

DS #: 5074

APN: 138.06-301.013

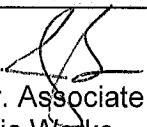
PROJECT: Jensen S. Helena Area 4

SUBMITTAL: 2nd

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		March 28, 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:	COPIES TO:
	Jensen & Helena Area 4	Taney Engineering
Cross Streets:	SWC of Helena Ave and Grand Canyon Dr	Lone Mountain Estates, LLC
File Number:	F:\Depot\DSMemos\DS5076A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	138-06-301-013	CCPW
Zoning Action:	TMP-74627	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	12/12/2018	12/27/2018	See Comments Below	\$400.00	501622: \$400
2 nd Submittal	1/30/2019 & 3/27/2019	2/14/2019 & 3/28/2019		\$400.00	502815: \$400
			TOTAL FEES (LDDRS):	\$800.00	----

REMARKS:

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

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

1. The site is also adjacent to Clark County's jurisdiction. The engineer must coordinate with Clark County Department of Public Works (CCPW) and incorporate any concerns for boundary conditions along the north, west, and south borders. CCPW concurrence is required prior to final acceptance of the study.
2. This site accepts offsite flows and conveys them through the site. Public drainage easements must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.
3. Helena Avenue, Grand Canyon Drive, and Hickam Avenue appear to be a part of parcel 138-06-301-013 and not yet dedicated as public right-of-way. Public right-of-ways must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.
4. Revise the note on Detail A to call out "20' Public Drainage Easement to be Privately Maintained by HOA".

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

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

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/R60E/06
AREA L-06



TANEY ENGINEERING

SUPPLEMENT #1

TO

ADDENDUM #1

FOR

Jensen & Helena Area 4
Residential Development



**CITY OF LAS VEGAS
NEVADA**

MARCH 2019

Prepared by:

Taney Engineering
6030 S. Jones
Las Vegas, Nevada 89118
Telephone: (702) 362-8844
Fax: (702) 362-5233

Prepared for:

Lone Mountain Estates LLC
3311 S. Rainbow Blvd., Ste 205
Las Vegas, NV 89146
Telephone: (702) 873-6700 Ext 123

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Jensen and Helena - Area 4 Date: Mar 25, 2019

Location of Development: a) Descriptive (Cross Streets) North/South: N Grand Canyon St
East/West: Helena Ave

b) Section: 6 Township: 20S Range: 60E

c) APN : 138-06-301-013

Name of Owner: Lone Mountain Estates LLC

Telephone No.: (702) 873-6700 Fax No.: _____ E-Mail Address: kt@ktri.biz

Address: 3311 S. Rainbow Blvd. Ste 205, Las Vegas, NV 89146

Contact Person-Name: Robert Cunningham, P.E. Telephone No.: (702) 362-8844

* E-Mail Address: rc@taneycorp.com Fax No.: (702) 362-5233

Firm: Taney Engineering

Address: 6030 S. Jones, Suite 100, Las Vegas NV. 89118

Type of Land Development/Land Disturbance Process:

☐	Rezoning	☒	Subdivision Map	☐	Clearing and Grading Only
☐	Parcel Map	☐	Planned Unit Development	☐	Other (Please specify below)
☐	Large Parcel Map	☐	Building Permit		

1. Total Owned Land Area: At Site: 15.1+/- acres Being Developed/Disturbed: 15.1+/- 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

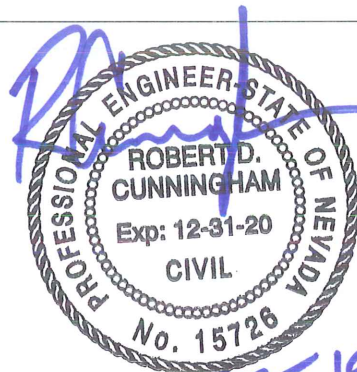
4. Proposed type of development (Residential, Commercial, Etc.): Residential

5. Approximate upstream land area which drains to the subject site: 133.01+/- acres

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: A portion of the project site was evaluated (HTE #07-29544)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The site will discharge to an adjacent, undeveloped parcel to the east (138-06-301-013) similar to the existing drainage pattern.

8. Briefly describe your proposed schedule for the subject project: A.S.A.P



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**

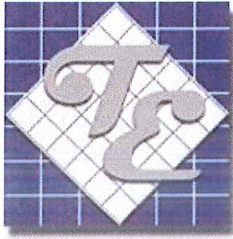
****Review and concurrence of the Clark County Regional Flood Control District is required.**

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1



TANEY ENGINEERING

6030 SOUTH JONES BLVD, SUITE 100

LAS VEGAS, NV 89118

TELEPHONE: 702-362-8844

Fax: 702-362-5233

March 25, 2019
Job No. LMT-18-001

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

Subject: Supplement #1 to Addendum #1 to the Technical Drainage Study for Jensen & Helena Area 4, DS5076A

Dear Mr. Sung:

Taney Engineering is pleased to provide Addendum #1 to the Technical Drainage Study for **Jensen & Helena Area 4**. This addendum includes a response to each comment from City of Las Vegas review email dated on March 11, 2019. The comments have been reproduced and addressed as follows:

Comment 1: Show block wall along Helena Avenue on Grading Plans.

A block wall has been shown on the grading plans along Helena Avenue. This area along Helena Avenue has also been regraded to make sure that the scarp between the wall and house pad can be constructed.

Comment 2: Details do not reflect cut off wall along Helena Avenue.

A cut off wall has been added to Section G on the plans. This depicts a cut off wall on the south side of the street section for Helena Avenue.

Comment 3: How does the west side of Grand Canyon Drive drain, specifically near station 12+50 (existing low point)?

In order to meet dry lane, a 4'x4' grate inlet, with a concrete apron, has been placed on the west side of Grand Canyon at the existing low point. This grate inlet intercepts the all of the 10-year storm event and conveys the flow to the east via an 18" RCP. A riprap calculation has been provided for the end of the storm drain where it daylight to the existing swale on the east side of Grand Canyon.



Comment 4: It is not clear who will maintain the public drainage easement since it is not on any one owner's property. Typically an HOA would maintain a "common lot".

The public drainage easement will remain as a common lot and be maintained by the HOA.

Comment 5: Revise FlowMaster worksheet for 48" RCP to match pipe slope shown on profile sheet.

The pipe slope that is shown on the plan and profile sheet is 1.21%. This slope has been added to the FlowMaster calculation for the 48" RCP and may be found in Appendix B.

A copy of the City of Las Vegas comments has been provided directly following this letter. If you need any additional information, please do not hesitate to call our office.

Sincerely,

TANEY ENGINEERING

Jeff Thomson
Hydrologist I



APPENDICES

APPENDIX A

Comment Email

APPENDIX B

Hydraulic Calculations

APPENDIX C

Improvement Plans



APPENDIX A

Comment Email

Jeff Thomson

From: Jennifer Shinn <jshinn@LasVegasNevada.GOV>
Sent: Monday, March 11, 2019 5:54 PM
To: Jeff Thomson
Subject: RE: Jensen & Helena Area 4 Drainage Study

Jeff,

Couple comments to address prior to conditional approval of Jensen & Helena Area 4:

1. Show block wall along Helena Avenue on Grading Plans.
2. Details do not reflect cut off wall along Helena Avenue.
3. How does the west side of Grand Canyon Drive drain, specifically near station 12+50 (existing low point)?
4. It is not clear who will maintain the public drainage easement since it is not on any one owner's property. Typically an HOA would maintain a "common lot".
5. Revise FlowMaster worksheet for 48" RCP to match pipe slope shown on profile sheet.

I will call you tomorrow morning to discuss.

Thank you,

Jennifer Shinn, P.E.

Engineering Associate
Department of Public Works | City Engineering Division
Phone: (702) 229-6131
333 N. Rancho, floor | Las Vegas, NV 89106



lasvegasnevada.gov



Your opinion is important! [Click here](#) to take a short survey.

From: Jeff Thomson <JeffT@taneycorp.com>
Sent: Monday, March 11, 2019 6:34 AM
To: Jennifer Shinn <jshinn@LasVegasNevada.GOV>
Subject: RE: Jensen & Helena Area 4 Drainage Study

EXTERNAL EMAIL

Good morning Jennifer,

Thank you for the update. It is much appreciated.



APPENDIX B

Hydraulic Calculations

4'X4' Grate Inlet Calculation

Description: Determine ponding depth at proposed 4'x4' grate inlet
Project: LMT-18-001 Jensen & Helena
Reference: The Clark County Regional Flood Control District (CCRFCD) Manual
Date: 3/12/2019

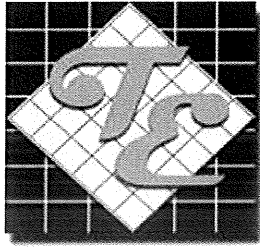
Orifice Equation: $Q = CA(2gh)^{1/2}$

where:

Q = 10-year event discharge = 10.0
C = discharge coefficient = 0.6
A = Effective area (ft²) = 10.72 ft²
4'X4' Grate Inlet
Clogging Factor = 50%
= 5.36 ft²
g = gravitational constant = 32.2 ft/s²
h = Head, ponding depth (ft), (measured from centerline of orifice)

Solving for h,
$$h = \frac{(Q/cA)^2}{2g} = \frac{[10\text{cfs} / (0.6*5.36\text{ft}^2)]^2}{2*32.2\text{ft/s}^2} = 0.15 \text{ ft}$$

Comments: Worst Case Scenario Occurs Under Weir Conditions,
the 10-year ponding depth is 0.15 ft.



TANEY ENGINEERING

6030 S. JONES BOULEVARD, SUITE #100

LAS VEGAS, NV 89118

TELEPHONE: 702-362-8844

FAX: 702-362-5233

Rip Rap Calculations for Circular Outlet

Project Name: Jensen & Helena Area 4
Proj. Number: LEN-18-001
Cross Streets: Jensen & Helena
Designed By: JRT
Date: 3/13/2019

Channel Description or Reference Section

Outlet of the 18" RCP

Input Data

Diameter (ft) = 1.5
Flow (cfs) = 10
Outlet Vel. (ft) = 9.04
Normal Depth (ft) = 0.9
Tailwater Depth (ft) = 1.05
Froude Number = 1.22

Rip Rap Size

Flow Type = Super Critical
 D_a (ft) = 1.20
 $Q/D^{2.5} = 6.34$
 d_{50} (in) = 2.46
Min d_{50} (in) = 3
Thickness (in) = 6

$$(d_{50}/D) (Y_e/D)^{1.2} / (Q/D^{2.5}) = 0.023$$

Mannings Coefficient

$n = 0.031$

$$D_a = 1/2 (D + Y_e)$$

$$n = 0.0395 (d_{50})^{1/6}$$

Reference:

Hydrologic Criteria and Drainage Design Manual, CCRFCD, Aug. 1999
Section 707.4 and equations 732, 760, and 762

Worksheet for 18" RCP

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	2.01000 %
Diameter	1.50 ft
Discharge	10.00 ft ³ /s

Results

Normal Depth	0.90 ft
Flow Area	1.11 ft ²
Wetted Perimeter	2.66 ft
Hydraulic Radius	0.42 ft
Top Width	1.47 ft
Critical Depth	1.22 ft
Percent Full	60.0 %
Critical Slope	0.00921 ft/ft
Velocity	9.04 ft/s
Velocity Head	1.27 ft
Specific Energy	2.17 ft
Froude Number	1.84
Maximum Discharge	16.02 ft ³ /s
Discharge Full	14.89 ft ³ /s
Slope Full	0.00906 ft/ft
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
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	59.99 %
Downstream Velocity	Infinity ft/s

Worksheet for 18" RCP

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.90	ft
Critical Depth	1.22	ft
Channel Slope	2.01000	%
Critical Slope	0.00921	ft/ft

Cross Section for 18" RCP

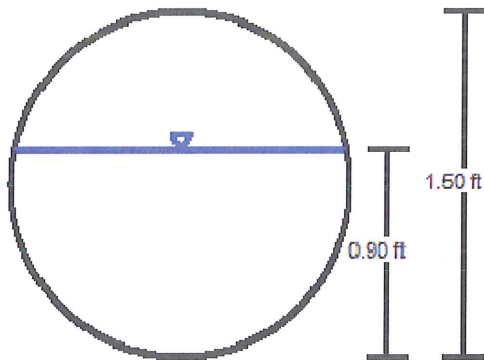
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	2.01000 %
Normal Depth	0.90 ft
Diameter	1.50 ft
Discharge	10.00 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for 48" RCP

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	1.21000 %
Diameter	4.00 ft
Discharge	119.00 ft³/s

Results

Normal Depth	2.59 ft
Flow Area	8.62 ft²
Wetted Perimeter	7.49 ft
Hydraulic Radius	1.15 ft
Top Width	3.82 ft
Critical Depth	3.29 ft
Percent Full	64.8 %
Critical Slope	0.00684 ft/ft
Velocity	13.81 ft/s
Velocity Head	2.96 ft
Specific Energy	5.56 ft
Froude Number	1.62
Maximum Discharge	169.96 ft³/s
Discharge Full	158.00 ft³/s
Slope Full	0.00686 ft/ft
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
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	64.81 %
Downstream Velocity	Infinity ft/s

Cross Section for 48" RCP

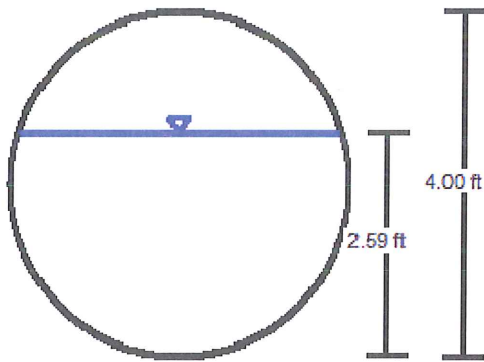
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	1.21000 %
Normal Depth	2.59 ft
Diameter	4.00 ft
Discharge	119.00 ft ³ /s

Cross Section Image



V: 1
H: 1



APPENDIX C

Improvement Plans



**LAS VEGAS VALLEY
WATER DISTRICT**

1001 South Valley View Boulevard
Las Vegas, NV 89153
(702) 870-2011 • lvwd.com

DEVELOPER ACKNOWLEDGEMENT FORM:
NO IMPACT TO DISTRICT WATER FACILITIES

I, JEMAL MUZYEN, as representative
of Darul Iman Ethiopian Muslim Community, Inc. (Developer), acknowledge
that the existing Las Vegas Valley Water District (District) water facilities located within the
proposed work area as shown on the improvement plans are to be protected in place during the
course of construction activities and all valves are to remain accessible during construction.

ALL water facilities are to be restored by the Developer and/or the Developer's Contractor
to current District standards per the Uniform Design and Construction Standards (UDACS) upon
completion of construction. The Developer and/or the Developer's Contractor will schedule
"Inspections" as required while the construction work is in progress. As part of the agency's
offsite bond release process, a final inspection is required upon completion of the
project, Call 702-258-7171 to schedule the final inspection.

DATE: 03/04/19

PROJECT NAME: 6036 Ponderosa Way

PROJECT NUMBER: 136209

AGREEMENT NUMBER:

CLARK COUNTY / CITY OF LAS VEGAS OFFSITE PERMIT NUMBER:

Clark County Public Works: PW18-20007

DEVELOPER INFORMATION:

NAME: Darul Iman Ethiopian Muslim Community, Inc.

ADDRESS: 962 King Richard Avenue, Las Vegas NV 89119

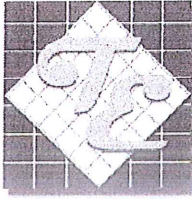
PHONE NO: (702)234-1919

SCOPE OF WORK: Sewer lateral installation only


AUTHORIZED SIGNOR & TITLE:

03/04/19
DATE

Date Received by LVVWD: _____



TANEY ENGINEERING

6030 SOUTH JONES BLVD.

LAS VEGAS, NV 89118

TELEPHONE: 702-362-8844

FAX: 702-362-5233

Transmittal

☐ Priority ☐ Must be delivered by:

☐ AM

☐ PM

To:	Engineering Services	From:	Janna Felipe jannaf@taneycorp.com
Company:	LVVWD	Date:	March 5, 2019
Address:	1001 S. Valley View Blvd. Las Vegas, NV 89153	Job No.:	ETP-17-001
Project:	6036 Ponderosa Way	Folder:	LVVWD
Re:	Acknowledgement Form	Project #	136209

Items Attached

1. (1) Copy of Engineering Services Water Plan Review Checklist
2. (1) Las Vegas Valley Water District – Signed Acknowledgement Form
3. (1) Copy of Signing Authorization (NV Secretary of State) for Jemal Muzyen

COMMENTS:	
For Review	
RECEIVED BY	Signature:
	Print name:
	Date: Time:

RCVD LVVWD ES 19MAR 5am10:26

Jck



March 04, 2019

ENGINEERING SERVICES DIVISION WATER PLAN REVIEW CHECKLIST

PROJECT NAME: **6036 PONDEROSA WAY**
PROJECT NO: **136209 Original Submittal**

This letter serves as notice of the items which are pending at this time. If there are no items listed, please see NEXT STEP.

- The enclosed acknowledgement form must be signed by the Developer and returned to LVVWD.

NEXT STEP: Complete Above Items Prior To Mylar.

This project water plan complies with the Las Vegas Valley Water District technical requirements. However, this water plan is NOT APPROVED FOR CONSTRUCTION at this time.

Should the project scope change, a resubmittal is required. The changes may include additions, deletions or modifications of facilities, or improvements that were not shown on the previously reviewed plans.

If additional information is required, please contact Diana Barentine at (702) 258-3923.
DJM/JNG/DB

IMPROVEMENT PLANS FOR JENSEN & HELENA AREA 4 A RESIDENTIAL SUBDIVISION CITY OF LAS VEGAS, NEVADA A PORTION OF APN 138-06-301-013

Avoid overhead power
line contact. It's costly.
**Call
before you
Overhead**
1-702-227-2929

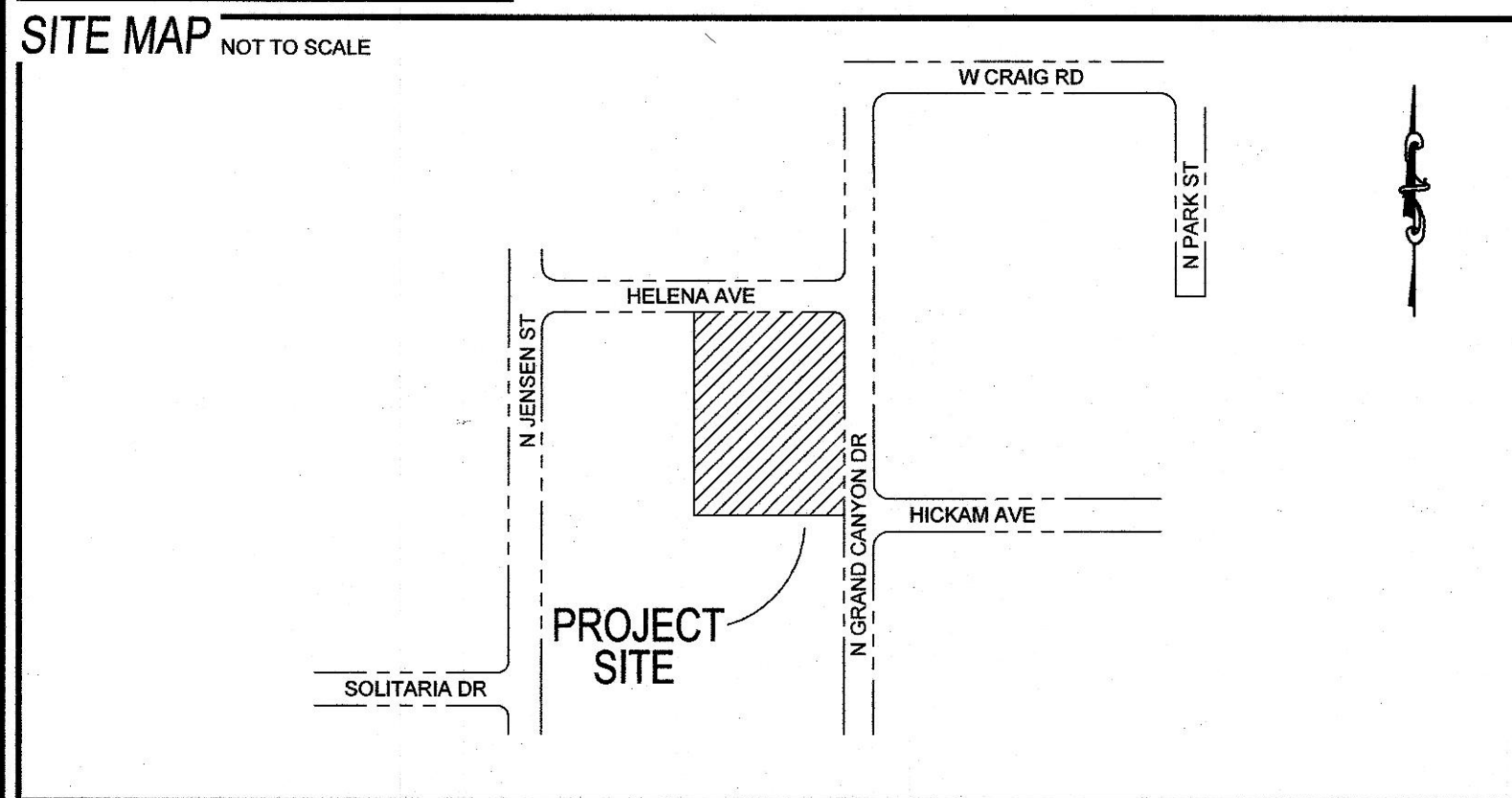
Call before you Dig
Avoid cutting underground
utility lines. It's costly.
**CALL
811**
OR
1-800-227-2800

LEGEND	EXISTING	PROPOSED
PROJECT BOUNDARY		
RIGHT-OF-WAY		
CENTERLINE		
PROPERTY LINE		
EDGE OF PAVEMENT		
SIDEWALK		
CURB AND GUTTER		
FENCE		
CONTOUR (1' INTERVAL)		
CONTOUR (5' INTERVAL)		
DIRECTION OF FLOW		
CUT LINE-ASPHALT		
SCARP (SLOPE VARIES)		
DESIGN ELEVATION	(10.00)	10.00
FUTURE ELEVATION		[10.00]
NUMBER OF RETAINING COURSES		10
RETAINING WALL		
CMU WALL		
SOLID GROUTED WALL - NO RETAINING		
CUT-OFF WALL		
POWER POLE		
SIDEWALK RAMP		
CURB DROP INLET		
STORM DRAIN W/MAINHOLE		
CUT-FILL LINE		
SIGHT VISIBILITY ZONE		
CAP & 2" BLOW OFF VALVE		
WATERLINE FITTINGS		
GATE VALVE		
FIRE HYDRANT		
SEWER LINE W/MAINHOLE		
SEWER LATERAL		
WATER LINE		
WATER LATERAL W/METER		
PRESSURE REDUCING VALVE		
BACKWATER VALVE		
200A SERVICE PEDESTAL		
STREET LIGHT CONDUIT		
F.A.S.T. CONDUIT		
TRAFFIC SIGN		
STOP SIGN W/STREET NAME SIGN		
100W HPS LUMINAIRE W/11 GA. POLE		
250W HPS LUMINAIRE W/11 GA. POLE		
400W HPS LUMINAIRE W/11 GA. POLE		

APPROVAL SIGNATURES	
APPROVED FOR CONSTRUCTION	
COX COMMUNICATIONS LAS VEGAS, INC.	DATE
SOUTHWEST GAS CORPORATION	DATE
CENTRAL TELEPHONE COMPANY dba CENTURYLINK	DATE
THE AFFIXED CENTURYLINK 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 RESOLVE STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.	
NV ENERGY	DATE
NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS 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.	
LAS VEGAS FIRE AND RESCUE	DATE
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES	
FIRST APPROVED DATE: PROJECT# 1223XX	
LVWD APPROVED FIRE FLOW: 1500 GPM AT 20 PSI RESIDUAL	
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW N/A GPM	
SHEETS:	
CITY ENGINEER - ALLEN PAVELKA, PE #9029	
DATE	
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARD IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.	
CITY OF LAS VEGAS, PLANNING DEPARTMENT	DATE
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.	
CLV	0000000

