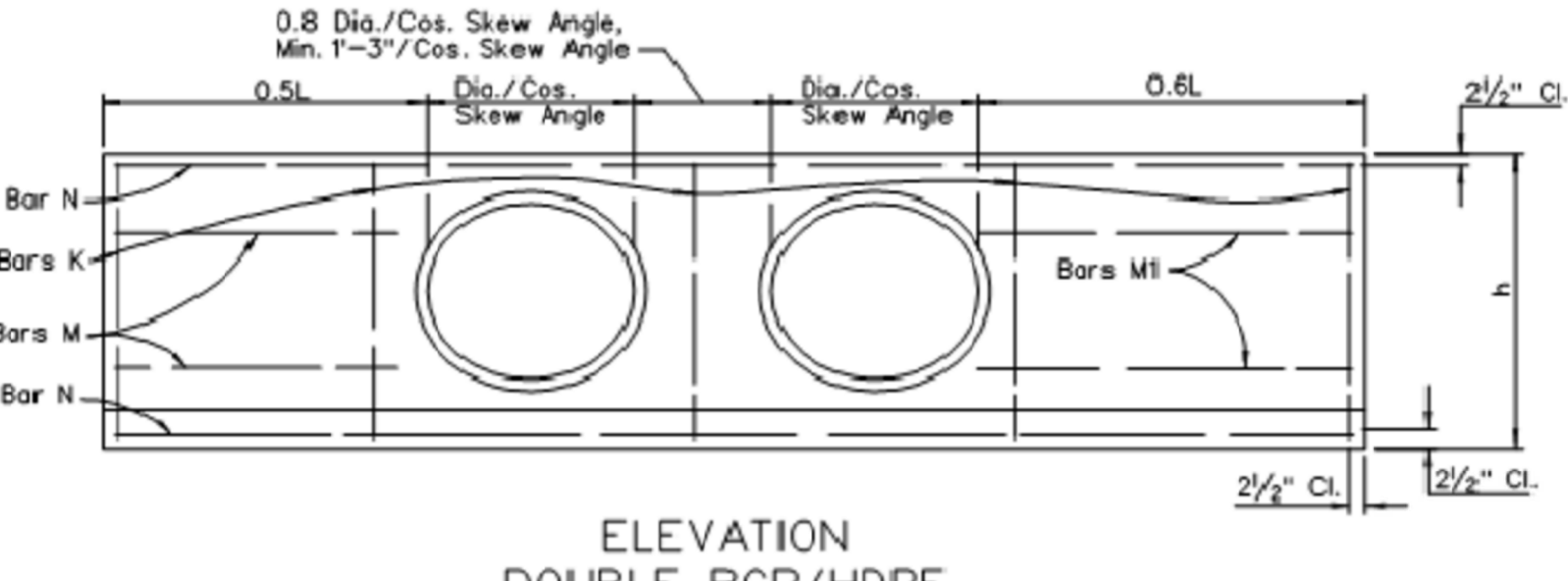
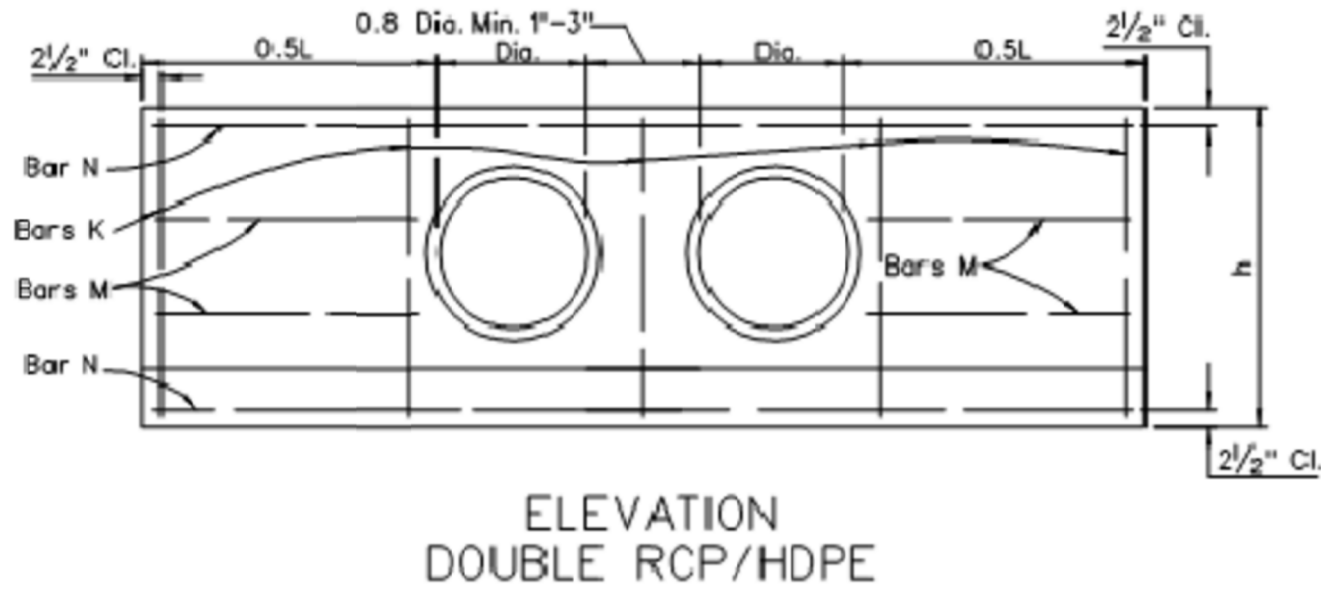
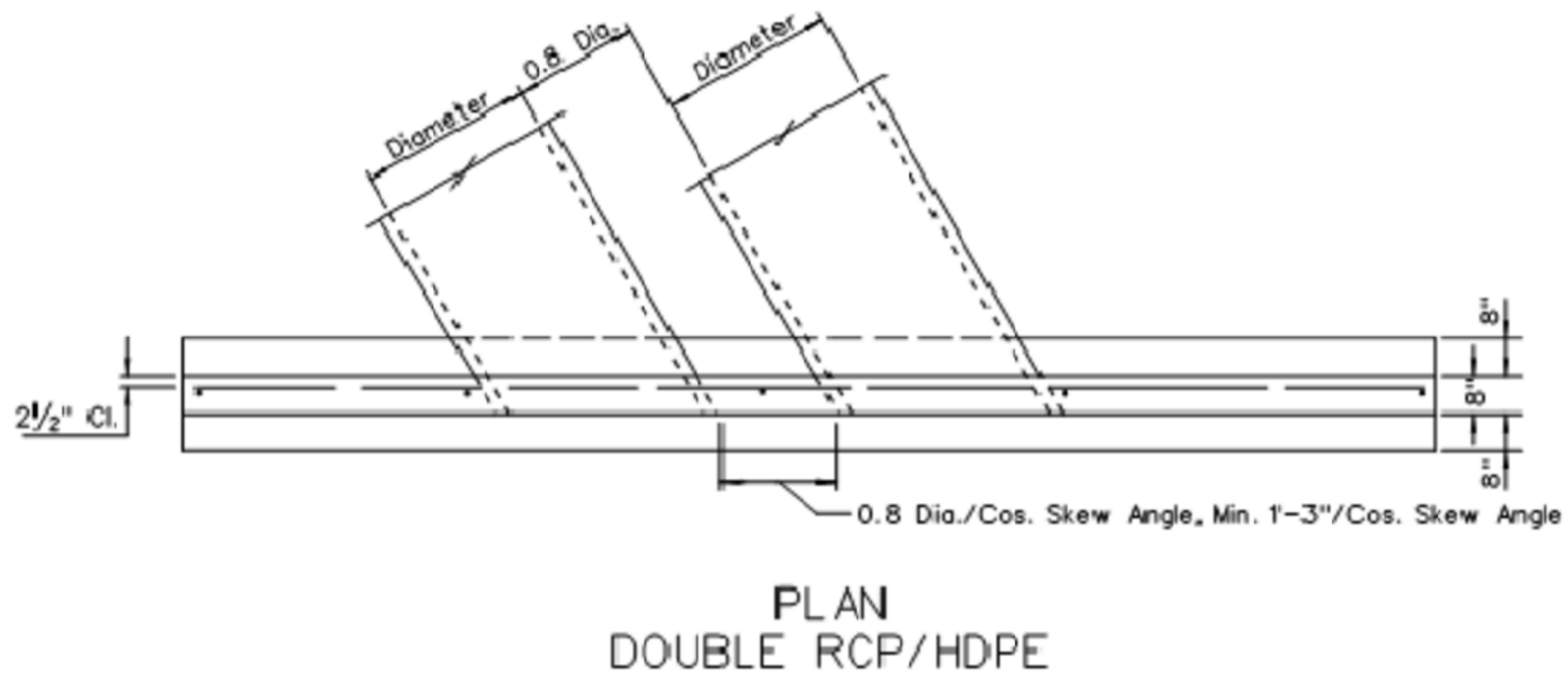
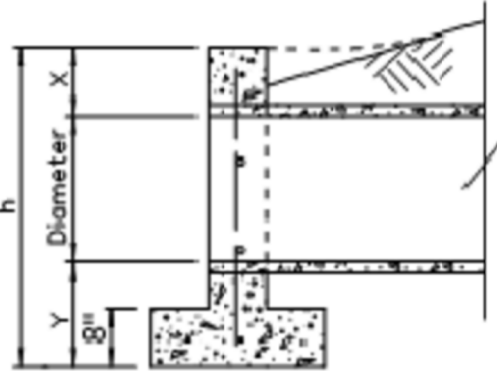
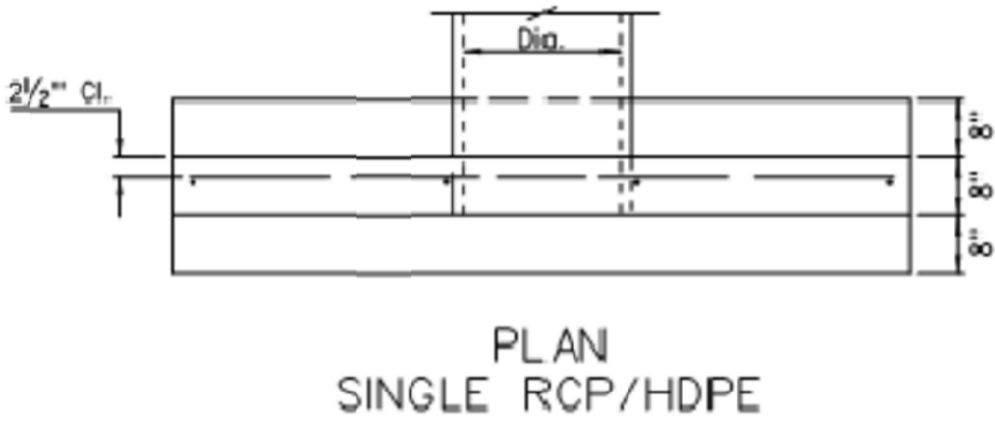
- Concrete shall be class A or AA.
- Reinforcing steel shall be deformed bars with maximum spacing of 18 inches set 2 1/2 inches clear of surface of concrete except as noted. Bar ends shall be kept 1 1/2 inches clear of surface of concrete. Reinforcing bars may be cut and bent in field.
- Footings shown are of minimum depth and shall be extended if soil is unsuitable or liable to scour.
- Culvert pipes to be set on a skew shall be mitered when headwalls are constructed. When headwalls are not constructed the pipes shall not be mitered except in overflow section.
- For estimating headwall quantities on skewed culverts:
0° to 10° - use quantities for 0° skew.
11° to 25° - use quantities for 15° skew.
26° to 40° - use quantities for 30° skew.
41° to 55° - use quantities for 45° skew.
over 55° - calculate quantities required.
Culverts should be installed on 5° increments where it is feasible.
- Dimensions X,Y,L, and h to remain constant regardless of minor variations in wall thickness due to class or type of pipe used.
- See sheet R-2.9.1 for details if connecting to HDPE pipe.