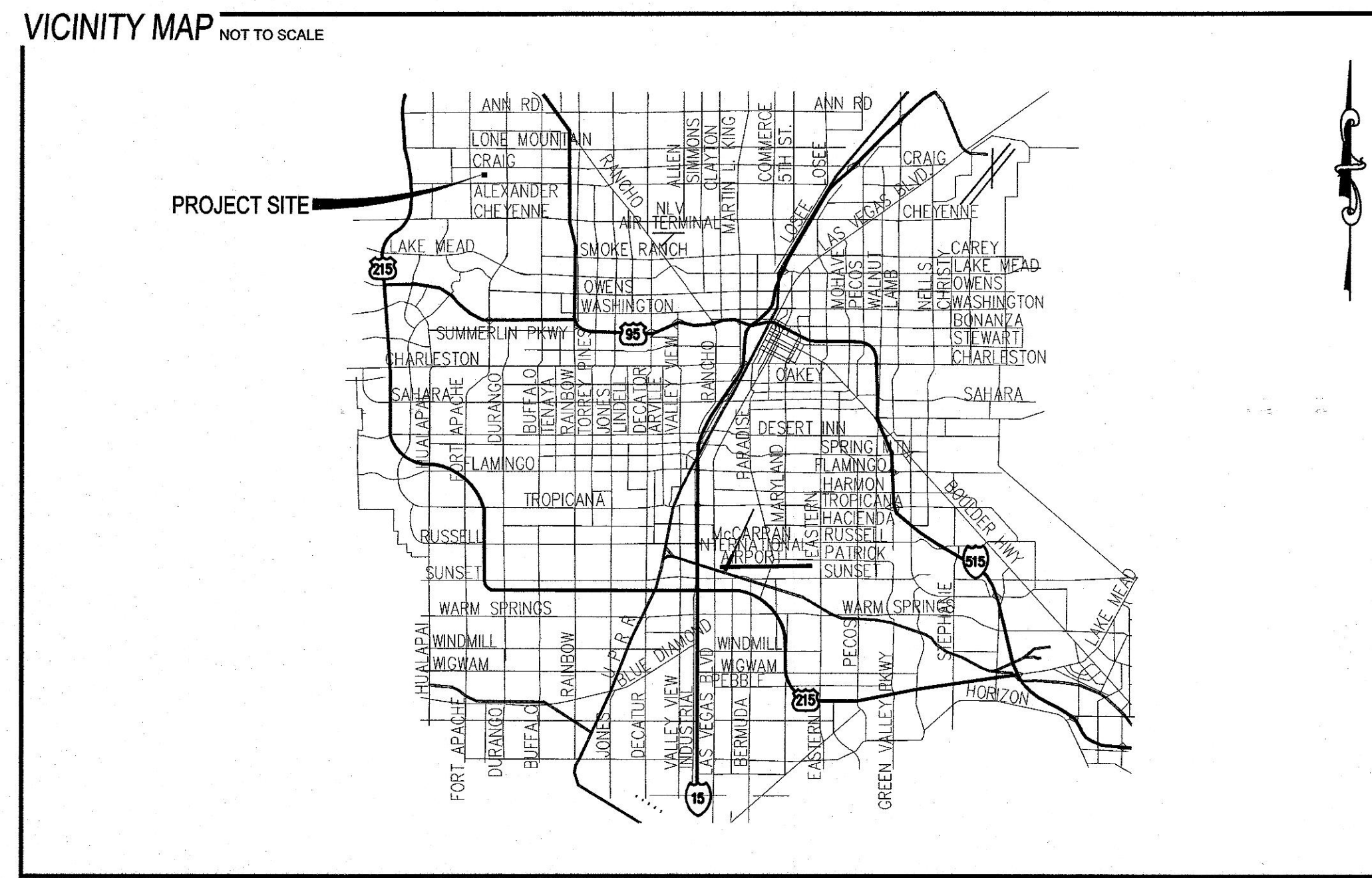
ENGINEER
TAMEY ENGINEERING
6030 SOUTH JONES BLVD
LAS VEGAS, NV 89118
(702) 362-8844 PHONE (702) 362-8233 FAX

DEVELOPER
LONE MOUNTAIN ESTATES LLC
3311 S RAINBOW BLVD, STE 205
LAS VEGAS, NV 89146
(702) 873-6700 PHONE



ABBREVIATIONS

AC	ASPHALTIC CONCRETE	FG	FINISH GRADE	R	RADIUS
AVE	AVENUE	FH	FIRE HYDRANT	RCB	REINFORCED CONCRETE BOX
BC	BACK OF CURB	FL	FLOW LINE	RCF	REINFORCED CONCRETE PIPE
BCR	BACK OF CURB RADIUS	FT	FEET	ROW	RIGHT-OF-WAY
BFE	BASE FLOOD ELEVATION	G	GRADING	RT	RIGHT
BFP	BACK FLOW PREVENTOR	GB	GRADE BREAK	SD	STORM DRAIN
BLM	BUREAU OF LAND MANAGEMENT	GFF	GARAGE FINISH FLOOR	SHT	SHEET
BM	BENCHMARK	HP	HIGH POINT	STLT	STREETLIGHT
BRPM	BLUE RAISED PAVEMENT MARKER	HPS	HIGH PRESSURE GAS	SWM	SOUTHERN NEVADA WATER AUTHORITY
BVC	BEGIN VERTICAL CURVE	INV	INVERT	SS	SANITARY SEWER
BW	BOTTOM OF EXISTING WALL	LF	LINEAR FEET	ST	STREET
CATV	CABLE TELEVISION	LN	LANE	STA	STATION
CC	CLARK COUNTY	LS	LANDSCAPE	STD	STANDARD
CCFD	CLARK COUNTY FIRE DEPARTMENT	LT	LEFT	SVZ	SIGHT VISIBILITY ZONE
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	LVWD	LAS VEGAS VALLEY WATER DISTRICT	SW	SIDEWALK
CL	CENTERLINE	MAX	MAXIMUM	SY	SQUARE YARD
CLSM	CONTROLLED LOW STRENGTH MATERIAL	MH	MANHOLE	TC	TOP OF CURB
CLV	CITY OF LAS VEGAS	MIN	MINIMUM	TELE	TELEPHONE
CMP	CORRUGATED METAL PIPE	NO	NUMBER	TF	TOP OF FOOTING
CNVL	CITY OF NORTH LAS VEGAS	NTS	NOT TO SCALE	T.O.P.	TOP OF PIPE
CO	CLEAN OUT, SEWER	OC	ON CENTER	TR	TOP OF RETAINING
COH	CITY OF HENDERSON	PB	PULL BOX	TW	TOP OF WALL
CY	CUBIC YARD	PC	POINT OF CURVE	TYP	TYPICAL
DOCS	DESIGN AND CONSTRUCTION STANDARDS FOR	PCC	POINT OF COMPOUND CURVE	UDCS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
DG	DUCTILE IRON PIPE	PE	POLYETHYLENE	UT	UTILITY
DI	DROP INLET	PI	POINT OF INTERSECTION	USD	UNIFORM STANDARD DRAWING
DIP	DUCTILE IRON PIPE	PLT	PLATE	VC	VERTICAL CURVE
DR	DRIVE	POC	POINT OF CONNECTION	VCP	VITRIFIED CLAY PIPE
EC	END OF CURVE	PP	POWER POLE	VG	VALLEY GUTTER
EG	EXISTING GRADE	P&P	PLAN AND PROFILE	W	WATER
ELEC	ELECTRICAL	PRC	POINT OF REVERSE CURVE	ZC	ZERO LIP CURB
EP	EDGE OF PAVEMENT	PROJ	PROJECT		
EVC	END VERTICAL CURVE	PRV	PRESSURE REDUCING VALVE		
EX	EXISTING	PT	POINT OF TANGENCY		
FF	FINISH FLOOR ELEVATION	PVC	POLYVINYL CHLORIDE		

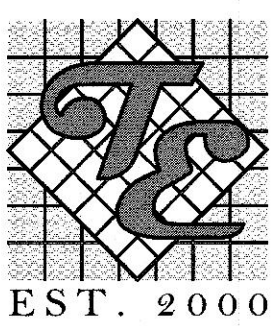


SUBDIVISION INFORMATION	
ACRES:	4.95 AC
AREA DISTURBED:	4.95 AC
LOTS:	5
LOT SIZE:	20,000 SF MIN.
ZONING:	R-E
FMP:	XX
TMP:	74827
SETBACKS:	50 FT (PUBLIC) 30 FT (PRIVATE)
FRONT:	35 FT
REAR:	10 FT
SIDE:	15 FT
CORNER:	15 FT
UTILITY DISCLAIMER	
EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR EXISTING LOCATIONS.	
BASIS OF BEARING	
NORTH 00°54'51" EAST, BEING THE BEARING OF EAST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 6, TOWNSHIP 20 SOUTH, RANGE 60 EAST M.D.B. & M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN IN FILE 101, PAGE 86 OF SURVEYS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER.	
BENCHMARK	
CITY OF LAS VEGAS BENCHMARK - MONUMENT ID NUMBER 9LV007N4 RIVET & PLATE IN TOP OF CURB AT SE CORNER OF ALEXANDER & GRAND CANYON ELEVATION 792.842 METERS / 2601.18 FEET (NAVE88)	
LEGAL DESCRIPTION	
EAST HALF (E 1/2) OF THE SOUTHWEST QUARTER (SE 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 6, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.	
SAID PARCEL CONTAINS 4.95 ACRES, MORE OR LESS.	

LONE MOUNTAIN ESTATES LLC

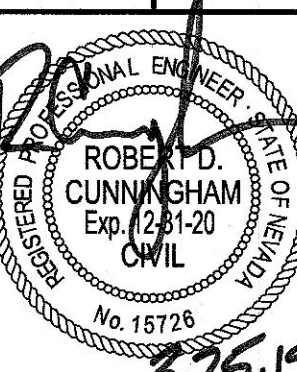
3311 S RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
(702) 873-6700 FAX

TAMEY ENGINEERING
1833 S. JONES BLVD
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-8233



N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL

COVER SHEET



DATE:	3/25/2019
SCALE:	1"=30'
JOB NO:	LMT-18-001
DESIGNED BY:	NB
CHECKED BY:	RC
SHEET NAME:	C1
SHEET NUMBER:	1 OF 7

CLV GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY, NEVADA AREA", LATEST EDITION, THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA, NEVADA" LATEST REVISED EDITION, THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA, AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY, THE "UNIFORM BUILDING CODE, AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR REFERENCE PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL, AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES, AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS. ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE I CEMENT SHALL BE USED ON ALL OFF-SITE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGN TO BE APPROVED BY THE CITY. PRIOR TO USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM OF EVERY 300' IN EXTRUDED TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY GEOTEK RESIDENTIAL, LLC (14434-LVR, NOVEMBER 2018) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE No. 625.380 & CITY OF LAS VEGAS TITLE 16, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC. SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS, FLOOD CONTROL, AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEANOUTS, ETC. TO FINISH GRADE AS APPLICABLE, WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING, AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF MDT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC. THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, AND STORM DRAIN MAIN ALIGNMENT. THE SANITARY SEWER AND STORM DRAIN LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTANTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COORDINATE FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

CLV STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATION SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY, NEVADA AREA", LATEST REVISION, AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY, NEVADA AREA", LATEST REVISION.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC/ELECTRICAL FIELD OPERATIONS DIVISION AND THE CONSTRUCTION PROJECT REPRESENTATIVE. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623.10.03 (E) OF THE SPECIFICATIONS.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
4. ALL EMPTY CONDUIT SHALL HAVE PULL STRINGS INSTALLED PRIOR TO FINAL INSPECTION.
5. ANY STRUCTURE, SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM OF EIGHTEEN INCHES (18") TO THE FACE OF STREET LIGHTING POLE ON ALL SIDES WHEN STREET LIGHT IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE ELECTRICAL SERVICES SECTION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWINGS SHALL BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINTS SHALL BE COORDINATED WITH NEVADA POWER COMPANY, AND WHEREVER POSSIBLE, SHALL BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
8. IT SHALL BE ASSUMED THAT IN THE ABSENCE OF AN EXISTING, WORKABLE CIRCUIT TO ATTACH TO, ALL INSTALLATIONS SHALL REQUIRE A NEW SERVICE FOR OPERATION OF THE CIRCUIT.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCULATIONS AND/OR PIPES, THE CONTRACTOR SHALL RESOLVE THE CONFLICT BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREET LIGHT BASES ARE INSTALLED AT NO EXPENSE TO THE CITY OF LAS VEGAS.
10. THE CONTRACTOR SHALL FURNISH COMPLETE SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

LEGAL DESCRIPTION

EAST HALF (E 1/2) OF THE SOUTHEAST QUARTER (SE 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 6, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

SAID PARCEL CONTAINS 4.95 ACRES, MORE OR LESS.

EARTHWORK

TOTAL FOR OVERALL DEVELOPMENT: 4,269 CY CUT / 5,548 CY FILL / 1,279 CY NET

NOTE: THIS OPINION OF THE CUT AND FILL QUANTITIES IS PROVIDED AS REQUIRED BY THE GOVERNING ENTITY. THIS INFORMATION SHOULD NOT BE USED FOR BIDDING PURPOSES. ALL CONTRACTORS ARE RESPONSIBLE FOR THEIR OWN QUANTITIES. THESE TOTALS ARE RAW AND DO NOT ACCOUNT FOR SHRINKAGE AND SUBSIDENCE.

CLV TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONES. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENT INTO EXISTING CITY STREETS WHERE WARRANTED. IMMEDIATELY AFTER GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCLOSED UPON BY A CONSTRUCTION WORK ZONE AND ALL PUBLIC WORKS START IDENTIFY A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL, OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE FEET (5') OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGN POST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGN POST SHALL BE ELIMINATED.
8. 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.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO EQUIPMENT AND FLAG PERSONS NECESSARY TO ENSURE THE SAFETY OF THE PUBLIC IN AND AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT-OF-WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZEN AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET AND SHALL ARRANGE FOR TEMPORARY RELOCATION OF THE STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE NO. 228-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ALL WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

CLV GRADING NOTES

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

	HORIZONTAL	VERTICAL	COMPACTION
A. EXISTING SUBGRADE	± 0.1"	± 0.1"	SEE SOILS REPORT
B. ENGINEERED FILL	± 0.2"	± 0.1" TO ± 0.1"	SEE SOILS REPORT

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

STORMWATER RUNOFF 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 ACCUMULATE 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.
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 CLARK COUNTY TITLE 24-40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND PRATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY, REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION IIIA.5.
4. AT A MINIMUM, THE CONTRACTOR R 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 RIMS WEEKLY, AND WITHIN 24 HOURS AFTER AN ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION IIIA.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.

SOUTHERN NEVADA SOUTHWEST GAS CORP. GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-969-6020.
2. MINIMUM HORIZONTAL AND VERTICAL CLEARANCES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND UTILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC SHALL BE AT LEAST 12-INCHES OR GREATER AS DICTATED BY LOCAL CODES AND STANDARDS.
3. ANY DEVIATION FROM SPECIFIED MINIMUM CLEARANCES MUST BE APPROVED BY ALL AFFECTED UTILITIES AND/OR MUNICIPALITIES.
4. FOR VALVE ADJUSTMENT CONTACT 702-658-6107 48 HOURS PRIOR TO CONSTRUCTION.
5. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099.
6. SWGS STANDBY CONTACT NUMBER: (702-400-1789)

SOUTHWEST GAS CORPORATION DATE

CLV FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE 8 6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. [IFC § 105.7.12]
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC § 3310, § 3312]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC § 507.5.7.3]
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE COMPLETED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC § 108.3]
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC § 507.2.1, NFPA 24]
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC § 507]
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [IFC § 507.5.7.1]
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC § 507]
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [IFC § C102]
 - RESIDENTIAL – 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
 - COMMERCIAL – 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS, WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [IFC § C102.6]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC § C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC § C102.4]
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC § C102.7]
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC § C102.6]
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS. SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SERVICE. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC § C104]
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC § 503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%, ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC § 503.2.7, § 503.2.8]
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. [IFC § 503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. [IFC § 503.2.1]
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES, NOT LESS THAN 32 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD, NOT LESS THAN 24 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [IFC § 503.2.1.1]
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC § 503.1.1]
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROADS) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. [IFC § 503.1.2]
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LINES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [IFC § 503.2.5]
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANE. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC § 503.3]
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC § 503.5 AND IFC APPENDIX M.

SEWER MANHOLE SCHEDULE

STORM DRAIN MANHOLE SCHEDULE

CLV SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF DESIGN & CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTORS TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS, ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEERS.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE I AGGREGATE BASE.
5. ALL MANHOLES IN PAVED STREETS EIGHTY FEET (80') R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY FEET (80') WILL REQUIRE RETROFITTING IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. THE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCHES (12") IN DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN-LINE "Y" SHALL BE USED ON LINES TWELVE INCHES (12") IN DIAMETER AND ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A MAIN LINE OR THE SEWER IS LESS THAN EIGHTEEN INCHES (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH OF A FOOT (0.1') FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED AND REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF PVC C900 WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

LAS VEGAS VALLEY WATER DISTRICT NOTES

- LVVWD PROJECT #XXXXXX
1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT NUMBER IDENTIFIED ABOVE.
 2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERCEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
 3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
 4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
 5. ALL SERVICE LATERALS TWO INCHES (2") IN DIAMETER AND SMALLER SHALL BE TYPE "K" COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
 6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
 7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY, AND CURB GUTTERS.
 8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
 9. ALL WATER FACILITIES AND APPURTENANCES SHALL BE DISINFECTED, PRESSURE TESTED, AND HAVE AN ACCEPTABLE PASSING HEALTH WATER SAMPLE OBTAINED, PRIOR TO OPERATION AND USE.
 10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO INCHES (2") AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802 TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
 11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
 12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD APPROVED PRODUCTS LIST FOR NEW FACILITIES. LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS BY SUBMITTING SHOP DRAWINGS.
 13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.
 14. THE INSTALLATION OF LVVWD MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.
- ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNERS ASSOCIATION EXISTS, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.
- 15. NO LEAD COMPLIANCE NOTE:** TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKS BRASS PRODUCTS PROSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE REUSED.

APPROVED FOR CONSTRUCTION	
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES	
FIRST APPROVED DATE	PROJECT# 122XXXX
LVVWD APPROVED FIRE FLOW: 1500 GPM AT 20 PSI RESIDUAL	

QUANTITIES

PAVING AND GRADING	PUBLIC	PRIVATE
2" ASPHALT	XX SY	
DRAINAGE	PUBLIC	PRIVATE
46 INCH RCP	125 LF	
5X5" JENSEN PRECAST DROP INLET	3 EA	
RIP RAP (560 = 9")	4 CY	
DRAINAGE EASEMENT - CONCRETE	4.228 SQ.F	
DRAINAGE EASEMENT - BOLLARD	3 EA	
RETAINING WALL	250 LF	
WATER	PUBLIC	PRIVATE
XX	XX SY	
SEWER	PUBLIC	PRIVATE
XX	XX SY	
TRAFFIC	PUBLIC	PRIVATE
XX	XX SY	

Call before you Dig

Call before you Overhead

1-702-227-2929

Call before you Dig

811

OR 1-800-227-2600

BASIS OF BEARING

NORTH 00°54'51" EAST, BEING THE BEARING OF EAST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 6, TOWNSHIP 20 SOUTH, RANGE 60 EAST M.D.B. & M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN IN FILE 101, PAGE 85 OF SURVEYS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK - MONUMENT ID NUMBER 9LV007N4
RIVET & PLATE IN TOP OF CURB AT SE CORNER OF ALEXANDER & GRAND CANYON
ELEVATION 792.842 METERS / 2601.18 FEET (NAVE88)

UTILITY DISCLAIMER

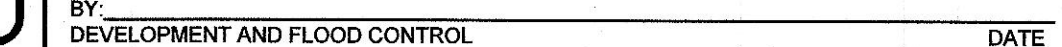
EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT EXISTING UTILITIES ARE SHOWN HEREON.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

DEVIATIONS FROM STANDARDS

1. XX

ABBREVIATIONS

AC ASPHALTIC CONCRETE	FG FINISH GRADE	R RADIUS
AVE AVENUE	FH FIRE HYDRANT	RCB REINFORCED CONCRETE BOX
BC BACK OF CURB	FL FLOW LINE	RCP REINFORCED CONCRETE PIPE
BCR BACK OF CURB RADIUS	FT FEET	R/W RIGHT-OF-WAY
BFE BASE FLOOD ELEVATION	G GRADING	RT RIGHT
BR BACK OF ROAD BREAK	GB GRADE BREAK	SD STORM DRAIN
BLM BUREAU OF LAND MANAGEMENT	GFF GARAGE FINISH FLOOR	ST SHEET
BM BENCHMARK	HP HIGH POINT	STLT STREETLIGHT
BRPM BLUE RAISED PAVEMENT MARKER	HPS HIGH PRESSURE GAS	SNWA SOUTHERN NEVADA WATER AUTHORITY
BVC BEGIN VERTICAL CURVE	IN INVERT	SS SANITARY SEWER
BW BOTTOM OF EXISTING WALL	LF LINEAR FEET	ST STREET
CA TV CABLE TELEVISION	LN LANE	STA STATION
CC CLARK COUNTY	LS LANDSCAPE	STD STANDARD
CCFD CLARK COUNTY FIRE DEPARTMENT	LT LEFT	SZ SIGHT VISIBILITY ZONE
CCWR CLARK COUNTY WATER RECLAMATION DISTRICT	LV LAS VEGAS VALLEY WATER DISTRICT	SVB SUBWALL
CL CENTERLINE	MAX MAXIMUM	SQ SQUARE YARD
CLSM CONTROLLED LOW STRENGTH MATERIAL	MH MANHOLE	TC TOP OF CURB
CLV CITY OF LAS VEGAS	MIN MINIMUM	TE TELEPHONE
CMP CORRUGATED METAL PIPE	NO NUMBER	TF TOP OF FOOTING
CNVL CITY OF NORTH LAS VEGAS	NTS NOT TO SCALE	T.O.P. TOP OF PIPE
CN CLEAN OUT, SOWER	OC ON CENTER	TR TOP OF RETAINING
COH CITY OF HENDERSON	PU PULL BOX	TW TOP OF WALL
CU CUBIC YARD	PC POINT OF CURVE	TY TYPICAL
CS DESIGN DESIGN AND CONSTRUCTION STANDARDS FOR	PCC POINT OF COMPOUND CURVE	UDS UNIFORM DESIGN AND CONSTRUCTION
CSW WASTE WATER COLLECTION SYSTEMS	PE POLYETHYLENE	US STANDARDS
DG DESIGN GRADE	PI POINT OF INTERSECTION	UT UTILITY
DI DROP INLET	PL PROPERTY LINE	USD UNIFORM STANDARD DRAWING
DIP DUCTILE IRON PIPE	PLT PLATE	VC VERTICAL CURVE
DR DRIVE	POC POINT OF CONNECTION	VCIP VERTICAL CURVE INLET
EC END OF CURVE	PP POWER POLE	VG VALLEY GUTTER
EG EXISTING GRADE	PPR PLAN AND PROFILE	W WATER
ELEC ELECTRICAL	PRC POINT OF REVERSE CURVE	ZC ZERO LIP CURB
EP EDGE OF PAVEMENT	PROJ PROJECT	
EVC END VERTICAL CURVE	PRV PRESSURE REDUCING VALVE	
EX EXISTING	PT POINT OF TANGENCY	
FF FINISH FLOOR ELEVATION	PVL POLYVINYL CHLORIDE	



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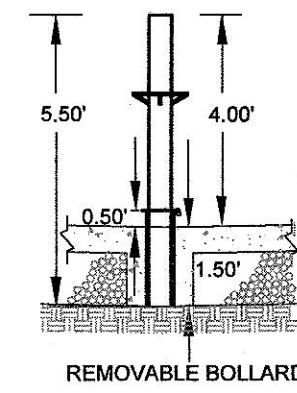
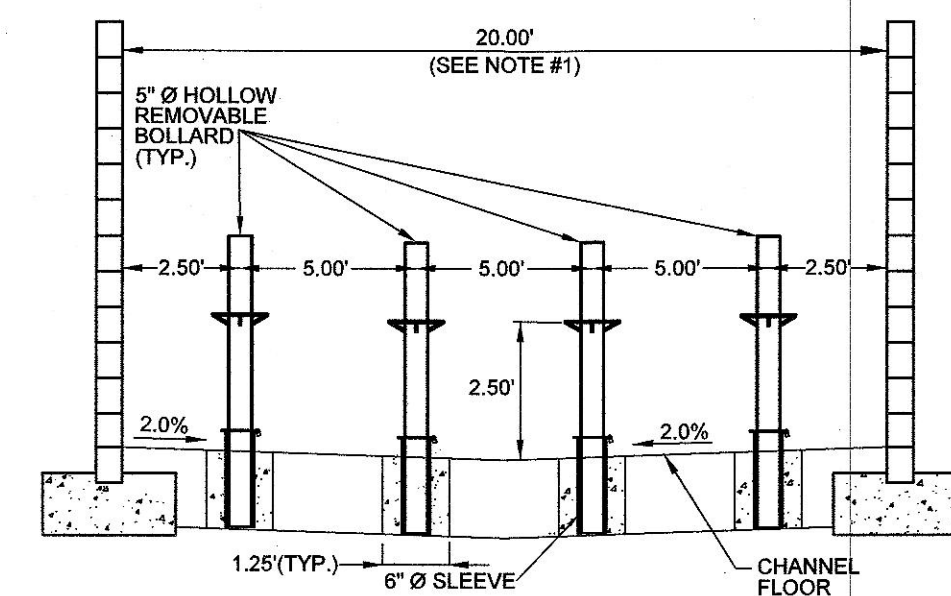
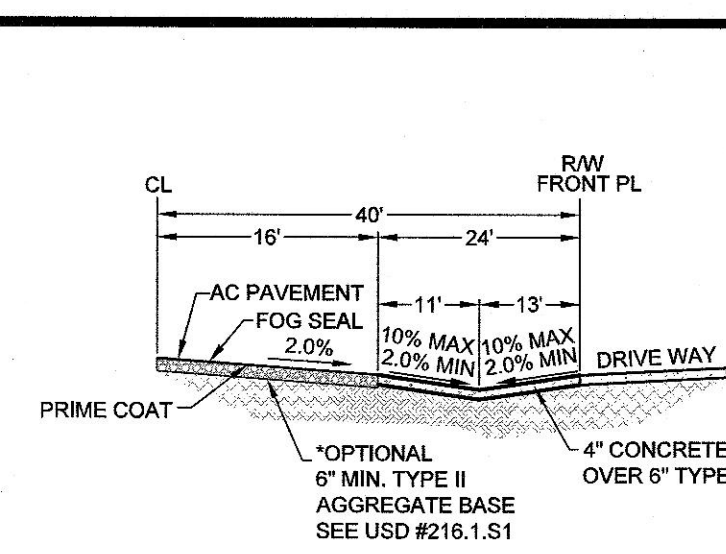
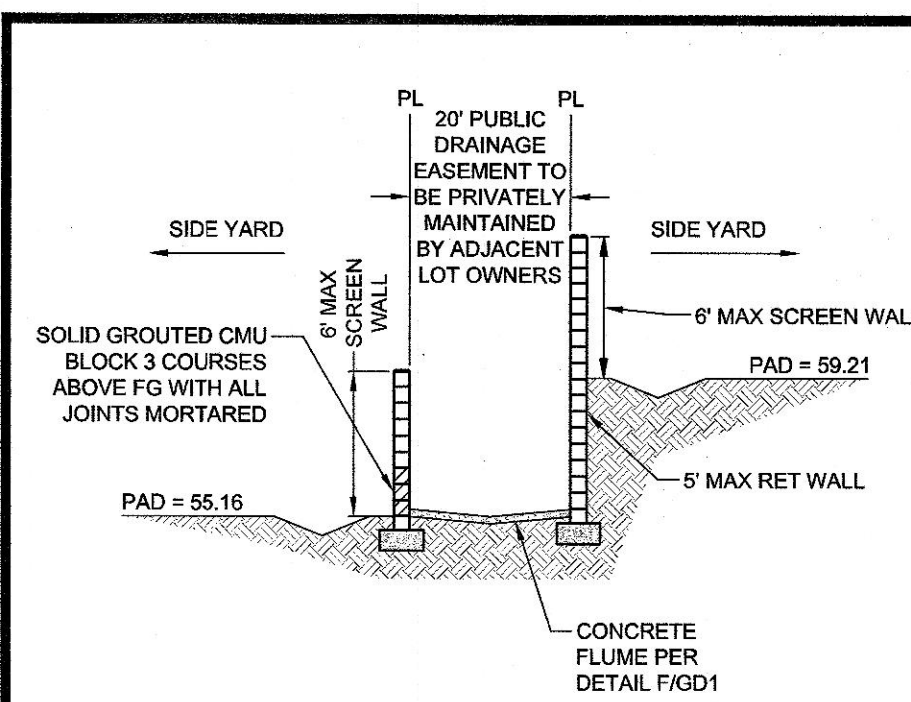
Call before you Dig!
Avoid cutting underground utility lines. It's costly.

CALL

811

OR

1-800-227-2600

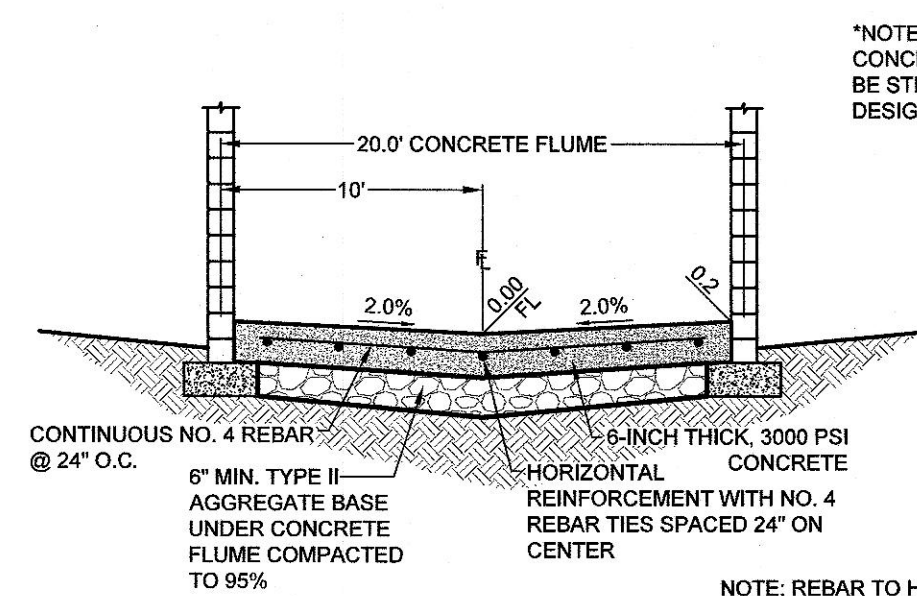
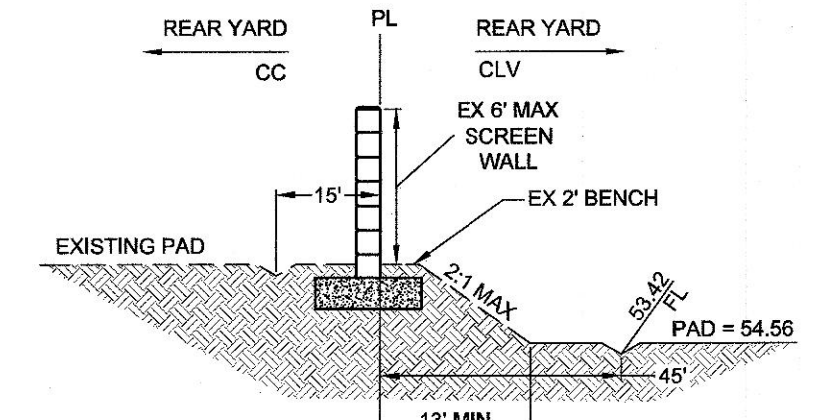
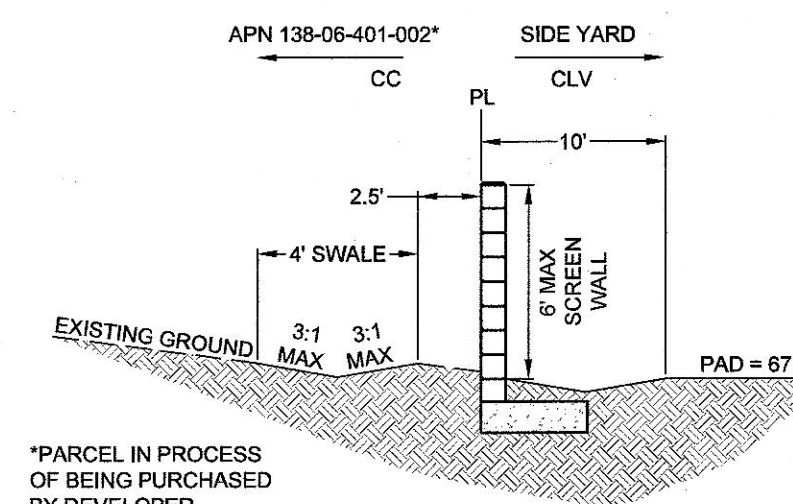


ONE PERCENT MINIMUM SLOPE THROUGH DRAINAGE SLAB IS REQUIRED. WHERE A STORM DRAIN LINE IS AVAILABLE IN THE EXTERIOR STREET, A STORM DRAIN INLET AT THE BEGINNING OF THE EASEMENT AND AN 18-INCH MINIMUM STORM DRAIN PIPE IS REQUIRED TO COVEY NUISANCE WATER THROUGH THE EASEMENT.

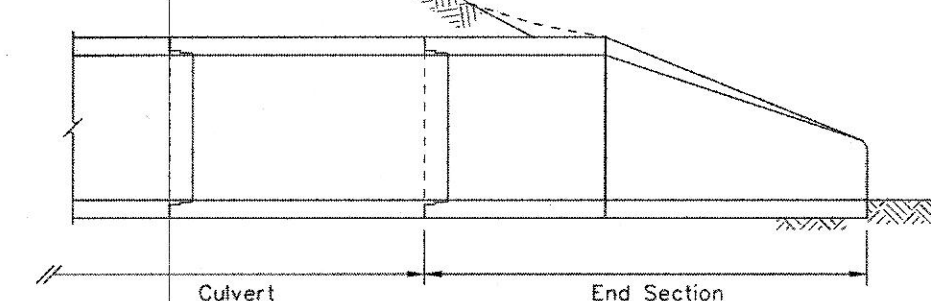
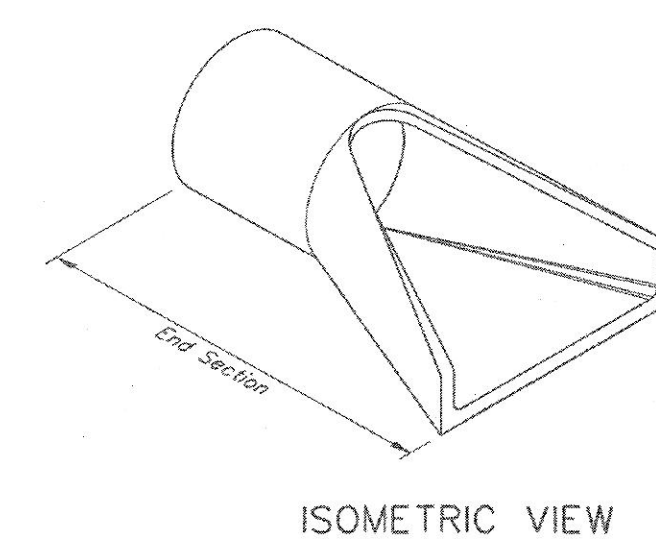
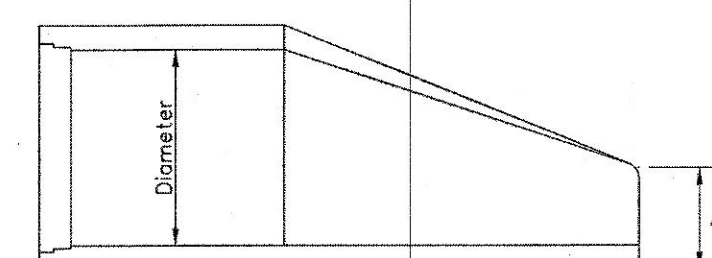
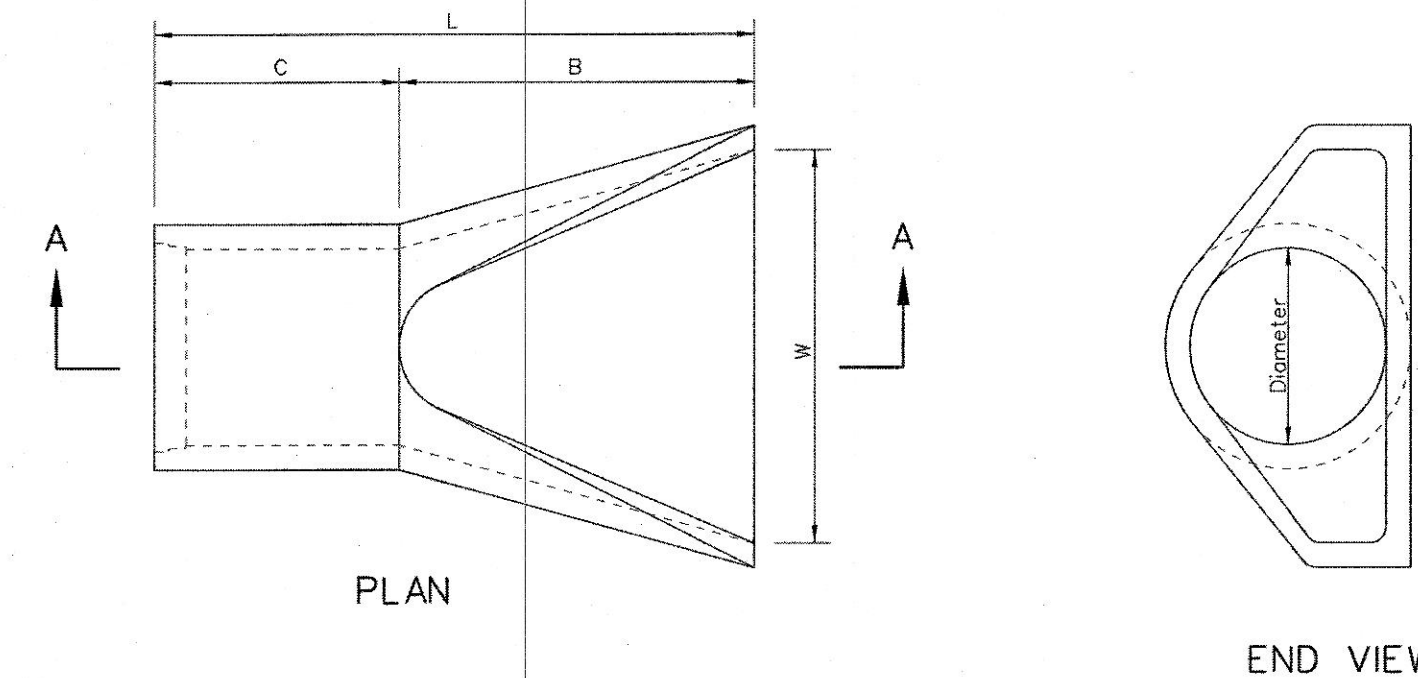
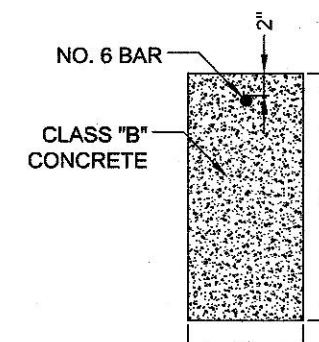
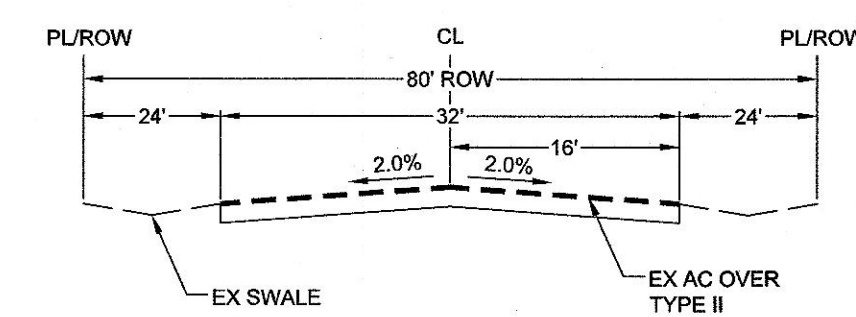
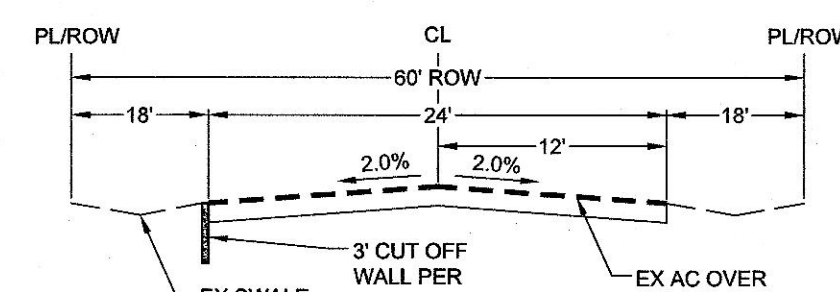
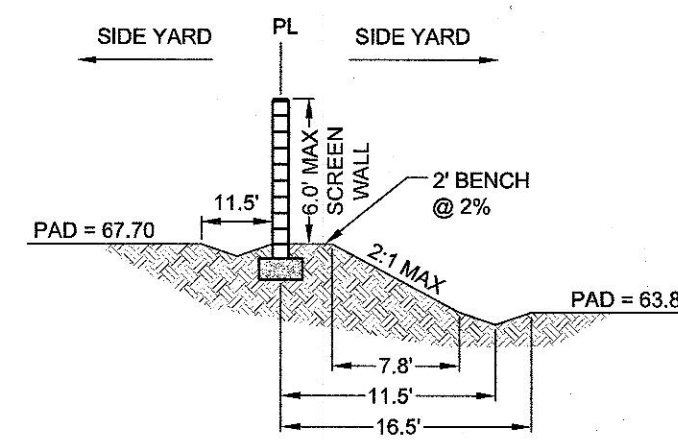
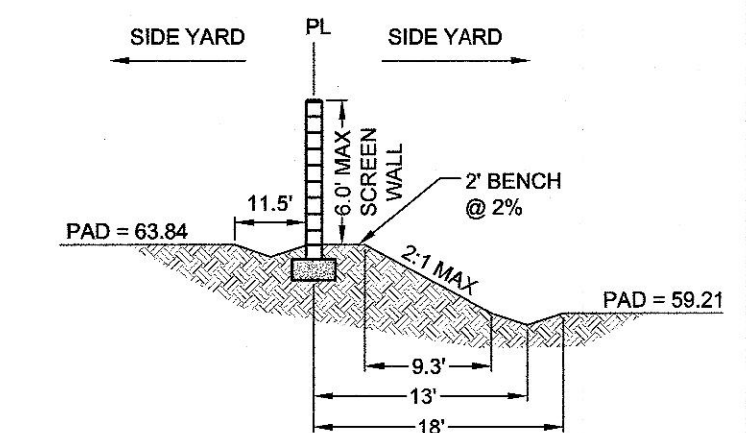
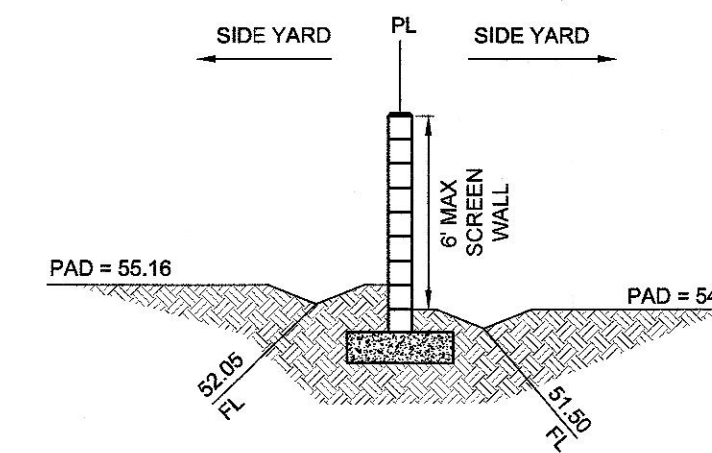
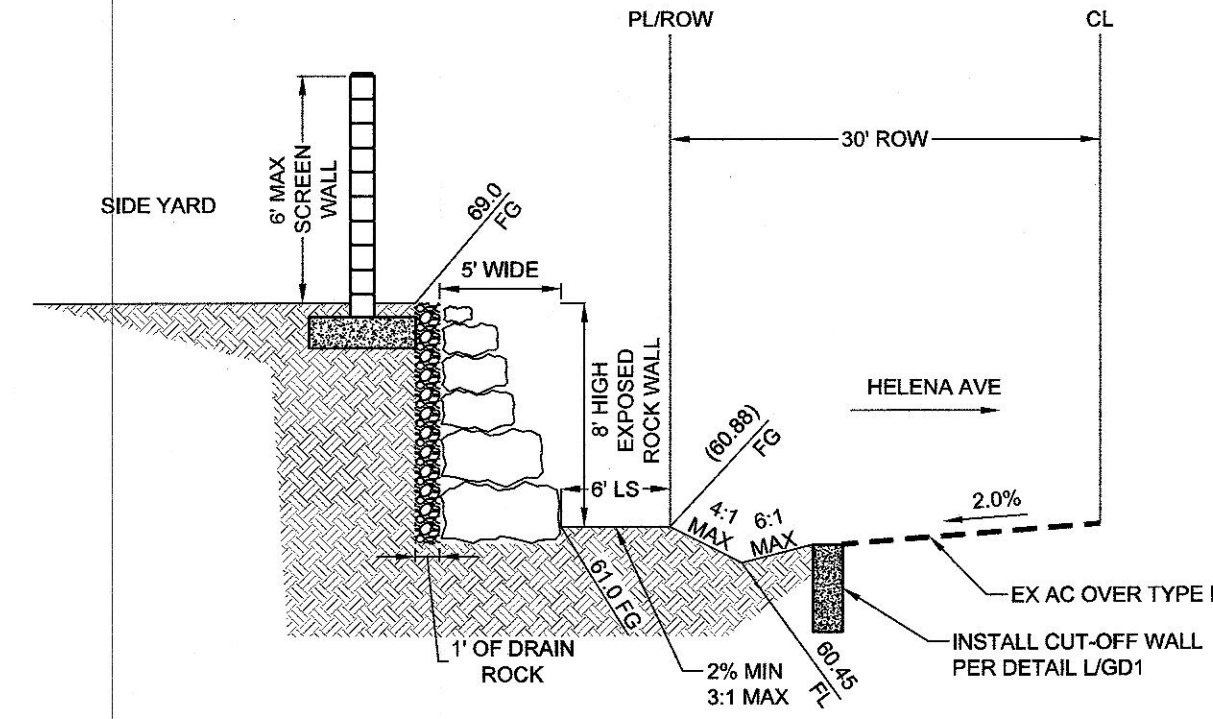
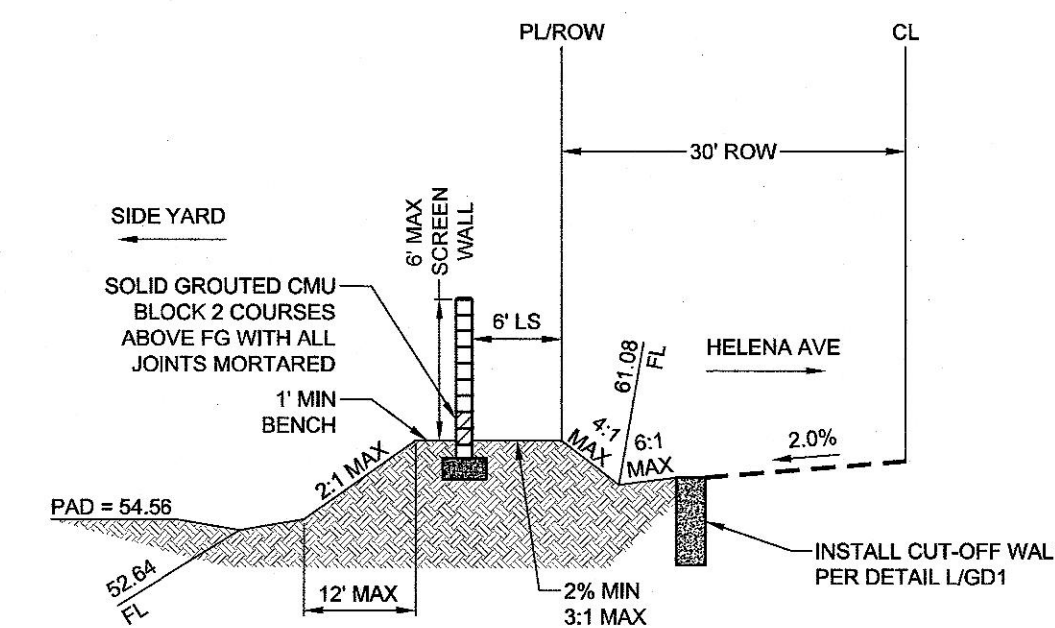
GENERAL NOTE: GATE AND FENCE CONSTRUCTION IS INTENDED TO PREVENT STORAGE OF MATERIALS AND VEHICLES WITHIN CHANNEL. PREVENTION OF PEDESTRIAN USE MAY BE IMPAIRED, BUT THE DESIGN IS NOT INTENDED TO PREVENT PEDESTRIAN TRAFFIC. BOLLARDS MAY BE USED IN LIEU OF GATE IF PEDESTRIAN ACCESS IS DESIRED.