SHEET 2 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CULVERT HEADWALLS
12" TO 36" RCP/HDPE

R-2.5.1.1 (502) Signed Original On File
ADOPTED 8/69 REVISED 5/09 CHIEF HYDRAULICS ENGR.



SHEET 1 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CULVERT HEADWALLS
12" TO 36" RCP/HDPE

R-2.5.1 (502) Signed Original On File
ADOPTED 8/69 REVISED 5/09 CHIEF HYDRAULICS ENGR.

Job No.

FILE No.

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE IDEAS AND DESIGN
INCORPORATED HEREIN, AS AN INSTRUMENT OF
PROFESSIONAL SERVICE, IS THE PROPERTY OF
THE ENGINEER. IT IS TO BE USED ONLY FOR THE
PROJECT AND SITE SPECIFICALLY IDENTIFIED
HEREIN. NO PART OF THIS DOCUMENT IS TO BE
REPRODUCED OR TRANSMITTED IN ANY FORM
OR BY ANY MEANS, ELECTRONIC OR MECHANICAL,
INCLUDING PHOTOCOPYING, RECORDING, OR BY
ANY INFORMATION STORAGE AND RETRIEVAL
SYSTEM, WITHOUT THE WRITTEN PERMISSION
OF THE ENGINEER.

APPROVED

REVISIONS

DESCRIPTION

DATE

NO.

DATE

NO.

PROFESSIONAL ENGINEER-STATE OF NEVADA
PHILIP D. WAKEFIELD
Exp: 6/30/2010
CIVIL
No. 15468 JOHN N. STAMP

BLUE DIAMOND
CIVIL ENGINEERING
8016 GILLESPIE STREET, SUITE 120
LAS VEGAS, NEVADA 89163
(702) 897-8814

DETAIL SHEET 3
RIVERA SHOPPING CENTER
OWENS/LAMB

CLARK COUNTY, NEVADA
A.P.N. 140-19-803-006

JOB No. 1813080
DATE: 10/14/19
VERT. SCALE N/A
HORIZ. SCALE N/A
DRAWN BY CM
CHECKED BY PDW

SHEET
C5.03