NOTE: BOLLARDS AND SLEEVE WILL BE EMBEDDED IN FRESH CONCRETE. WHEN PLACED IN HARDENED CONCRETE, THE SIZE OF THE CORINGS WILL BE 10" FOR BOLLARDS, AND 12" FOR SLEEVE BOLLARDS AND SLEEVE TO BE FULLY GROUTED WITH HIGH STRENGTH GROUT.

NOTE: ALL STEEL USED FOR BOLLARDS AND SLEEVE WILL BE SCHEDULE 40. EXPOSED STEEL WILL BE PRIMERED AND PAINTED YELLOW.



*NOTE: FOOTING AND CONCRETE FLUME TO BE STRUCTURALLY DESIGNED TOGETHER



- NOTES:

1. Class and type of concrete shall be as specified for reinforced concrete pipe.
2. Structural design of end section shall conform to that of standard reinforced concrete culvert pipe.
3. Length of pipe shown on the design plans does not include connector section (length C).
4. Contact hydraulics Engineer for sizes not listed.
5. Actual dimensions of end sections may vary by manufacturer. Adjust pipe lengths as necessary to accommodate precast end sections used. See sheets R-1.12 and R-2.14 for extension beyond fill slope and pipe pay lengths.

DIAMETER	WEIGHT	A	B	C *	L	W
18"	670	9"	27"	46"	73"	36"
24"	1300	9 1/2"	43 1/2"	30"	73 1/2"	48"
30"	1850	12"	54"	19 3/4"	73 3/4"	60"
36"	3500	15"	63"	34 3/4"	97"	72"
42"	4930	21"	63"	35"	98"	78"
48"	6700	24"	72"	26"	98"	84"
54"	7150	27"	65"	15"	100"	90"

* For Reference Only

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

RCP END SECTION
18" TO 54" RCP

R-2.3.1 (603)		Signed Original On File
ADOPTED 11/75	REVISED 10/15	CHIEF HYDRAULICS ENGR.

Avoid overhead power line contact. it's costly.

Call
before you
Overhead
1-702-227-2929

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

CALL

811

OR

1-800-227-2600

**3311 S. RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
(702) 873-6700 FAX:**

LANE & ENGINEERING
6030 S. JONES BOULEVARD
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233



**N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL**

GRADING DETAILS

DATE: 3/25/2019

SCALE: 1"=40'

LAB NO: **LMT-18-001**

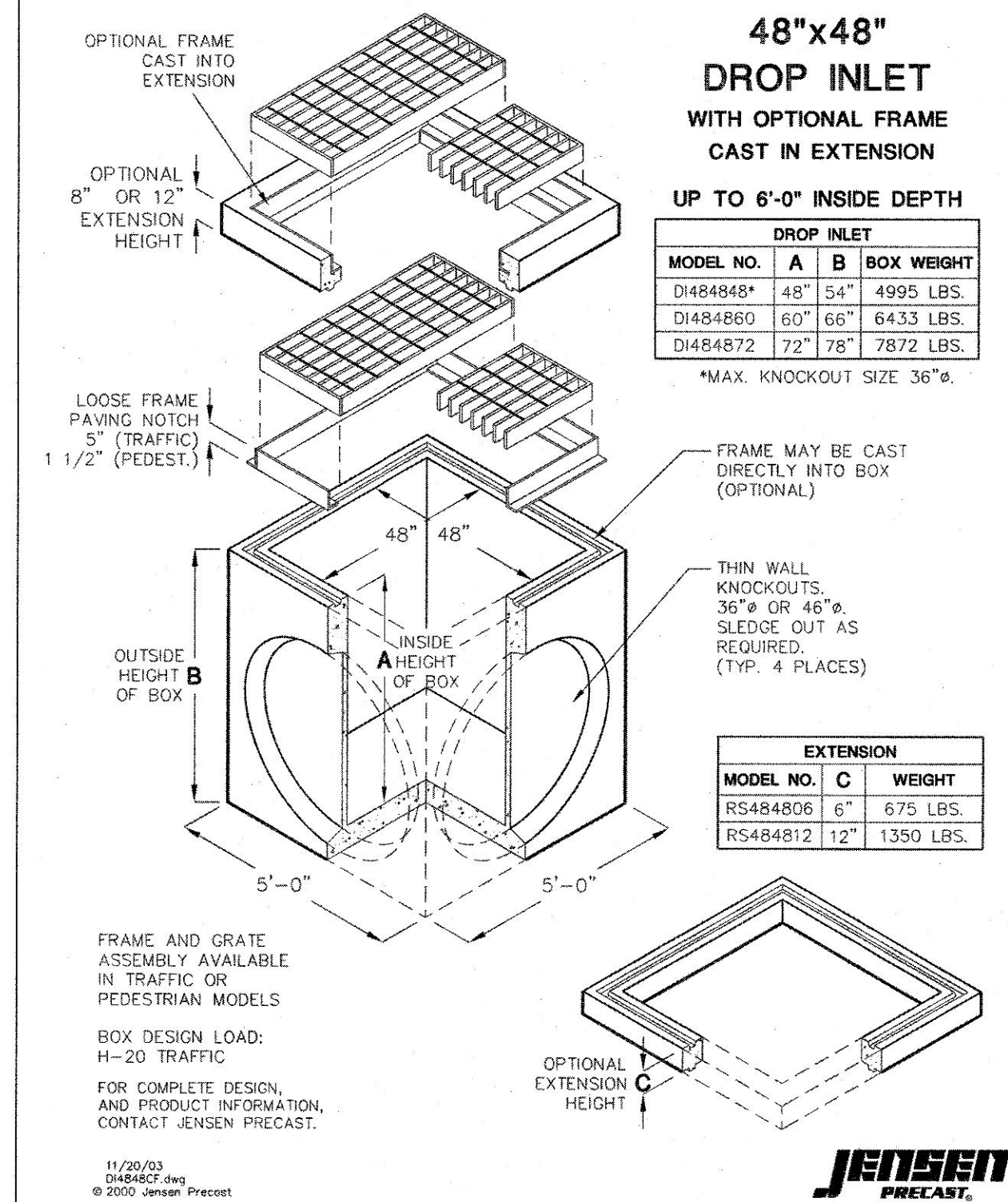
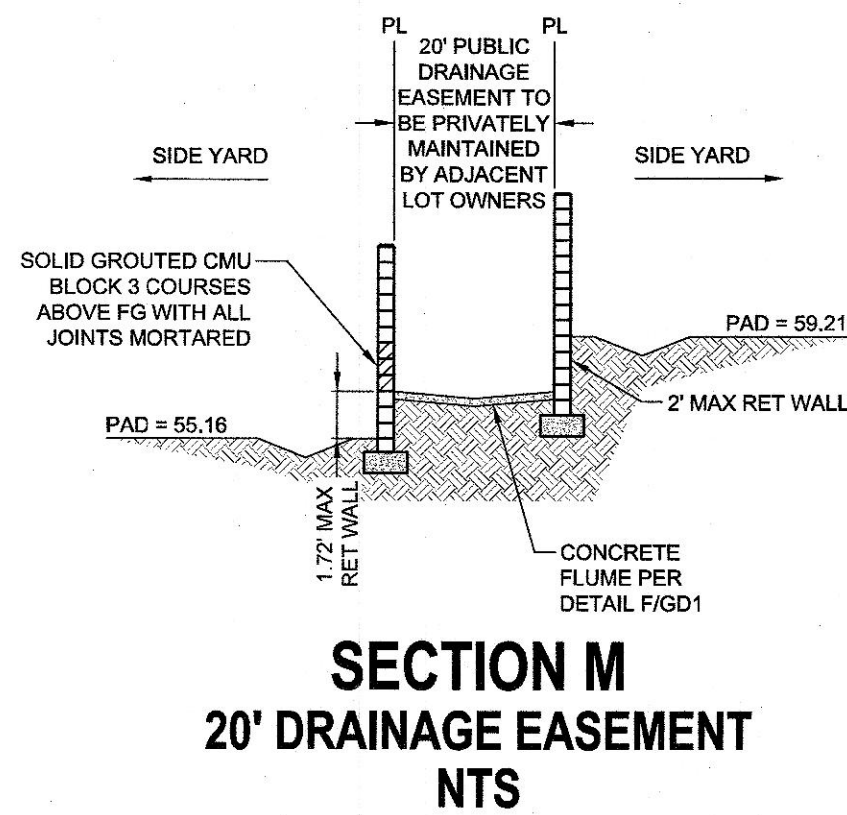
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HEET NAME: **GD1**

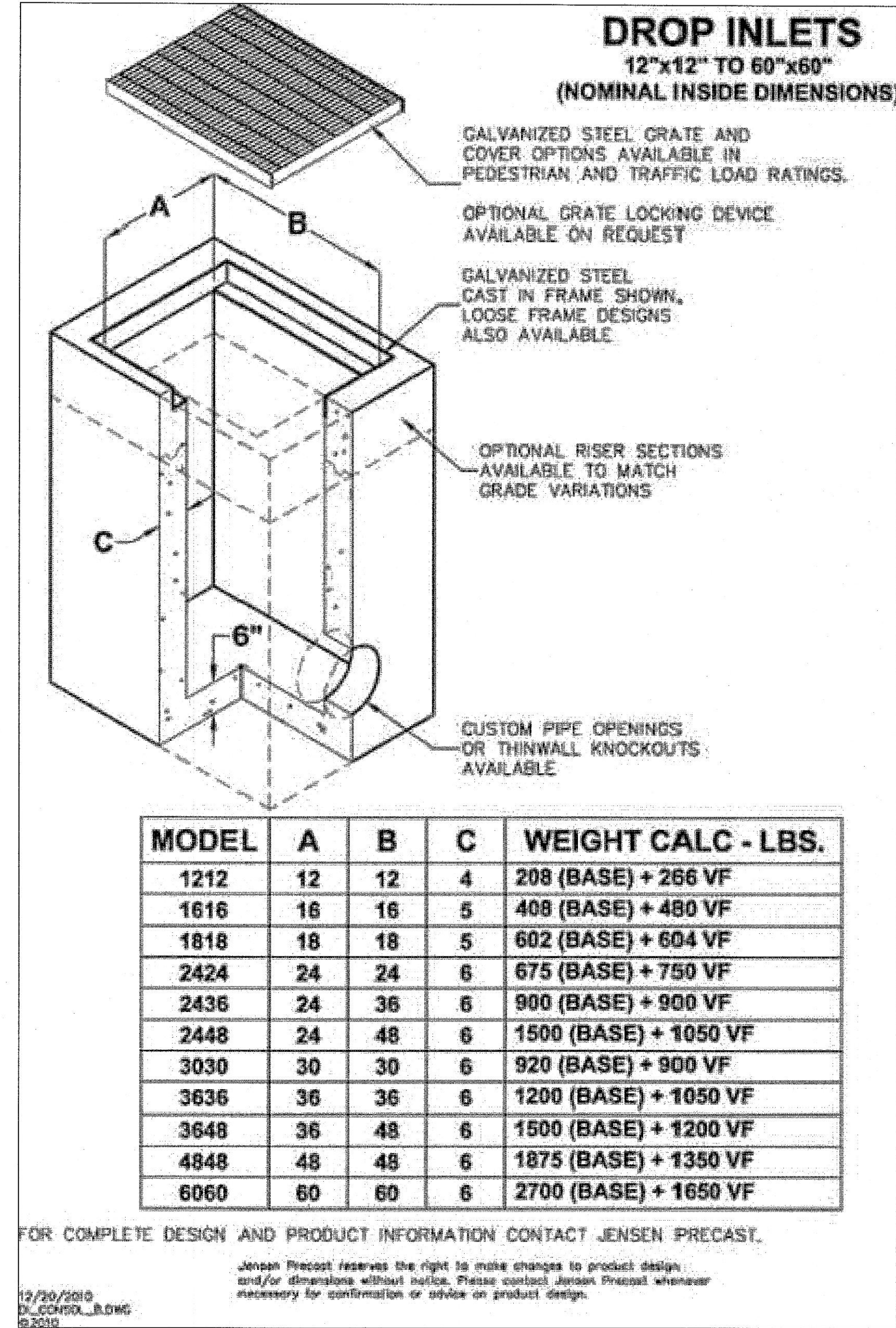
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4 OF 7

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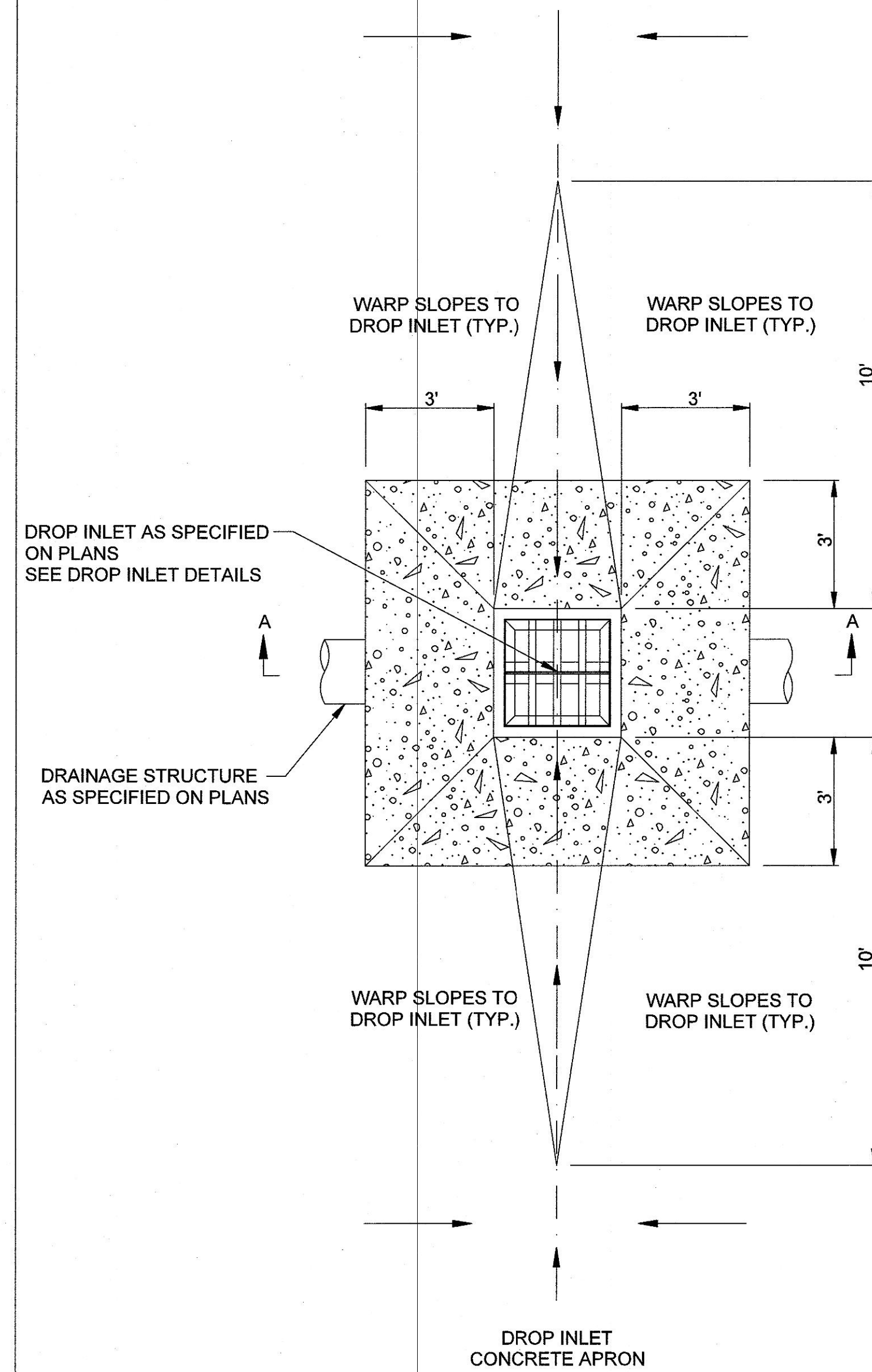
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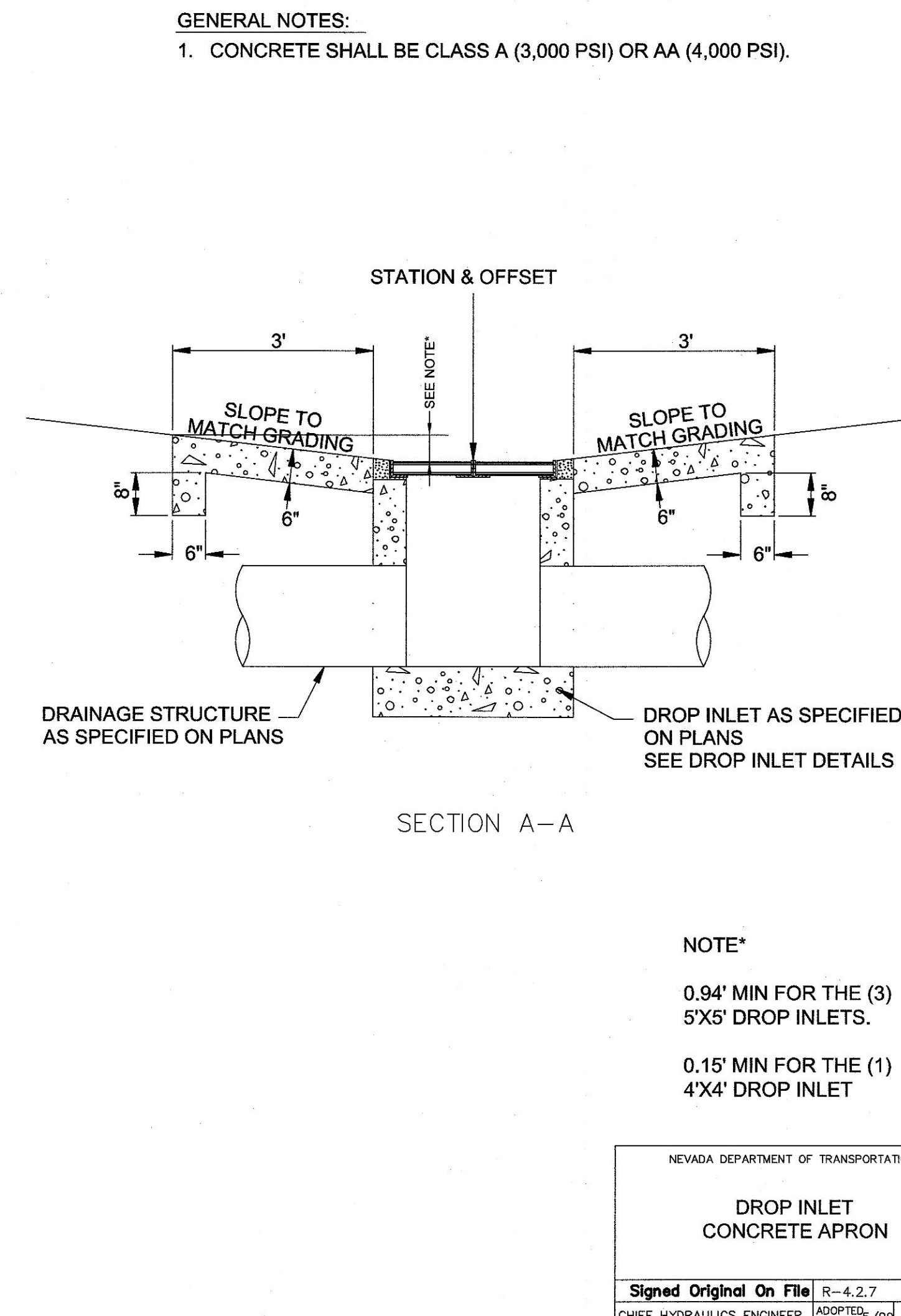
4'X4' JENSEN PRECAST DROP INLET



JENSEN PRECAST DROP INLET



DROP INLET CONCRETE APRON

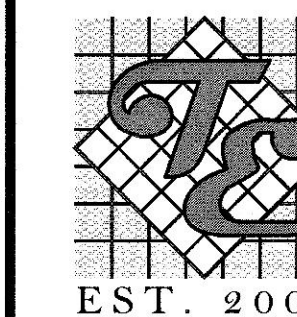


LONE MOUNTAIN ESTATES LLC

3311 S. RAINBOW BLVD. STE 225
LAS VEGAS, NV 89146
(702) 773-5700 FAX: (702) 362-8844

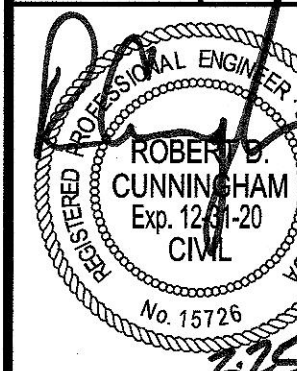
JANNEY ENGINEERING

6800 S. JONES BOULEVARD
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233



N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL

GRADING DETAILS 2



DATE: 3/25/2019

SCALE: 1"=40'

JOB NO: LMT-18-001

DESIGNED BY: NB CHECKED BY: RC

SHEET NAME: GD2

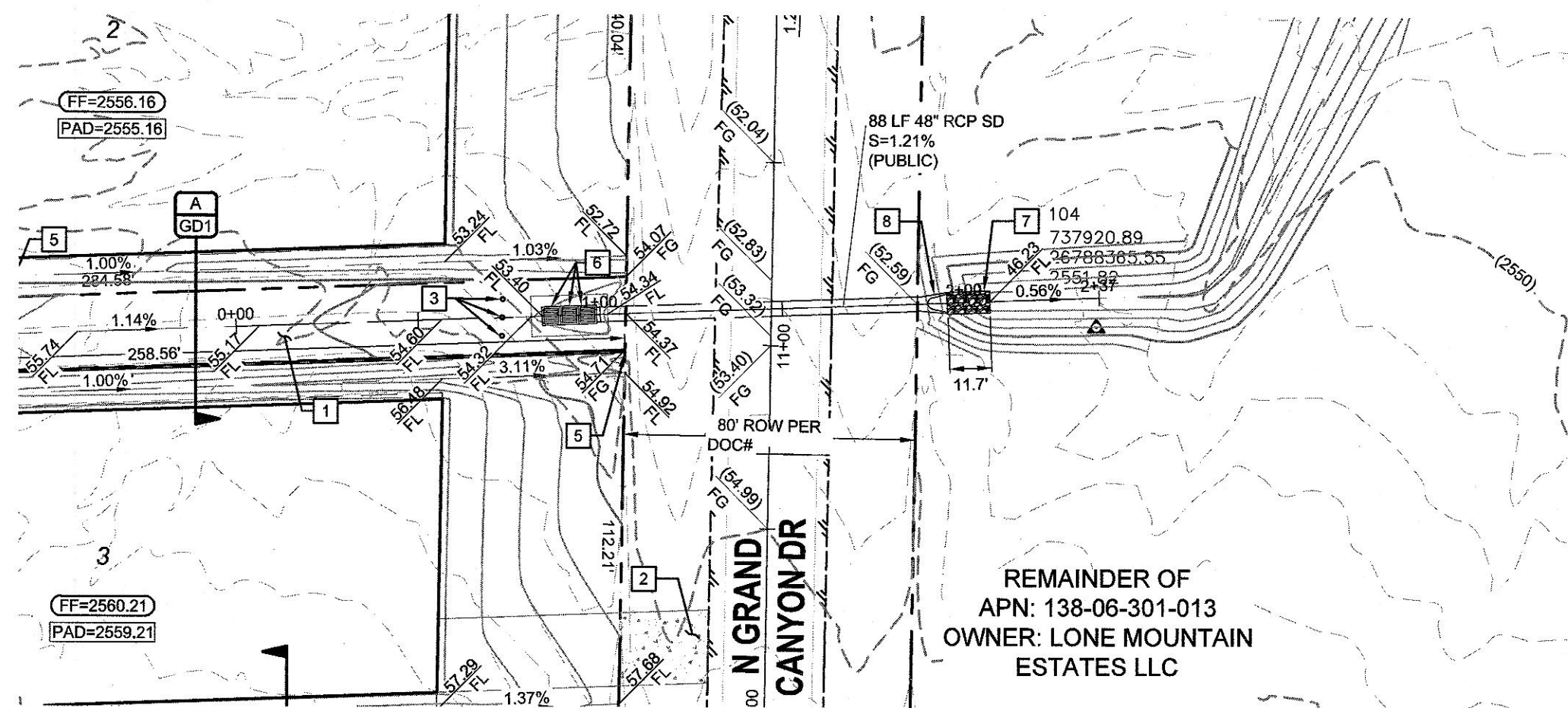
SHEET NUMBER: 5 OF 7

CLV 0000000

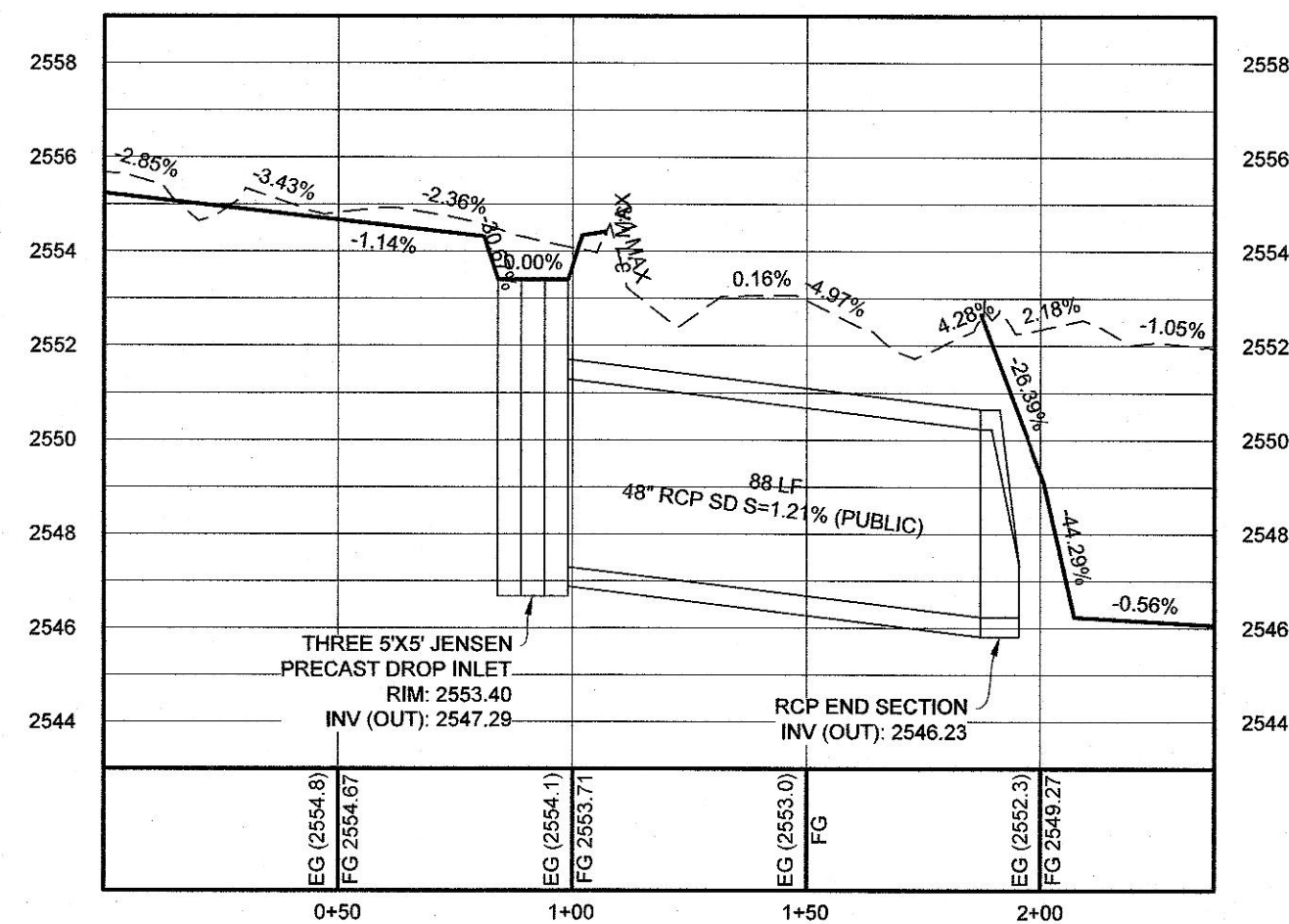
Call before you Dig
1-702-227-2929

Call before you Dig
1-800-227-2600

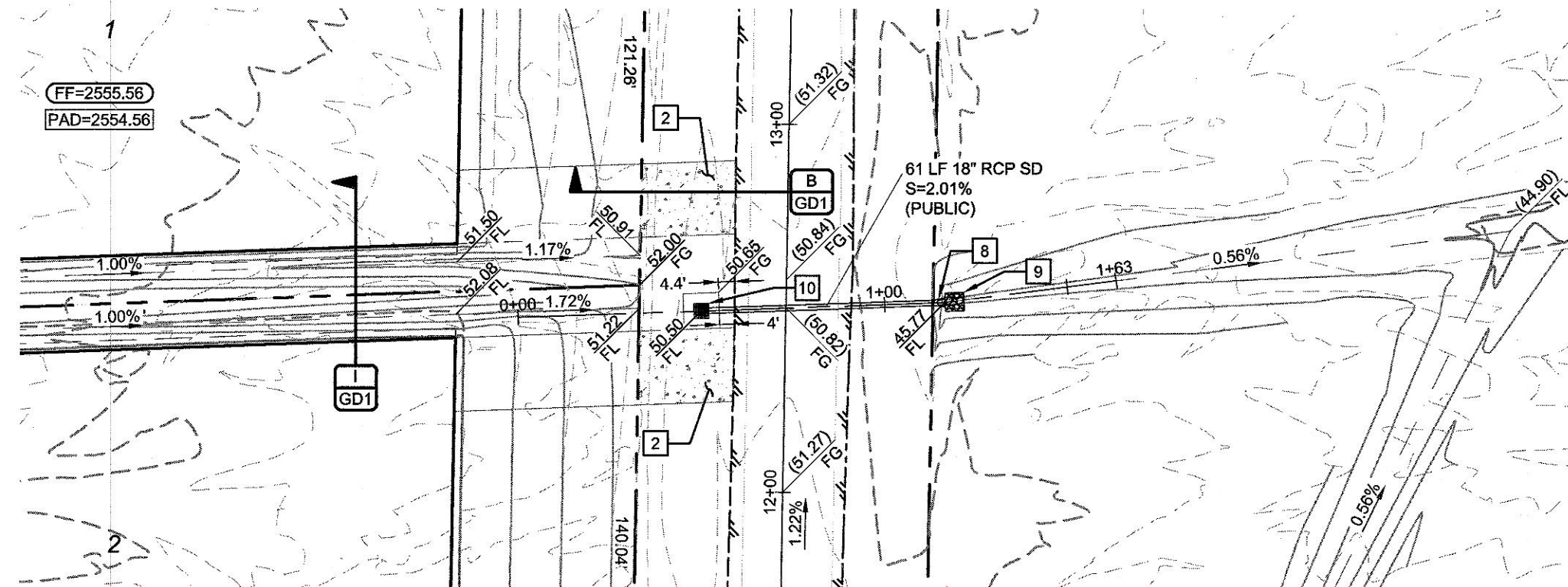
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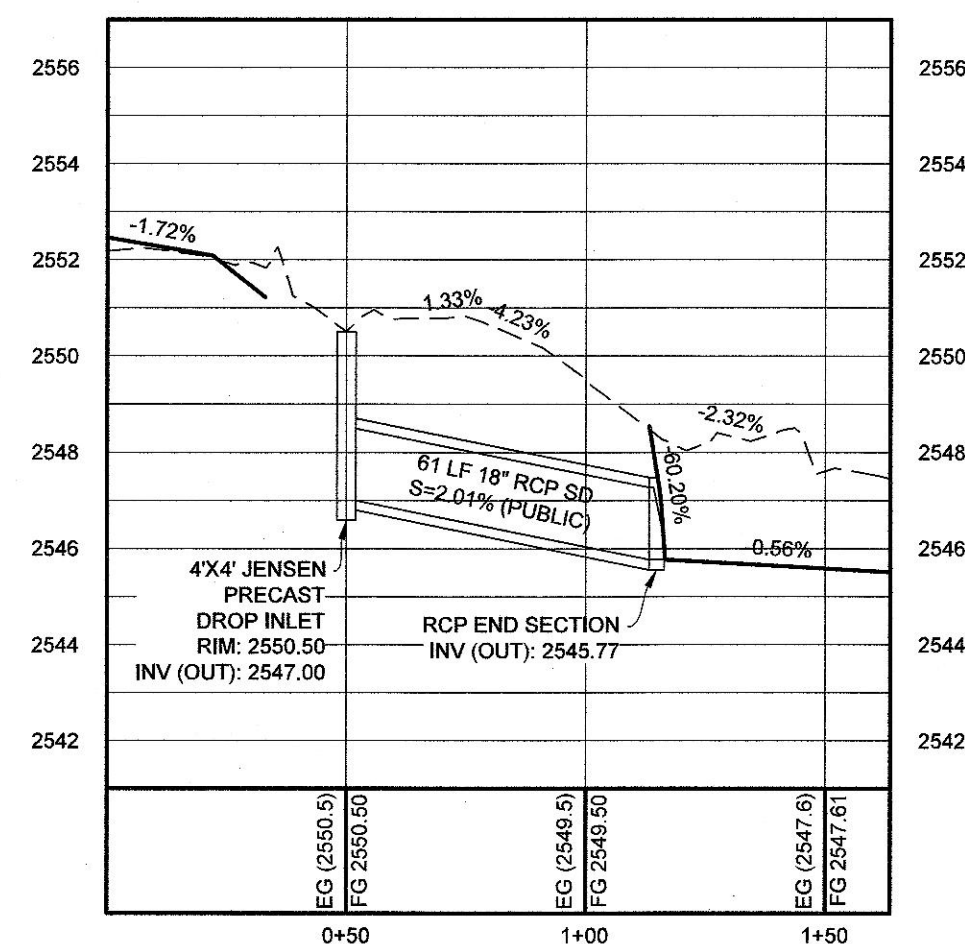
48-INCH RCP STORM DRAIN (PUBLIC) - PLAN
STA: 0+00.00 TO 2+37.00



48-INCH RCP STORM DRAIN (PUBLIC) - PROFILE
STA: 0+00.00 TO 2+37.00
SCALE: 1"=40' HORIZONTAL; 1"=4' VERTICAL



18-INCH RCP STORM DRAIN (PUBLIC) - PLAN
STA: 0+00.00 TO 1+63.00



18-INCH RCP STORM DRAIN (PUBLIC) - PROFILE
STA: 0+00.00 TO 1+63.00
SCALE: 1"=40' HORIZONTAL; 1"=4' VERTICAL

- GRADING CONSTRUCTION NOTES**
- 15' CONCRETE FLUME (DETAIL F/GD1)
 - DRIVEWAY 4" CONCRETE OVER 8" TYPE II (SECTION B/GD1)
 - INSTALL REMOVABLE LOCKING BOLLARDS (DETAIL C/GD1)
 - INSTALL ROCK RETAINING WALL (SECTION H/GD1)
 - INSTALL 5X5' JENSEN PRECAST DROP INLET & CONCRETE APRON (SEE GD2)
 - RIPRAP PAD (18" THICKNESS, D50 = 9")
 - INSTALL RCP END SECTION (SEE GD1)
 - 3X3' RIPRAP PAD (6" THICKNESS, D50 = 3")
 - INSTALL 4X4' JENSEN PRECAST DROP INLET & CONCRETE APRON (SEE GD2)

SCALE: 1" = 40'

GEOTECHNICAL
GEOTEK RESIDENTIAL, LLC
6835 SOUTH ESCONDIDO STREET, SUITE B
LAS VEGAS, NV 89119
(702) 897-1424
REPORT NO: 14434-LVR
DATE: 11/01/18

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

LINE AND CURVE DATA
FOR LINE AND CURVE DATA TABLES, SEE THE GRADING PLAN SHEETS FOR THIS PROJECT.

PROFILE NOTES
ADD 2500 FEET TO ALL GRADE TAGS TO GET ACTUAL ELEVATION.
ALL PRIVATE STREETS AND DRAINAGE EASEMENTS ARE TO BE PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION (H.O.A.).
ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENTS HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO GOVERNING ENTITY.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK - MONUMENT ID NUMBER 9LV007N4
RIVET & PLATE IN TOP OF CURB AT SE CORNER OF ALEXANDER & GRAND CANYON
ELEVATION 732.842 METERS / 2391.18 FEET (NAVE83)

ACCEPTANCE OF PLANS
SOUTHWEST GAS CORPORATION
DATE

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
FIRST APPROVED DATE PROJECT# 122XXX
LWWD APPROVED FIRE FLOW: 1500 GPM AT 20 PSI RESIDUAL

ACCEPTANCE OF PLANS FOR FILING
BY: DEVELOPMENT AND FLOOD CONTROL
DATE

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL
811
OR
1-800-227-2800

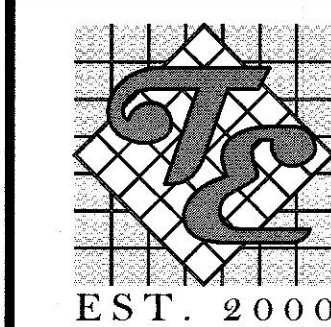
Call before you Overhead
Avoid overhead power line contact. It's costly.
Call before you Overhead
1-702-227-2929

DEPTH OF COVER DURING CONSTRUCTION
MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.06.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

WATER MAIN JOINT DEFLECTION NOTE (PVC 4"-24")
PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) DEGREE PER JOINT WITH A MAXIMUM RADIUS OF CURVATURE OF 1,150 FEET, PER UDACS 2.07.01 AND 2.07.02.

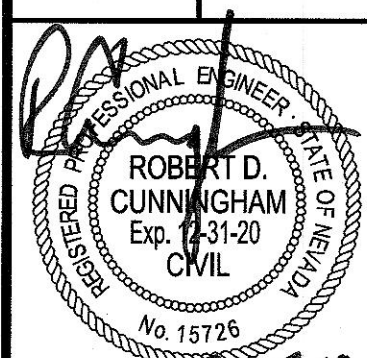
FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTING SHALL BE USED.

LONE MOUNTAIN ESTATES LLC
3311 S. RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
(702) 873-9700 FAX:



N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL

48-IN RCP SD & 18-IN RCP SD
STA: 0+00 TO 2+37 & 0+00 TO 1+63
PLAN & PROFILE 1



DATE: 3/25/19
3/25/2019

SCALE: 1"=40'

JOB NO: LMT-18-001

DESIGNED BY: NB CHECKED BY: RC

SHEET NAME: PP1

SHEET NUMBER: 6 OF 7

CLV 0000000



TANEY ENGINEERING

TECHNICAL DRAINAGE STUDY
FOR
Jensen & Helena Area 4
Residential Development



**CITY OF LAS VEGAS
NEVADA**

JANUARY 2019

Prepared by:

Taney Engineering
6030 S. Jones
Las Vegas, Nevada 89118
Telephone: (702) 362-8844
Fax: (702) 362-5233

Prepared for:

Lone Mountain Estates LLC
3311 S. Rainbow Blvd., Ste 205
Las Vegas, NV 89146
Telephone: (702) 873-6700 Ext 123

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Jensen and Helena - Area 4 Date: Jan 29, 2019

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

East/West: Helena Ave

b) Section: 6 Township: 20S Range: 60E

c) APN : 138-06-301-013

Name of Owner: Lone Mountain Estates LLC

Telephone No.: (702) 873-6700 Fax No.: _____ E-Mail Address: kt@ktri.biz

Address: 3311 S. Rainbow Blvd. Ste 205, Las Vegas, NV 89146

Contact Person-Name: Robert Cunningham, P.E. Telephone No.: (702) 362-8844

* E-Mail Address: rc@taneycorp.com Fax No.: (702) 362-5233

Firm: Taney Engineering

Address: 6030 S. Jones, Suite 100, Las Vegas NV. 89118

Type of Land Development/Land Disturbance Process:

☐ Rezoning	☒ Subdivision Map	☐ Clearing and Grading Only
☐ Parcel Map	☐ Planned Unit Development	☐ Other (Please specify below)
☐ Large Parcel Map	☐ Building Permit	

1. Total Owned Land Area: At Site: 15.1+/- acres Being Developed/Disturbed: 15.1+/- 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.): Residential

5. Approximate upstream land area which drains to the subject site: 133.01+/- acres

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: A portion of the project site was evaluated (HTE #07-29544)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The site will discharge to an adjacent, undeveloped parcel to the east (138-06-301-013) similar to the existing drainage pattern.

8. Briefly describe your proposed schedule for the subject project: A.S.A.P

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

***New Required Field**

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

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1



TANEY ENGINEERING

6030 SOUTH JONES BLVD, SUITE 100

LAS VEGAS, NV 89118

TELEPHONE: 702-362-8844

Fax: 702-362-5233

January 29, 2019
Job No. LMT-18-001

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

Subject: Addendum #1 to the Technical Drainage Study Update for Jensen & Helena Area 4, DS5076A

Dear Mr. Sung:

Taney Engineering is pleased to provide Addendum #1 to the Technical Drainage Study for **Jensen & Helena Area 4**. This addendum includes a response to each comment from City of Las Vegas review memorandum dated on December 27, 2018. The comments have been reproduced and addressed as follows:

Comment 1: Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the City Council). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

A copy of the zoning/planning conditions has been provided in Appendix E of this submittal.

Comment 2: The site is also adjacent to Clark County's jurisdiction. The engineer must coordinate with Clark County Department of Public Works (CCPW) and incorporate any concerns for boundary conditions along the north, west, and south borders. CCPW concurrence is required prior to final acceptance of the study.

This study will be sent over to CCPW for concurrence upon approval from CLV. Note that Areas 1-3, adjacent to the west boundary of Area 4, is in review at CCPW. Clark County is aware of this submittal and is waiting for approval from CLV to then look over.

Comment 3: A review of the grading plan shows an elevation difference of approximately 15 feet of cut/fill adjacent to undeveloped properties.



Sites with a grade difference of 2 feet above or below existing grades are required to have approval from the *City of Las Vegas Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department (229-6301)*. The engineer must provide *City Planning* approval with the next submittal.

The approval letter from the *City of Las Vegas Planning and Development Department* may be found in Appendix E of this addendum.

Comment 4: This site accepts offsite flows and conveys them through the site. Provide a "Public Drainage Easement to be Privately Maintained" and show the easement on the grading plan. Public drainage easements must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.

Noted.

Comment 5: The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

A quantity estimate table has been provided on the grading plans for all drainage improvements.

Comment 6: Helena Avenue, Grand Canyon Drive, and Hickam Avenue appear to be a part of parcel 138-06-301-013 and not yet dedicated as public right-of-way. Public right-of-ways must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.

A final map is in process to separate the right-of-ways and parcels.

Comment 7: It is unclear how the offsite flows from the west enters the subject site. Verify if there is an opening in the existing wall along the western boundary between Lots 2 & 3 to allow the offsite flows to enter the proposed 15' public drainage easement. In addition, there appears to be a significant grade difference at the western boundary. Provide reference materials to show the location and size of the wall opening as well any details for transition structures at the easement entrance.

There is no block wall opening at the location of the easement at the western boundary of the project site for Area 4. The 15' public drainage easement between Lots 2 & 3 is a continuation of the 15' drainage easement that will be constructed as part of Areas 1-3. No wall will separate the different areas in the easement. Reference material from Areas 1-3 have been provided in Appendix E. Further detail for the drainage easement at this location may be found on



the grading plans. Note that Areas 1-3 and Area 4 will be constructed simultaneously, as one big project.

Comment 8: The following finish floors do not meet the Regional Flood Control District minimum criteria of twice the Q100 depth of flow up to 18-inches above the water surface (CCRFCD Manual Section 304.4.E.1) or 6-inch minimum above the highest adjacent top of curb (CCRFCD Manual Section 1602 304.4.E.1). The following finish floors should be revised or alternate flood protection provided.

LOT FF shown Min. FF

1 2555.56' 2561.64' (Based on high side FL 59.5' per Detail H/GD1)

As an alternate, each lot must be discussed in the drainage study, shown to be flood protected, and any necessary flood improvements shown on the grading plan.

The flow depth in Helena Avenue is 1.00' and the flowline elevation is a 61.08'. Adding this elevation plus 18 inches equals 63.58'. Assuming a 6:1 scarp up from the flowline elevation to where the block wall would be, over 7', plus 2% minimum for 6' in the landscape area, equals the base of the wall elevation at a $(61.08 + 1.17 + 0.12) 62.37'$. In order to achieve flood protection, solid grouting up to 2 courses (1.34') has been called out on section G on the grading detail sheet. $(62.37' + 1.34' = 63.71' > 63.58')$

Note that the section H detail shows a FF that is 8' higher than the base of the wall; therefore, solid grouting will not be needed for this portion of the decorative rock wall.

Comment 9: The following Clark County Regional Flood Control District Design Manual Criteria is not being met by the proposed design in the following Streets:

Grand Canyon Drive

a. **Section 304.4 Minor Storm Street Capacity Limitations for right-of-way widths greater than or equal to 80-feet**

i. **12 foot dry lane is not provided**

Three 5' x 5' grate inlets have been placed in the 20' drainage easement to collect 119 cfs of the 123/287 cfs that is being conveyed in the easement. This is done by allowing a ponding depth of 0.97' which is achieved at 119 cfs. The rest of the flow will bypass the inlets and enter Grand Canyon Drive. Note that the outer edge of the apron around the grate is set at an elevation 0.94' higher than the rim of the grate. The other 0.03' to equal 0.97' comes from the 54.37 FL at the end of the easement, creating this sump condition. The flow that is intercepted allows for the dry lane to be met for the undeveloped street in the ultimate condition and with fully developed streets. Dry lane calculations may be found on



cross sections B & C for Grand Canyon Drive in Appendix D. Once the runoff is collected in the grate inlets, it is then conveyed under Grand Canyon Drive via a 48" RCP which then daylights on the property west of Grand Canyon which is owned by the same owners. A rip rap pad has been called out to dissipate the flows that are exiting the RCP.

Comment 10: The flows in Helena Avenue and Grand Canyon Drive appear to be erosive. Provide erosion protection in the form of a stem wall, rip rap, or approved alternate as required in the Regional Flood Control District Manual in Section 904.3. Revise the grading plan and section details accordingly.

A cut off wall has been called out on the plans to ensure erosion protection in Helena Avenue. The amount of flow in Grand Canyon Drive has been reduced which produces a velocity that is non-erosive. This reduction of flow came from piping the flow underneath Grand Canyon in order to meet dry lane.

Comment 11: It is noted that an Interim Condition analysis was not performed due to the parcel to the west of the subject site being developed first. Provide reference materials to support the offsite design of the adjacent parcel including approved drainage studies and improvement plans.

An approval letter from Areas 1-3 will be provided once the study is approved. It is in the second submittal and approval is expected. Note that the owners' expectations are to construct Areas 1-3 and Area 4 at the same time as one big operation.

Comment 12: Provide typical road section and hydraulic section for Hickam Avenue.

Hickam Avenue, just west of Grand Canyon, is planning to be vacated. Due to this, no hydraulic section has been provided.

Comment 13: The hydraulic cross sections modeled in FlowMaster do not appear to be representative of the actual road sections for Helena Avenue and Grand Canyon Drive. Revise accordingly.

Section A, for Helena Avenue, has been revised to better represent the actual road section. The FlowMaster sections for Grand Canyon Drive have not been revised due to them being modeled with no swale to represent a more conservative approach. With no swale, the normal depth will be greater which would cause for worst case scenario. This approach is being used because the houses that are going to be constructed on these lots are custom homes. Due to the custom homes, driveway locations aren't set and swales are to be minimized so that the cars can drive in and out without having to create a "bridge" to get over the swale and introduce piping underneath the drive ways.



Comment 14: Revise the note for all sections showing solid grouting for flood control to indicate "8-inch minimum solid grouted CMU block XX courses above finish grade with all joints mortared," where XX is 18- inches or twice the depth above the calculated water surface elevation.

This note has been revised to show the number of courses above the FG that needs to be solid grouted. The number of solid grouted courses is in accordance with the freeboard criteria.

Comment 15: It appears that flow is perpetuated east via an existing low point across Grand Canyon Drive. Provide a hydraulic section to show the depth and velocity of flow at the crossing.

Cross section F has been added to the basin map to represent the flow that is being discharged on the east side of Grand Canyon Drive. A rip rap pad has been placed at the exit of the flared end section to dissipate the erosive velocity that is coming out of the pipe. A rip rap calculation may be found toward the end of Appendix D. Note that this parcel is under the same ownership as Area 4 and permission to grade will not be needed.

Comment 16: Existing centerline grades provided on the Grading Plan shows a potential for flows in Helena Avenue to split at Grand Canyon and combine at the existing low point at approximate ST A: 12+50. Provide hydraulic calculations at this intersection to demonstrate flow patterns.

Hydraulic sections, Helena 2 and Grand Canyon, have been created to represent the flow split that will occur at this intersection. A Pima County flow split calculation was also done for when the streets become fully developed. The HEC-1 model for the ultimate condition has been revised with this flow split included.

Comment 17: Revise the Flow Split Calculation for Jensen and Helena - 10 YR to reference "Total Developed 10- year flow entering the side street" and " ... remaining in main street".

This has been revised.

Comment 18: Provide discussion for the flow value of 0.01 cfs used for the Jensen cross section.

The 0.01 cfs in the Jensen cross section is due to FlowMaster not letting an input of 0 cfs to be a valid input. An error comes up and doesn't let the values to be calculated. 0.01 is approximately zero so this is why 0.01 cfs was used.

Comment 19: Revise the basin maps to label the concentrate point within Grand Canyon Drive just north of the proposed public drainage easement (Section B) as C11 and label the low point just east of Grand Canyon Drive (Section C) where are the flows discharge to as C10.



C10 has been revised to be located at the low point just east of Grand Canyon where all the flows are concentrated. C11 has been revised on the basin maps to be located just south of the project site that combines offsite basins XOF5 and XOF6 for the Interim Condition. Note that cross section B is not affiliated with a concentration point, but the description of the flow that is attributed to this section is labeled on the cross section summary tables.

Comment 20: Detail C appears to be dimensioned for a 20-foot easement width. Revise plans accordingly.

Detail C has been revised to represent an easement width of 15-feet.

Comment 21: Revise the note on Detail A to callout "15 Public Drainage Easement to be Privately Maintained by HOA".

The note on Detail A has been revised to callout a "15 Public Drainage Easement to be Privately Maintained by adjacent lot owners." There will be no HOA.

Comment 22: Revise Detail D to provide the number of courses of solid grouting of the proposed wall.

No solid grouting will be needed. A 4' swale will be graded to protect the southern boundary of the site from the 100-year flow. Section G has been created to show that the 100-year flow is contained in the swale.

A copy of the City of Las Vegas comments has been provided directly following this letter. If you need any additional information, please do not hesitate to call our office.

Sincerely,

TANEY ENGINEERING

Jeff Thomson
Hydrologist I



APPENDICES

APPENDIX A

Comment Letter

APPENDIX B

Figures

APPENDIX C

Hydrologic Calculations

APPENDIX D

Hydraulic Calculations

APPENDIX E

Reference Material

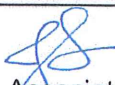
APPENDIX F

Improvement Plans



APPENDIX A

Comment Letter

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		December 27, 2018
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: Jensen & Helena Area 4	
Cross Streets:	NWC of Helena Ave and Grand Canyon Dr	
File Number:	F:\Depot\DSMemos\DS5076A.doc	
Parcel Number:	138-06-301-013	
Zoning Action:		
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
		COPIES TO: Taney Engineering Lone Mountain Estates, LLC Bart Anderson, P.E., DevCo CCPW

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	12/12/2018	12/27/2018	See Comments Below	\$400.00	501622: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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

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

1. Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the City Council). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
2. The site is also adjacent to Clark County's jurisdiction. The engineer must coordinate with Clark County Department of Public Works (CCPW) and incorporate any concerns for boundary conditions along the north, west, and south borders. CCPW concurrence is required prior to final acceptance of the study.
3. **A review of the grading plan shows an elevation difference of approximately 15 feet of cut/fill adjacent to undeveloped properties.** Sites with a grade difference of 2 feet above or below existing grades are required to have approval from the *City of Las Vegas Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide *City Planning* approval with the next submittal.
4. This site accepts offsite flows and conveys them through the site. Provide a "Public Drainage Easement to be Privately Maintained" and show the easement on the grading plan. Public drainage

easements must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.

5. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.
6. Helena Avenue, Grand Canyon Drive, and Hickam Avenue appear to be a part of parcel 138-06-301-013 and not yet dedicated as public right-of-way. Public right-of-ways must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.
7. It is unclear how the offsite flows from the west enters the subject site. Verify if there is an opening in the existing wall along the western boundary between Lots 2 & 3 to allow the offsite flows to enter the proposed 15' public drainage easement. In addition, there appears to be a significant grade difference at the western boundary. Provide reference materials to show the location and size of the wall opening as well any details for transition structures at the easement entrance.
8. The following finish floors do not meet the Regional Flood Control District minimum criteria of twice the Q100 depth of flow up to 18-inches above the water surface (CCRFCD Manual Section 304.4.E.1) or 6-inch minimum above the highest adjacent top of curb (CCRFCD Manual Section 1602 304.4.E.1). The following finish floors should be revised or alternate flood protection provided.

LOT	FF shown	Min. FF
1	2555.56'	2561.64' (Based on high side FL 59.5' per Detail H/GD1)

As an alternate, each lot must be discussed in the drainage study, shown to be flood protected, and any necessary flood improvements shown on the grading plan.

9. The following Clark County Regional Flood Control District Design Manual Criteria is not being met by the proposed design in the following Streets:

Grand Canyon Drive

- a. Section 304.4 Minor Storm Street Capacity Limitations for right-of-way widths greater than or equal to 80-feet
 - i. 12 foot dry lane is not provided

10. The flows in Helena Avenue and Grand Canyon Drive appear to be erosive. Provide erosion protection in the form of a stem wall, rip rap, or approved alternate as required in the Regional Flood Control District Manual in Section 904.3. Revise the grading plan and section details accordingly.
11. It is noted that an Interim Condition analysis was not performed due to the parcel to the west of the subject site being developed first. Provide reference materials to support the offsite design of the adjacent parcel including approved drainage studies and improvement plans.
12. Provide typical road section and hydraulic section for Hickam Avenue.
13. The hydraulic cross sections modeled in FlowMaster do not appear to be representative of the actual road sections for Helena Avenue and Grand Canyon Drive. Revise accordingly.
14. Revise the note for all sections showing solid grouting for flood control to indicate "8-inch minimum solid grouted CMU block XX courses above finish grade with all joints mortared," where XX is 18-inches or twice the depth above the calculated water surface elevation.

15. It appears that flow is perpetuated east via an existing low point across Grand Canyon Drive. Provide a hydraulic section to show the depth and velocity of flow at the crossing.
16. Existing centerline grades provided on the Grading Plan shows a potential for flows in Helena Avenue to split at Grand Canyon and combine at the existing low point at approximate STA: 12+50. Provide hydraulic calculations at this intersection to demonstrate flow patterns.
17. Revise the Flow Split Calculation for Jensen and Helena – 10 YR to reference "Total Developed 10-year flow entering the side street" and "...remaining in main street".
18. Provide discussion for the flow value of 0.01 cfs used for the Jensen cross section.
19. Revise the basin maps to label the concentrate point within Grand Canyon Drive just north of the proposed public drainage easement (Section B) as C11 and label the low point just east of Grand Canyon Drive (Section C) where are the flows discharge to as C10.
20. Detail C appears to be dimensioned for a 20-foot easement width. Revise plans accordingly.
21. Revise the note on Detail A to call out "15 Public Drainage Easement to be Privately Maintained by HOA".
22. Revise Detail D to provide the number of courses of solid grouting of the proposed wall.

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/R60E/06
AREA L-06

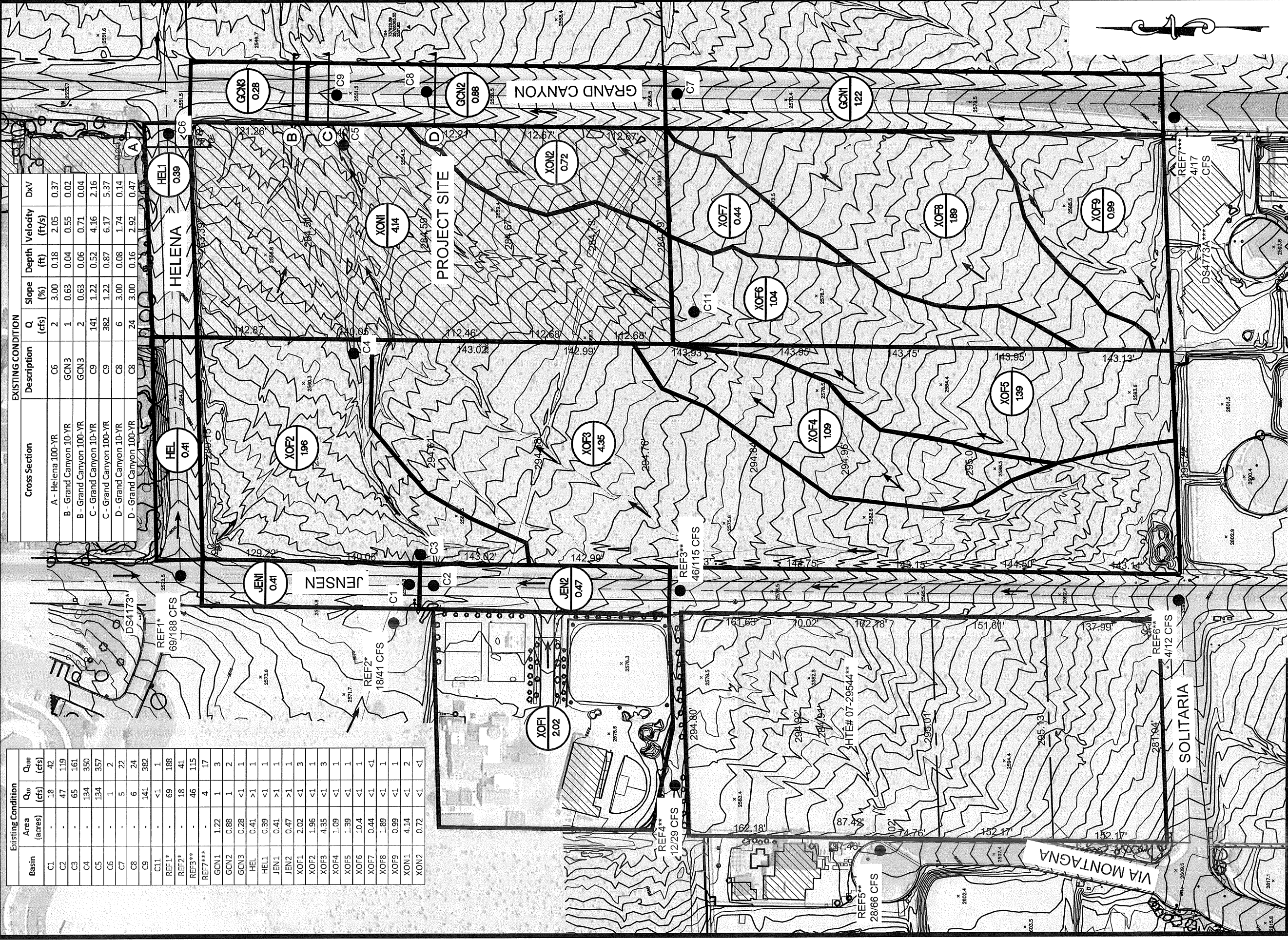


APPENDIX B

Figures

Existing Condition			
Basin	Area (acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
C1	-	18	42
C2	-	47	119
C3	-	65	161
C4	-	134	350
C5	-	134	357
C6	-	1	2
C7	-	5	22
C8	-	6	24
C9	-	141	382
CL1	-	<1	1
REF1*	-	69	188
REF2*	-	18	41
REF3**	-	46	115
REF7***	-	4	17
GCN1	1.22	1	3
GCN2	0.88	1	2
GCN3	0.28	<1	1
HEL	0.41	>1	1
HEL1	0.39	>1	1
JEN1	0.41	>1	1
JEN2	0.47	>1	1
XOF1	2.02	<1	3
XOF2	1.96	<1	1
XOF3	4.35	<1	3
XOF4	1.09	<1	1
XOF5	1.39	<1	1
XOF6	10.4	<1	1
XOF7	0.44	<1	<1
XOF8	1.89	<1	1
XOF9	0.99	<1	1
XON1	4.14	<1	2
XON2	0.72	<1	<1

Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
A - Helena 100-YR	C6	2	3.00	0.18	2.05	0.37
B - Grand Canyon 10-YR	GCN3	1	0.63	0.04	0.55	0.02
B - Grand Canyon 100-YR	GCN3	2	0.63	0.06	0.71	0.04
C - Grand Canyon 10-YR	C9	141	1.22	0.52	4.16	2.16
C - Grand Canyon 100-YR	C9	382	1.22	0.87	6.17	5.37
D - Grand Canyon 10-YR	C8	6	3.00	0.08	1.74	0.14
D - Grand Canyon 100-YR	C8	24	3.00	0.16	2.92	0.47



DRAINAGE LEGEND

BASIN IDENTIFICATION

BASIN AREA (ACRES)

BASIN BOUNDARY

CONCENTRATION POINT

FLOW PATH

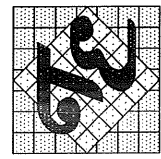
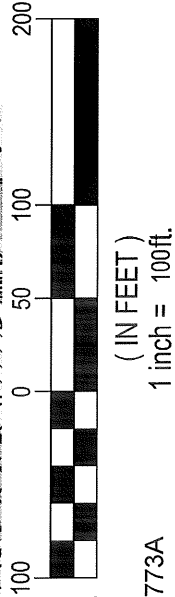
CROSS SECTION

10-YR/100-YR FLOW (CFS)

REFERENCE FLOW (CFS)

NOTES:

- * REFERENCED FROM THE LONE MOUNTAIN REGIONAL PARK PHASE 4 (AREA 4) STUDY, DS4173
- ** REFERENCED FROM THE JENSEN & HICKMAN STUDY, HTE 07-29544 *** REFERENCED FROM DS4773A



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

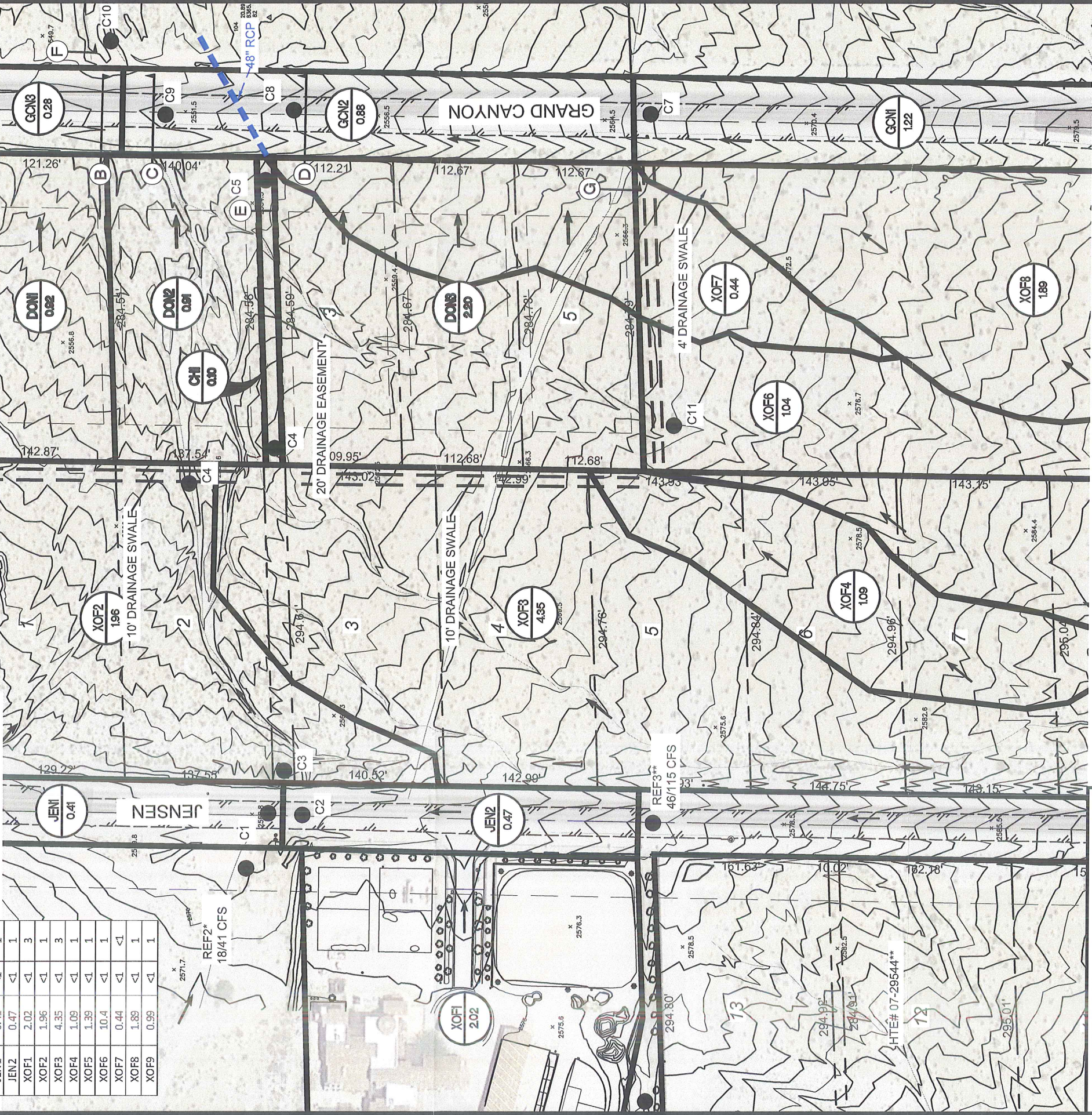
FIGURE 6
EXISINTG BASIN MAP
JENSEN & HELENA

Interim Condition			
Basin	Area (acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
C1	-	18	42
C2	-	47	126
C3	-	65	170
C4	-	134	171
C5	-	135	120
C6	-	1	189
C7	-	5	23
C8	-	7	28
C9	-	141	382
C10	-	142	384
C11	-	<1	1
REF1*	-	69	188
REF2*	-	18	41
REF3**	-	46	115
REF7***	-	4	17
CH1	0.1	<1	1
DON1	0.92	<1	1
DON2	0.91	<1	1
DON3	2.20	<1	3
GCN1	1.22	1	3
GCN2	0.88	1	2
GCN3	0.28	<1	1
HEL	0.41	<1	1
HEL1	0.39	<1	1
JEN1	0.41	<1	1
JEN2	0.47	<1	1
XOF1	2.02	<1	3
XOF2	1.96	<1	1
XOF3	4.35	<1	3
XOF4	1.09	<1	1
XOF5	1.39	<1	1
XOF6	10.4	<1	1
XOF7	0.44	<1	<1
XOF8	1.89	<1	1
XOF9	0.99	<1	1

NOTES:
- THIS BASIN MAP DOES NOT HAVE CROSS SECTION ON IT DUE TO THIS CONDITION NOT EVERY HAPPENING
- THE SUBDIVISION TO THE WEST WILL BE DEVELOPED AT THE SAME TIME AS THIS SITE AND DIVERT FLOW THAT IS IMPACTING THE SITE FROM THE NORTH



INTERIM CONDITION					
Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)
G - 4' Swale 100-YR	C11 + XOF7	2	1.00	0.53	2.36
					1.25



DRAINAGE LEGEND

- BASIN IDENTIFICATION
- BASIN AREA (ACRES)
- BASIN BOUNDARY
- CONCENTRATION POINT
- FLOW PATH
- CROSS SECTION
- 10-YR/100-YR FLOW (CFS)
- REFERENCE FLOW (CFS)

NOTES:
* REFERENCED FROM THE LONE MOUNTAIN REGIONAL PARK PHASE 4 (AREA 4) STUDY, DS4173
** REFERENCED FROM THE JENSEN & HICKMAN STUDY, HTE 07-29544 *** REFERENCED FROM DS4773A

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

FIGURE 7
INTERIM BASIN MAP
JENSEN & HELENA



Drainage Legend

XOF1

xxx

BASIN IDENTIFICATION

BASIN AREA (ACRES)

BASIN BOUNDARY

CONCENTRATION POINT

FLOW PATH

CROSS SECTION

10-YR/100-YR FLOW (CFS)

REFERENCE FLOW (CFS)

C1

→

XX/XXX

(XX/XXX)

NOTES:

- * REFERENCED FROM THE LONE MOUNTAIN REGIONAL PARK PHASE 4 (AREA 4) STUDY, DS4173
- ** REFERENCED FROM THE JENSEN & HICKMAN STUDY, HTE 07-29544 *** REFERENCED FROM DS4773A

(IN FEET)
1 inch = 100ft.

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LAS VEGAS, NV 89118
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FIGURE 8
ULTIMATE BASIN MAP
JENSEN & HELENA



APPENDIX C

Hydrologic Calculations

```

X      X  XXXXXXXX  XXXXX      X
X      X  X        X      X      XX
X      X  X        X      X
XXXXXXX XXXXX  X          XXXXX  X
X      X  X        X          X
X      X  X        X      X      X
X      X  XXXXXXXX  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: DMBREAK 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

```

*DIAGRAM
1 ID
2 ID <><><><><><><><><><><>
3 ID JENSEN/HELENA
4 ID HYDROLOGIC MODEL
5 ID -----
6 ID
7 ID 10-YR STORM EVENT
8 ID -----
9 ID TANEY ENGINEERING
10 ID ULTIMATE CONDITION
11 ID FILE: ULT10.DAT
12 ID PROJECT No: LMT-18-001
13 ID DATE: DEC 2018
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 0.56
*
```

[illegible]

37	KK	FSP1
38	KM	FLOW SPLIT AT THE INTERSECTION OF JENSEN AND HELENA
39	DT	FSP2
40	DI	69
41	DQ	14
	*	

42	KK	D0F1	
43	BA	.0015	
44	BF	0	
45	LS	0	73
46	UD	0.122	

Page 1

ULT10.OUT

47	KK	DOF2	
48	BA	.0015	
49	BF	0	
50	LS	0	73
51	UD	0.122	
	*		
52	KK	JEN1	
53	BA	.0006	
54	BF	0	
55	LS	0	98
56	UD	0.050	
	*		
57	KK	REF2	
58	KM	REFERENCED FLOW FROM THE BASIN WEST OF JENSEN ST (DS4173)	
59	BA	.0001	
60	BF	18	
61	LS	0	63
62	UD	.6	
	*		
63	KK	C1	
64	KM	COMBINES FSP1, DOF1, DOF2, JEN1, AND REF2	
65	HC	5	
	*		
66	KK	REF6	
67	KM	REFERENCED FLOW CONVEYED NORTH IN JENSEN ST (HTE# 07-29544)	
68	BA	.0001	
69	BF	4	
70	LS	0	63
71	UD	.6	
	*		
72	KK	DOF7	
73	BA	.0114	
74	BF	0	
75	LS	0	73
76	UD	0.072	
	*		
77	KK	REF5	
78	KM	REFERENCED FLOW FROM VIA MONTAGNA (HTE# 07-29544)	
79	BA	.0001	
80	BF	28	
81	LS	0	63
82	UD	.6	
	*		

1

HEC-1 INPUT

PAGE 3

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

83	KK	DOF6	
84	BA	.0035	
85	BF	0	
86	LS	0	73
87	UD	0.108	
	*		
88	KK	REF4	
89	KM	REFERENCED FLOW FROM THE BASIN WEST OF JENSEN ST (DS4173)	
90	BA	.0001	
91	BF	12	
92	LS	0	63
93	UD	.6	
	*		
94	KK	C12	
95	KM	COMBINES REF6, DOF7, REF5, DOF6, AND REF4	
96	HC	5	
	*		
97	KK	DOF5	
98	BA	.0008	
99	BF	0	
100	LS	0	73
101	UD	0.122	
	*		
102	KK	DOF4	
103	BA	.0015	
104	BF	0	
105	LS	0	73
106	UD	0.122	
	*		
107	KK	XOF1	
108	BA	.0032	
109	BF	0	
110	LS	0	73
111	UD	0.110	

ULT10.OUT

*
 112 KK DOF3
 113 BA .0015
 114 BF 0
 115 LS 0 73
 116 UD 0.122
 *
 117 KK JEN2
 118 BA .0007
 119 BF 0
 120 LS 0 98
 121 UD 0.050
 *

HEC-1 INPUT

PAGE 4

1

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

122 KK C2
 123 KM COMBINES C12, DOF5, DOF4, XOF1, DOF3, AND JEN1
 124 HC 6
 *

125 KK C3
 126 KM COMBINES C1 AND C2
 127 HC 2
 *

128 KK CH
 129 BA .0002
 130 BF 0
 131 LS 0 98
 132 UD 0.050
 *

133 KK C4
 134 KM COMBINES C3 AND CH
 135 HC 2
 *

136 KK CH1
 137 BA .0002
 138 BF 0
 139 LS 0 98
 140 UD 0.050
 *

141 KK C5
 142 KM COMBINES C4 AND CH1
 143 HC 2
 *

144 KK DIV1
 145 KM (3) 5' X 5' GRATE INLETS IN SAG
 146 DT D1
 147 DI 123
 148 DQ 119
 *

149 KK DOF8
 150 BA .0068
 151 BF 0
 152 LS 0 73
 153 UD 0.122
 *

154 KK REF7
 155 KM REFERENCED FLOW FROM THE DEVELOPMENT SOUTH OF THE PROJECT SITE (DS4773A)
 156 BA .0001
 157 BF 4
 158 LS 0 63
 159 UD .6
 *

HEC-1 INPUT

PAGE 5

1

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

160 KK GCN1
 161 BA .0019
 162 BF 0
 163 LS 0 98
 164 UD 0.058
 *

165 KK C7
 166 KM COMBINES DOF8, REF7, AND GCN1
 167 HC 3
 *

168 KK DON3
 169 BA .0034
 170 BF 0


```

171      LS      0      73      ULT10.OUT
172      UD      0.122
      *

173      KK      GCN2
174      BA      .0014
175      BF      0
176      LS      0      98
177      UD      0.052
      *

178      KK      C8
179      KM      COMBINES C7, DON2, AND GCN2
180      HC      3
      *

181      KK      DON2
182      BA      .0014
183      BF      0
184      LS      0      73
185      UD      0.122
      *

186      KK      C9
187      KM      COMBINES DIV1, C8, AND DON2
188      HC      3
      *

189      KK      FSP2
190      KM      FLOW THAT TRAVELS EAST ON HELENA
191      BA      .0001
192      BF      14
193      LS      0      63
194      UD      .6
      *

```

1 HEC-1 INPUT PAGE 6

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

```

195      KK      HEL
196      BA      .0006
197      BF      0
198      LS      0      98
199      UD      0.050
      *

200      KK      HEL1
201      BA      .0006
202      BF      0
203      LS      0      98
204      UD      0.050
      *

205      KK      C6
206      KM      COMBINES FSP2, HEL AND HEL1
207      HC      3
      *

208      KK      FSPG
209      KM      FLOW SPLIT AT THE INTERSECTION OF GRAND CANYON AND HELENA
210      DT      FSPH
211      DI      16
212      DQ      14
      *

213      KK      DON1
214      BA      .0014
215      BF      0
216      LS      0      73
217      UD      0.122
      *

218      KK      GCN3
219      BA      .0004
220      BF      0
221      LS      0      98
222      UD      0.050
      *

223      KK      C10
224      KM      COMBINES C9, FSPG, DON1, AND GCN3
225      HC      4
      *

226      ZZ

```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

22 REF1

.

.

```

39          .----->    FSP2          ULT10.OUT
37      FSP1
    .
    .
42      .      DOF1
    .
    .
47      .      .      DOF2
    .
    .
52      .      .      .      JEN1
    .
    .
57      .      .      .      .      REF2
    .
    .
63      C1.....
    .
    .
66      .      REF6
    .
    .
72      .      .      DOF7
    .
    .
77      .      .      .      REF5
    .
    .
83      .      .      .      .      DOF6
    .
    .
88      .      .      .      .      .      REF4
    .
    .
94      .      C12.....
    .
    .
97      .      .      DOF5
    .
    .
102     .      .      .      DOF4
    .
    .
107     .      .      .      .      XOF1
    .
    .
112     .      .      .      .      .      DOF3
    .
    .
117     .      .      .      .      .      .      JEN2
    .
    .
122     .      C2.....
    .
    .
125     C3.....
    .
    .
128     .      CH
    .
    .
133     C4.....
    .
    .
136     .      CH1
    .
    .
141     C5.....
    .
    .
146     .----->    D1
144     DIV1
    .
    .
149     .      DOF8
    .
    .
154     .      .      REF7
    .
    .
160     .      .      .      GCN1
    .
    .
165     .      C7.....
    .
    .
168     .      .      DON3
    .
    .
173     .      .      .      GCN2
    .
    .
178     .      C8.....
    .
    .

```


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 .56
HYDROGRAPH AT +	REF1	.00	1 FLOW TIME	69. 4.75
DIVERSION TO +	FSP2	.00	1 FLOW TIME	14. .00
HYDROGRAPH AT +	FSP1	.00	1 FLOW TIME	55. 4.92
HYDROGRAPH AT +	DOF1	.00	1 FLOW TIME	0. 3.58
HYDROGRAPH AT +	DOF2	.00	1 FLOW TIME	0. 3.58
HYDROGRAPH AT +	JEN1	.00	1 FLOW TIME	1. 3.50
HYDROGRAPH AT +	REF2	.00	1 FLOW TIME	18. 4.75
5 COMBINED AT +	C1	.00	1 FLOW TIME	74. 3.50
HYDROGRAPH AT +	REF6	.00	1 FLOW TIME	4. 4.75
HYDROGRAPH AT +	DOF7	.01	1 FLOW TIME	2. 3.50
HYDROGRAPH AT +	REF5	.00	1 FLOW TIME	28. 4.75
HYDROGRAPH AT +	DOF6	.00	1 FLOW TIME	1. 3.58
HYDROGRAPH AT +	REF4	.00	1 FLOW TIME	12. 4.75
5 COMBINED AT +	C12	.02	1 FLOW TIME	46. 3.58
HYDROGRAPH AT +	DOF5	.00	1 FLOW TIME	0. 3.58
HYDROGRAPH AT +	DOF4	.00	1 FLOW TIME	0. 3.58
HYDROGRAPH AT +	XOF1	.00	1 FLOW TIME	0. 3.58
HYDROGRAPH AT +	DOF3	.00	1 FLOW TIME	0. 3.58
HYDROGRAPH AT +	JEN2	.00	1 FLOW TIME	1. 3.50
6 COMBINED AT +	C2	.02	1 FLOW TIME	48. 3.50
2 COMBINED AT +	C3	.03	1 FLOW TIME	122. 3.50

ULT10.OUT

HYDROGRAPH AT +	CH	.00	1	FLOW TIME	0. 3.50
2 COMBINED AT +	C4	.03	1	FLOW TIME	122. 3.50
HYDROGRAPH AT +	CH1	.00	1	FLOW TIME	0. 3.50
2 COMBINED AT +	C5	.03	1	FLOW TIME	123. 3.50
DIVERSION TO +	D1	.03	1	FLOW TIME	119. 3.50
HYDROGRAPH AT +	DIV1	.03	1	FLOW TIME	4. 3.50
HYDROGRAPH AT +	DOF8	.01	1	FLOW TIME	1. 3.58
HYDROGRAPH AT +	REF7	.00	1	FLOW TIME	4. 4.75
HYDROGRAPH AT +	GCN1	.00	1	FLOW TIME	3. 3.50
3 COMBINED AT +	C7	.01	1	FLOW TIME	7. 3.50
HYDROGRAPH AT +	DON3	.00	1	FLOW TIME	0. 3.58
HYDROGRAPH AT +	GCN2	.00	1	FLOW TIME	2. 3.50
3 COMBINED AT +	C8	.01	1	FLOW TIME	9. 3.50
HYDROGRAPH AT +	DON2	.00	1	FLOW TIME	0. 3.58
3 COMBINED AT +	C9	.04	1	FLOW TIME	14. 3.50
HYDROGRAPH AT +	FSP2	.00	1	FLOW TIME	14. 4.75
HYDROGRAPH AT +	HEL	.00	1	FLOW TIME	1. 3.50
HYDROGRAPH AT +	HEL1	.00	1	FLOW TIME	1. 3.50
3 COMBINED AT +	C6	.00	1	FLOW TIME	16. 3.50
DIVERSION TO +	FSPH	.00	1	FLOW TIME	14. 3.50
HYDROGRAPH AT +	FSPG	.00	1	FLOW TIME	2. 3.50
HYDROGRAPH AT +	DON1	.00	1	FLOW TIME	0. 3.58
HYDROGRAPH AT +	GCN3	.00	1	FLOW TIME	1. 3.50
4 COMBINED AT +	C10	.05	1	FLOW TIME	16. 3.50

ULT10.OUT

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


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

Page 1

47	KK	DOF2	
48	BA	.0015	
49	BF	0	
50	LS	0	73
51	UD	0.122	
	*		
52	KK	JEN1	
53	BA	.0006	
54	BF	0	
55	LS	0	98
56	UD	0.050	
	*		
57	KK	REF2	
58	KM	REFERENCED FLOW FROM THE BASIN WEST OF JENSEN ST (DS4173)	
59	BA	.0001	
60	BF	41	
61	LS	0	63
62	UD	.6	
	*		
63	KK	C1	
64	KM	COMBINES FSP1, DOF1, DOF2, JEN1, AND REF2	
65	HC	5	
	*		
66	KK	REF6	
67	KM	REFERENCED FLOW CONVEYED NORTH IN JENSEN ST (HTE# 07-29544)	
68	BA	.0001	
69	BF	12	
70	LS	0	63
71	UD	.6	
	*		
72	KK	DOF7	
73	BA	.0114	
74	BF	0	
75	LS	0	73
76	UD	0.072	
	*		
77	KK	REF5	
78	KM	REFERENCED FLOW FROM VIA MONTAGNA (HTE# 07-29544)	
79	BA	.0001	
80	BF	66	
81	LS	0	63
82	UD	.6	
	*		

1

HEC-1 INPUT

PAGE 3

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

83	KK	DOF6	
84	BA	.0035	
85	BF	0	
86	LS	0	73
87	UD	0.108	
	*		
88	KK	REF4	
89	KM	REFERENCED FLOW FROM THE BASIN WEST OF JENSEN ST (DS4173)	
90	BA	.0001	
91	BF	29	
92	LS	0	63
93	UD	.6	
	*		
94	KK	C12	
95	KM	COMBINES REF6, DOF7, REF5, DOF6, AND REF4	
96	HC	5	
	*		
97	KK	DOF5	
98	BA	.0008	
99	BF	0	
100	LS	0	73
101	UD	0.122	
	*		
102	KK	DOF4	
103	BA	.0015	
104	BF	0	
105	LS	0	73
106	UD	0.122	
	*		
107	KK	XOF1	
108	BA	.0032	
109	BF	0	
110	LS	0	73
111	UD	0.110	

*
 112 KK DOF3
 113 BA .0015
 114 BF 0
 115 LS 0 73
 116 UD 0.122
 *

117 KK JEN2
 118 BA .0007
 119 BF 0
 120 LS 0 98
 121 UD 0.050
 *

1

HEC-1 INPUT

PAGE 4

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

122 KK C2
 123 KM COMBINES C12, DOF5, DOF4, XOF1, DOF3, AND JEN1
 124 HC 6
 *

125 KK C3
 126 KM COMBINES C1 AND C2
 127 HC 2
 *

128 KK CH
 129 BA .0002
 130 BF 0
 131 LS 0 98
 132 UD 0.050
 *

133 KK C4
 134 KM COMBINES C3 AND CH
 135 HC 2
 *

136 KK CH1
 137 BA .0002
 138 BF 0
 139 LS 0 98
 140 UD 0.050
 *

141 KK C5
 142 KM COMBINES C4 AND CH1
 143 HC 2
 *

144 KK DIV1
 145 KM (3) 5' X 5' GRATE INLETS IN SAG
 146 DT D1
 147 DI 287
 148 DQ 119
 *

149 KK DOF8
 150 BA .0068
 151 BF 0
 152 LS 0 73
 153 UD 0.122
 *

154 KK REF7
 155 KM REFERENCED FLOW FROM THE DEVELOPMENT SOUTH OF THE PROJECT SITE (DS4773A)
 156 BA .0001
 157 BF 17
 158 LS 0 63
 159 UD .6
 *

1

HEC-1 INPUT

PAGE 5

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

160 KK GCN1
 161 BA .0019
 162 BF 0
 163 LS 0 98
 164 UD 0.058
 *

165 KK C7
 166 KM COMBINES DOF8, REF7, AND GCN1
 167 HC 3
 *

168 KK DON3
 169 BA .0034
 170 BF 0

ULT100.OUT

171	LS	0	73
172	UD	0.122	
	*		
173	KK	GCN2	
174	BA	.0014	
175	BF	0	
176	LS	0	98
177	UD	0.052	
	*		
178	KK	C8	
179	KM	COMBINES C7, DON2, AND GCN2	
180	HC	3	
	*		
181	KK	DON2	
182	BA	.0014	
183	BF	0	
184	LS	0	73
185	UD	0.122	
	*		
186	KK	C9	
187	KM	COMBINES DIV1, C8, AND DON2	
188	HC	3	
	*		
189	KK	FSP2	
190	KM	FLOW THAT TRAVELS EAST ON HELENA	
191	BA	.0001	
192	BF	73	
193	LS	0	63
194	UD	.6	
	*		

1

HEC-1 INPUT

PAGE 6

LINE	ID	1	2	3	4	5	6	7	8	9	10
195	KK	HEL									
196	BA	.0006									
197	BF	0									
198	LS	0									98
199	UD	0.050									
	*										
200	KK	HEL1									
201	BA	.0006									
202	BF	0									
203	LS	0									98
204	UD	0.050									
	*										
205	KK	C6									
206	KM	COMBINES FSP2, HEL AND HEL1									
207	HC	3									
	*										
208	KK	FSPG									
209	KM	FLOW SPLIT AT THE INTERSECTION OF GRAND CANYON AND HELENA									
210	DT	FSPH									
211	DI	76									
212	DQ	48									
	*										
213	KK	DON1									
214	BA	.0014									
215	BF	0									
216	LS	0									73
217	UD	0.122									
	*										
218	KK	GCN3									
219	BA	.0004									
220	BF	0									
221	LS	0									98
222	UD	0.050									
	*										
223	KK	C10									
224	KM	COMBINES FSPG, C9, DON1, AND GCN3									
225	HC	4									
	*										
226	ZZ										

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
LINE		
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
22	REF1	
	.	
	.	


```

39          .----->   FSP2          ULT100.OUT
37  FSP1
.
.
42          .      DOF1
.      .
.      .
47          .      .      DOF2
.      .      .
.      .      .
52          .      .      .      JEN1
.      .      .      .
57          .      .      .      .      REF2
.      .      .      .      .
63  C1.....
.
.
66          .      REF6
.      .
.      .
72          .      .      DOF7
.      .      .
.      .      .
77          .      .      .      REF5
.      .      .      .
83          .      .      .      .      DOF6
.      .      .      .      .
88          .      .      .      .      .      REF4
.      .      .      .      .      .
94          .      C12.....
.      .
.      .
97          .      .      DOF5
.      .      .
.      .      .
102         .      .      .      DOF4
.      .      .      .
.      .      .      .
107         .      .      .      .      XOF1
.      .      .      .      .
112         .      .      .      .      .      DOF3
.      .      .      .      .      .
117         .      .      .      .      .      .      JEN2
.      .      .      .      .      .      .
122         .      C2.....
.      .
125  C3.....
.
.
128         .      CH
.      .
.      .
133  C4.....
.
.
136         .      CH1
.      .
.      .
141  C5.....
.
.
146         .----->   D1
144  DIV1
.
.
149         .      DOF8
.      .
.      .
154         .      .      REF7
.      .      .
.      .      .
160         .      .      .      GCN1
.      .      .      .
165         .      C7.....
.      .
.      .
168         .      .      DON3
.      .      .
.      .      .
173         .      .      .      GCN2
.      .      .      .
.      .      .      .
178         .      C8.....
.      .
.      .

```

```

181      .      .      DON2
      .      .
186      C9.....
      .
189      .      FSP2
      .      .
195      .      .      HEL
      .      .
200      .      .      .      HEL1
      .      .
205      .      C6.....
      .
210      .      .----->      FSPH
208      .      FSPG
      .
213      .      .      DON1
      .      .
218      .      .      .      GCN3
      .      .
223      C10.....

```

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****
*      FLOOD HYDROGRAPH PACKAGE (HEC-1)      *
*      JUN 1998                               *
*      VERSION 4.1                             *
*      RUN DATE 03JAN19 TIME 09:48:56          *
*****

```

```

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

```

```

<><><><><><><><><><><><><><><><>
JENSEN/HELENA
HYDROLOGIC MODEL
-----
100-YR STORM EVENT
-----
TANEY ENGINEERING
ULTIMATE CONDITION
FILE: ULT100.DAT
PROJECT No: LMT-18-001
DATE: DEC 2018
<><><><><><><><><><><><><><><><>
---> 6-HOUR / SDN 3 <---

```

```

19 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					
+	REF1	.00	1	FLOW	188.
				TIME	4.08
DIVERSION TO					
+	FSP2	.00	1	FLOW	73.
				TIME	4.08
HYDROGRAPH AT					
+	FSP1	.00	1	FLOW	115.
				TIME	4.17
HYDROGRAPH AT					
+	DOF1	.00	1	FLOW	1.
				TIME	3.58
HYDROGRAPH AT					
+	DOF2	.00	1	FLOW	1.
				TIME	3.58
HYDROGRAPH AT					
+	JEN1	.00	1	FLOW	2.
				TIME	3.50
HYDROGRAPH AT					
+	REF2	.00	1	FLOW	41.
				TIME	4.08
5 COMBINED AT					
+	C1	.00	1	FLOW	160.
				TIME	3.50
HYDROGRAPH AT					
+	REF6	.00	1	FLOW	12.
				TIME	4.08
HYDROGRAPH AT					
+	DOF7	.01	1	FLOW	10.
				TIME	3.50
HYDROGRAPH AT					
+	REF5	.00	1	FLOW	66.
				TIME	4.08
HYDROGRAPH AT					
+	DOF6	.00	1	FLOW	3.
				TIME	3.58
HYDROGRAPH AT					
+	REF4	.00	1	FLOW	29.
				TIME	4.08
5 COMBINED AT					
+	C12	.02	1	FLOW	120.
				TIME	3.50
HYDROGRAPH AT					
+	DOF5	.00	1	FLOW	1.
				TIME	3.58
HYDROGRAPH AT					
+	DOF4	.00	1	FLOW	1.
				TIME	3.58
HYDROGRAPH AT					
+	XOF1	.00	1	FLOW	3.
				TIME	3.58
HYDROGRAPH AT					
+	DOF3	.00	1	FLOW	1.
				TIME	3.58
HYDROGRAPH AT					
+	JEN2	.00	1	FLOW	2.
				TIME	3.50
6 COMBINED AT					
+	C2	.02	1	FLOW	127.
				TIME	3.50
2 COMBINED AT					
+	C3	.03	1	FLOW	286.
				TIME	3.50

HYDROGRAPH AT					
+	CH	.00	1	FLOW TIME	1. 3.50
2 COMBINED AT					
+	C4	.03	1	FLOW TIME	287. 3.50
HYDROGRAPH AT					
+	CH1	.00	1	FLOW TIME	1. 3.50
2 COMBINED AT					
+	C5	.03	1	FLOW TIME	287. 3.50
DIVERSION TO					
+	D1	.03	1	FLOW TIME	119. 3.50
HYDROGRAPH AT					
+	DIV1	.03	1	FLOW TIME	168. 3.50
HYDROGRAPH AT					
+	DOF8	.01	1	FLOW TIME	5. 3.58
HYDROGRAPH AT					
+	REF7	.00	1	FLOW TIME	17. 4.08
HYDROGRAPH AT					
+	GCN1	.00	1	FLOW TIME	5. 3.50
3 COMBINED AT					
+	C7	.01	1	FLOW TIME	26. 3.50
HYDROGRAPH AT					
+	DON3	.00	1	FLOW TIME	3. 3.58
HYDROGRAPH AT					
+	GCN2	.00	1	FLOW TIME	4. 3.50
3 COMBINED AT					
+	C8	.01	1	FLOW TIME	32. 3.50
HYDROGRAPH AT					
+	DON2	.00	1	FLOW TIME	1. 3.58
3 COMBINED AT					
+	C9	.04	1	FLOW TIME	201. 3.50
HYDROGRAPH AT					
+	FSP2	.00	1	FLOW TIME	73. 4.08
HYDROGRAPH AT					
+	HEL	.00	1	FLOW TIME	2. 3.50
HYDROGRAPH AT					
+	HEL1	.00	1	FLOW TIME	2. 3.50
3 COMBINED AT					
+	C6	.00	1	FLOW TIME	76. 3.50
DIVERSION TO					
+	FSPH	.00	1	FLOW TIME	48. 3.50
HYDROGRAPH AT					
+	FSPG	.00	1	FLOW TIME	28. 3.50
HYDROGRAPH AT					
+	DON1	.00	1	FLOW TIME	1. 3.58
HYDROGRAPH AT					
+	GCN3	.00	1	FLOW TIME	1. 3.50
4 COMBINED AT					
+	C10	.05	1	FLOW TIME	231. 3.50

ULT100.OUT

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



APPENDIX D

Hydraulic Calculations



Existing Conditions

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Channel Slope	3.00000	%
Discharge	2.00	ft ³ /s
Section Definitions		

Roughness Segment Definitions

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

Normal Depth	0.18	ft
Elevation Range	0.00 to 1.02	ft
Flow Area	0.98	ft ²
Wetted Perimeter	11.09	ft

Worksheet for A - Helena 100-YR

Results

Hydraulic Radius	0.09	ft
Top Width	11.07	ft
Normal Depth	0.18	ft
Critical Depth	0.19	ft
Critical Slope	0.01999	ft/ft
Velocity	2.05	ft/s
Velocity Head	0.07	ft
Specific Energy	0.24	ft
Froude Number	1.21	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.18	ft
Critical Depth	0.19	ft
Channel Slope	3.00000	%
Critical Slope	0.01999	ft/ft



Interim Condition

Worksheet for G - 4' Swale

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.00000 %
Discharge 2.00 ft³/s
Section Definitions

Station (ft)

Elevation (ft)

0+00.0	0.66
0+02.0	0.00
0+04.0	0.66

Roughness Segment Definitions

Start Station

Ending Station

Roughness Coefficient

(0+00.0, 0.66)

(0+04.0, 0.66)

0.025

Options

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

Results

Normal Depth	0.53	ft
Elevation Range	0.00 to 0.66	ft
Flow Area	0.85	ft ²
Wetted Perimeter	3.37	ft
Hydraulic Radius	0.25	ft
Top Width	3.20	ft
Normal Depth	0.53	ft
Critical Depth	0.49	ft
Critical Slope	0.01564	ft/ft
Velocity	2.36	ft/s

Worksheet for G - 4' Swale

Results

Velocity Head	0.09	ft
Specific Energy	0.62	ft
Froude Number	0.81	
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	0.53	ft
Critical Depth	0.49	ft
Channel Slope	1.00000	%
Critical Slope	0.01564	ft/ft

Project Description

Manning Formula

Normal Depth

2.00 ft³/s



Ultimate Condition w/ Undeveloped Streets

Worksheet for A - Helena 10-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.00000 %
Discharge 71.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.45
0+08.8	0.00
0+18.0	0.78
0+30.0	1.02
0+42.0	0.78
0+51.3	0.00
0+60.0	0.45

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.45)	(0+18.0, 0.78)	0.025
(0+18.0, 0.78)	(0+42.0, 0.78)	0.016
(0+42.0, 0.78)	(0+60.0, 0.45)	0.025

Options

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

Results

Normal Depth 0.67 ft
Elevation Range 0.00 to 1.02 ft
Flow Area 13.03 ft²
Wetted Perimeter 33.84 ft

Worksheet for A - Helena 10-YR

Results

Hydraulic Radius	0.38	ft
Top Width	33.33	ft
Normal Depth	0.67	ft
Critical Depth	0.82	ft
Critical Slope	0.01211	ft/ft
Velocity	5.45	ft/s
Velocity Head	0.46	ft
Specific Energy	1.13	ft
Froude Number	1.54	
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	0.67	ft
Critical Depth	0.82	ft
Channel Slope	3.00000	%
Critical Slope	0.01211	ft/ft

Cross Section for A - Helena 10-YR

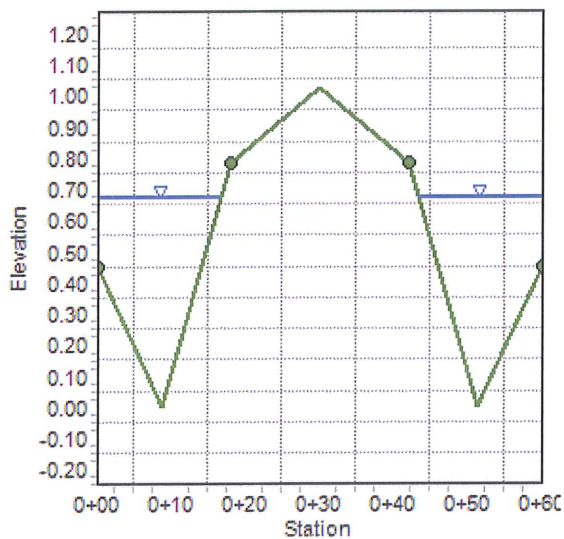
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.00000 %
Normal Depth 0.67 ft
Discharge 71.00 ft³/s

Cross Section Image



Project Description

Input Data

Section Definitions

Roughness Segment Definitions

Options

Results

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

Worksheet for A - Helena 100-YR

Results

Hydraulic Radius	0.46	ft
Top Width	58.07	ft
Normal Depth	1.00	ft
Critical Depth	1.22	ft
Critical Slope	0.00838	ft/ft
Velocity	6.96	ft/s
Velocity Head	0.75	ft
Specific Energy	1.75	ft
Froude Number	1.79	
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	1.00	ft
Critical Depth	1.22	ft
Channel Slope	3.00000	%
Critical Slope	0.00838	ft/ft

Project Description

Manning Formula

Normal Depth

190.00 ft³/s

Worksheet for B - Grand Canyon 10-YR

Results

Hydraulic Radius	0.10	ft
Top Width	52.43	ft
Normal Depth	0.11	ft
Critical Depth	0.07	ft
Critical Slope	0.02175	ft/ft
Velocity	1.00	ft/s
Velocity Head	0.02	ft
Specific Energy	0.12	ft
Froude Number	0.57	
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	0.11	ft
Critical Depth	0.07	ft
Channel Slope	0.63000	%
Critical Slope	0.02175	ft/ft

Project Description

Input Data

Station (ft)	Elevation (ft)
0+00.0	0.00
0+20.0	0.00
0+24.0	0.08
0+40.0	0.40
0+54.0	0.08
0+58.0	0.00
0+80.0	0.00

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.00)	(0+24.0, 0.08)	0.025
(0+24.0, 0.08)	(0+54.0, 0.08)	0.016
(0+54.0, 0.08)	(0+80.0, 0.00)	0.025

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

Normal Depth		0.25	ft
Elevation Range	0.00 to 0.40 ft		
Flow Area		13.21	ft²
Wetted Perimeter		65.97	ft

Worksheet for B - Grand Canyon 100-YR

Results

Hydraulic Radius	0.20	ft
Top Width	65.48	ft
Normal Depth	0.25	ft
Critical Depth	0.19	ft
Critical Slope	0.01444	ft/ft
Velocity	1.74	ft/s
Velocity Head	0.05	ft
Specific Energy	0.29	ft
Froude Number	0.68	
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	0.19	ft
Channel Slope	0.63000	%
Critical Slope	0.01444	ft/ft

Cross Section for B - Grand Canyon 100-YR

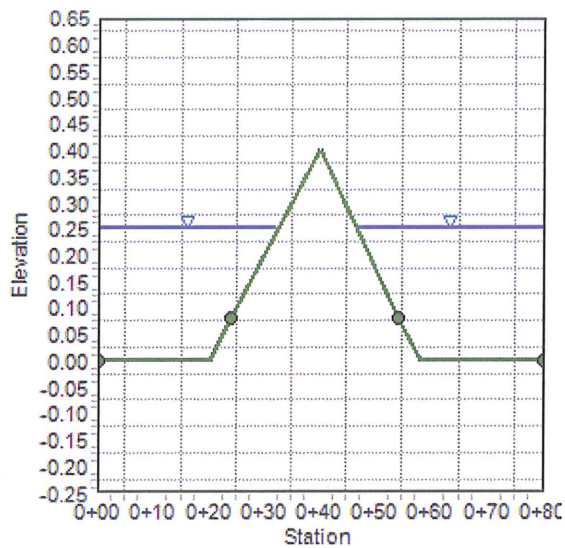
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.63000 %
Normal Depth 0.25 ft
Discharge 23.00 ft³/s

Cross Section Image



Worksheet for C - Grand Canyon 10-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.22000 %
Discharge 14.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.00
0+20.0	0.00
0+24.0	0.08
0+40.0	0.40
0+54.0	0.08
0+58.0	0.00
0+80.0	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.00)	(0+24.0, 0.08)	0.025
(0+24.0, 0.08)	(0+54.0, 0.08)	0.016
(0+54.0, 0.08)	(0+80.0, 0.00)	0.025

Options

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

Results

Normal Depth 0.16 ft
Elevation Range 0.00 to 0.40 ft
Flow Area 7.78 ft²
Wetted Perimeter 57.49 ft

Worksheet for C - Grand Canyon 10-YR

Results

Hydraulic Radius	0.14	ft
Top Width	57.17	ft
Normal Depth	0.16	ft
Critical Depth	0.14	ft
Critical Slope	0.01698	ft/ft
Velocity	1.80	ft/s
Velocity Head	0.05	ft
Specific Energy	0.21	ft
Froude Number	0.86	
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	1.22000	%
Critical Slope	0.01698	ft/ft

Cross Section for C - Grand Canyon 10-YR

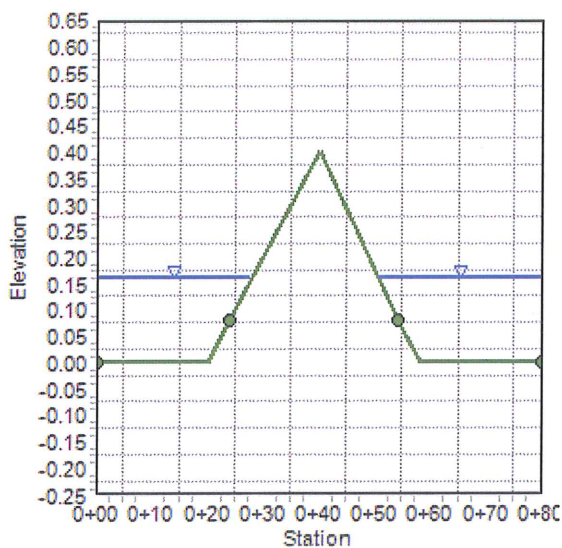
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.22000 %
Normal Depth 0.16 ft
Discharge 14.00 ft³/s

Cross Section Image



DRYLANE = (CL-DEPTH)/0.02 = (0.40-0.16)/0.02 = 12' > 12' (MEETS DRY LINE CRITERIA)

Worksheet for C - Grand Canyon 100-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.22000 %
Discharge 201.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.00
0+20.0	0.00
0+24.0	0.08
0+40.0	0.40
0+54.0	0.08
0+58.0	0.00
0+80.0	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.00)	(0+24.0, 0.08)	0.025
(0+24.0, 0.08)	(0+54.0, 0.08)	0.016
(0+54.0, 0.08)	(0+80.0, 0.00)	0.025

Options

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

Results

Normal Depth 0.62 ft
Elevation Range 0.00 to 0.40 ft
Flow Area 42.04 ft²
Wetted Perimeter 81.25 ft

Worksheet for C - Grand Canyon 100-YR

Results

Hydraulic Radius	0.52	ft
Top Width	80.00	ft
Normal Depth	0.62	ft
Critical Depth	0.68	ft
Critical Slope	0.00873	ft/ft
Velocity	4.78	ft/s
Velocity Head	0.36	ft
Specific Energy	0.97	ft
Froude Number	1.16	
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	0.62	ft
Critical Depth	0.68	ft
Channel Slope	1.22000	%
Critical Slope	0.00873	ft/ft

Cross Section for C - Grand Canyon 100-YR

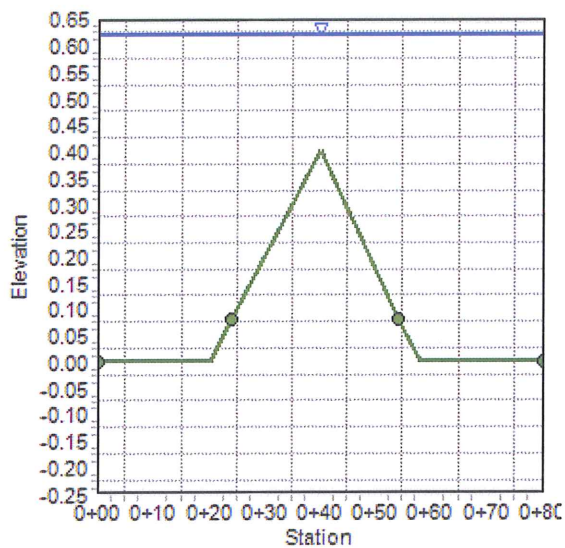
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.22000 %
Normal Depth 0.62 ft
Discharge 201.00 ft³/s

Cross Section Image





Flow Splits

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Channel Slope	0.63000	%
Discharge	4.00	ft³/s
Section Definitions		

Roughness Segment Definitions

Bentley Systems, Inc. Haestad Methods Software Center Master V8i (SELECTseries 1) [08.11.01.03]
1/3/2019 10:06:14 AM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 3

Worksheet for Grand Canyon 10-YR

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2553.37)	(0+25.3, 2551.38)	0.025
(0+25.3, 2551.38)	(0+54.9, 2551.32)	0.016
(0+54.9, 2551.32)	(0+80.0, 2551.23)	0.025

Options

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

Results

Normal Depth	0.31	ft
Elevation Range	2550.36 to 2554.06 ft	
Flow Area	2.69	ft²
Wetted Perimeter	15.17	ft
Hydraulic Radius	0.18	ft
Top Width	15.15	ft
Normal Depth	0.31	ft
Critical Depth	0.26	ft
Critical Slope	0.01771	ft/ft
Velocity	1.49	ft/s
Velocity Head	0.03	ft
Specific Energy	0.34	ft
Froude Number	0.62	
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		

Worksheet for Grand Canyon 10-YR

GVF Output Data

Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.31	ft
Critical Depth	0.26	ft
Channel Slope	0.63000	%
Critical Slope	0.01771	ft/ft

Cross Section for Grand Canyon 10-YR

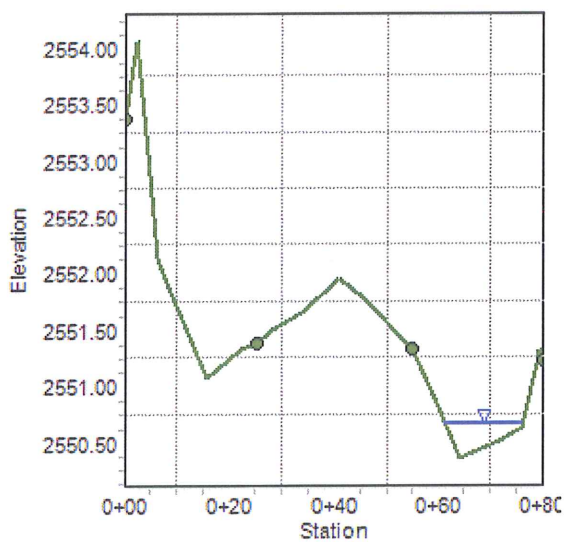
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.63000 %
Normal Depth 0.31 ft
Discharge 4.00 ft³/s

Cross Section Image



Worksheet for Grand Canyon 100-YR

Project Description

Manning Formula

Normal Depth

Input Data

0.63000 %

21.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	2553.37
0+02.0	2554.06
0+04.4	2553.05
0+06.1	2552.13
0+08.4	2551.87
0+15.5	2551.07
0+22.4	2551.32
0+25.3	2551.38
0+28.0	2551.49
0+34.2	2551.67
0+41.0	2551.96
0+45.3	2551.79
0+54.9	2551.32
0+59.1	2550.89
0+64.0	2550.36
0+71.8	2550.51
0+76.1	2550.63
0+78.8	2551.20
0+79.4	2551.32
0+79.8	2551.29
0+80.0	2551.23

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
---------------	----------------	-----------------------

Worksheet for Grand Canyon 100-YR

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2553.37)	(0+25.3, 2551.38)	0.025
(0+25.3, 2551.38)	(0+54.9, 2551.32)	0.016
(0+54.9, 2551.32)	(0+80.0, 2551.23)	0.025

Options

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

Results

Normal Depth	0.62	ft
Elevation Range	2550.36 to 2554.06 ft	
Flow Area	8.05	ft²
Wetted Perimeter	19.56	ft
Hydraulic Radius	0.41	ft
Top Width	19.49	ft
Normal Depth	0.62	ft
Critical Depth	0.52	ft
Critical Slope	0.01302	ft/ft
Velocity	2.61	ft/s
Velocity Head	0.11	ft
Specific Energy	0.72	ft
Froude Number	0.72	
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		

Worksheet for Grand Canyon 100-YR

GVF Output Data

Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.52	ft
Channel Slope	0.63000	%
Critical Slope	0.01302	ft/ft

Cross Section for Grand Canyon 100-YR

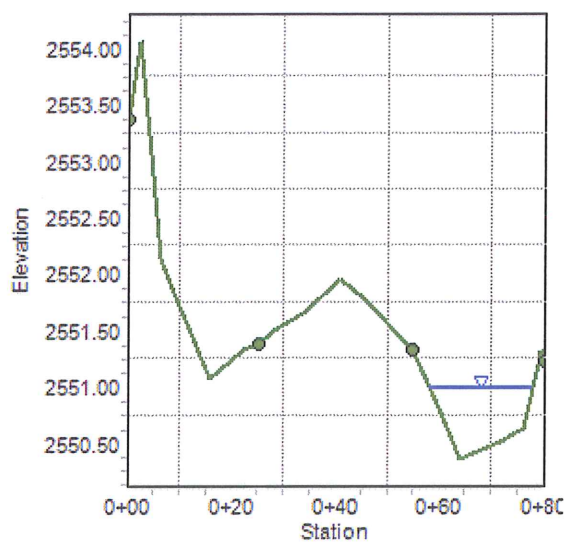
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.63000	%
Normal Depth	0.62	ft
Discharge	21.00	ft ³ /s

Cross Section Image



Project Description

Input Data

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

Roughness Segment Definitions

Worksheet for Helena 2 10-YR

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2550.39)	(0+60.2, 2550.96)	0.025

Options

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

Results

Normal Depth	0.89	ft
Elevation Range	2549.78 to 2551.41 ft	
Flow Area	13.03	ft²
Wetted Perimeter	36.93	ft
Hydraulic Radius	0.35	ft
Top Width	36.51	ft
Normal Depth	0.89	ft
Critical Depth	1.01	ft
Critical Slope	0.01206	ft/ft
Velocity	5.14	ft/s
Velocity Head	0.41	ft
Specific Energy	1.30	ft
Froude Number	1.52	
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	0.89	ft

Worksheet for Helena 2 10-YR

GVF Output Data

Critical Depth	1.01	ft
Channel Slope	3.00000	%
Critical Slope	0.01206	ft/ft

Cross Section for Helena 2 10-YR

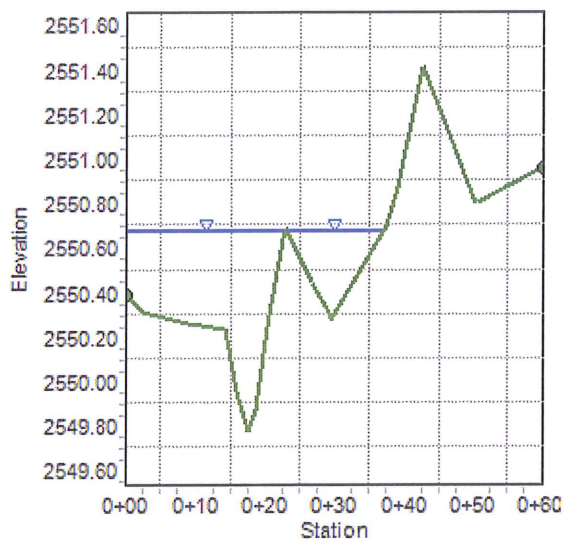
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.00000 %
Normal Depth 0.89 ft
Discharge 67.00 ft³/s

Cross Section Image



Worksheet for Helena 2 100-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.00000 %
Discharge 169.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	2550.39
0+00.0	2550.39
0+02.4	2550.31
0+09.1	2550.26
0+14.2	2550.23
0+15.8	2549.95
0+17.5	2549.78
0+18.5	2549.87
0+20.4	2550.25
0+22.8	2550.69
0+26.7	2550.45
0+26.8	2550.44
0+29.3	2550.29
0+29.5	2550.28
0+31.0	2550.36
0+37.5	2550.70
0+39.2	2550.87
0+42.6	2551.41
0+50.1	2550.82
0+50.4	2550.80
0+50.6	2550.80
0+59.9	2550.96
0+60.2	2550.96

Roughness Segment Definitions

Worksheet for Helena 2 100-YR

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2550.39)	(0+60.2, 2550.96)	0.025

Options

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

Results

Normal Depth	1.20	ft
Elevation Range	2549.78 to 2551.41 ft	
Flow Area	26.19	ft²
Wetted Perimeter	52.75	ft
Hydraulic Radius	0.50	ft
Top Width	51.98	ft
Normal Depth	1.20	ft
Critical Depth	1.40	ft
Critical Slope	0.01076	ft/ft
Velocity	6.45	ft/s
Velocity Head	0.65	ft
Specific Energy	1.85	ft
Froude Number	1.60	
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	1.20	ft

Worksheet for Helena 2 100-YR

GVF Output Data

Critical Depth	1.40	ft
Channel Slope	3.00000	%
Critical Slope	0.01076	ft/ft

Cross Section for Helena 2 100-YR

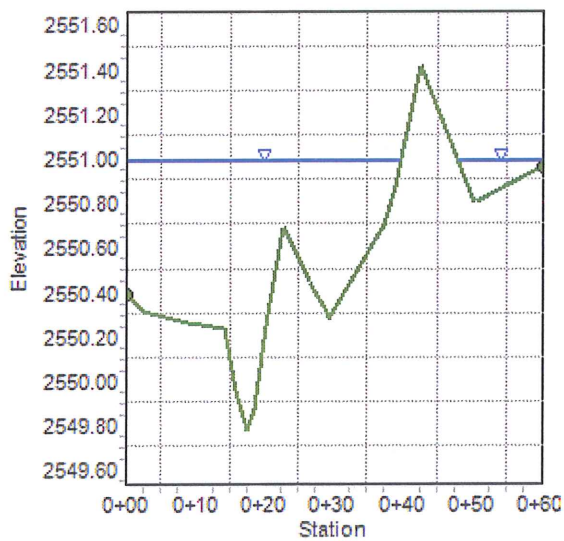
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.00000 %
Normal Depth 1.20 ft
Discharge 169.00 ft³/s

Cross Section Image





Ultimate Conditions

Worksheet for A - Helena 10-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 3.00000 %
Discharge 16.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+30.0	0.63
0+53.0	0.17
0+54.5	0.00
0+54.5	0.50
0+55.0	0.50
0+60.0	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+53.0, 0.17)	0.016
(0+53.0, 0.17)	(0+60.0, 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 A - Helena 10-YR

Results

Normal Depth		0.40	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		3.68	ft ²
Wetted Perimeter		27.18	ft
Hydraulic Radius		0.14	ft
Top Width		26.35	ft
Normal Depth		0.40	ft
Critical Depth		0.50	ft
Critical Slope		0.00648	ft/ft
Velocity		4.35	ft/s
Velocity Head		0.29	ft
Specific Energy		0.70	ft
Froude Number		2.05	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.40	ft
Critical Depth	0.50	ft
Channel Slope	3.00000	%
Critical Slope	0.00648	ft/ft

Cross Section for A - Helena 10-YR

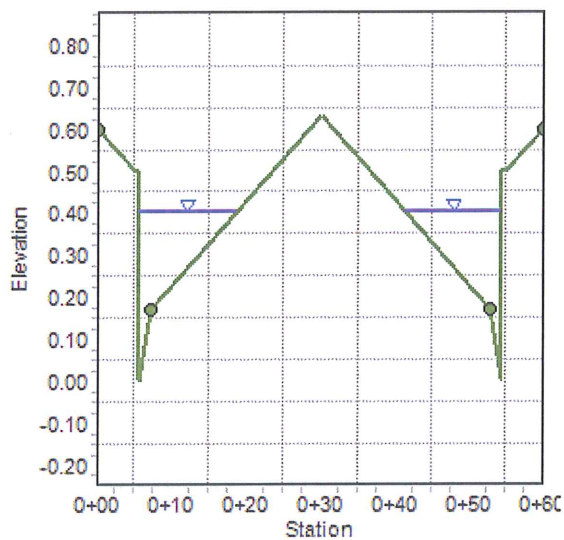
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope	3.00000	%
Normal Depth	0.40	ft
Discharge	16.00	ft³/s

Cross Section Image



Worksheet for B - Grand Canyon 10-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.63000 %
Discharge 3.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+40.0	0.83
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 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 B - Grand Canyon 10-YR

Results

Normal Depth		0.32	ft
Elevation Range	0.00 to 0.83 ft		
Flow Area		1.85	ft ²
Wetted Perimeter		18.75	ft
Hydraulic Radius		0.10	ft
Top Width		18.09	ft
Normal Depth		0.32	ft
Critical Depth		0.31	ft
Critical Slope		0.00793	ft/ft
Velocity		1.63	ft/s
Velocity Head		0.04	ft
Specific Energy		0.36	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	0.32	ft
Critical Depth	0.31	ft
Channel Slope	0.63000	%
Critical Slope	0.00793	ft/ft

Cross Section for B - Grand Canyon 10-YR

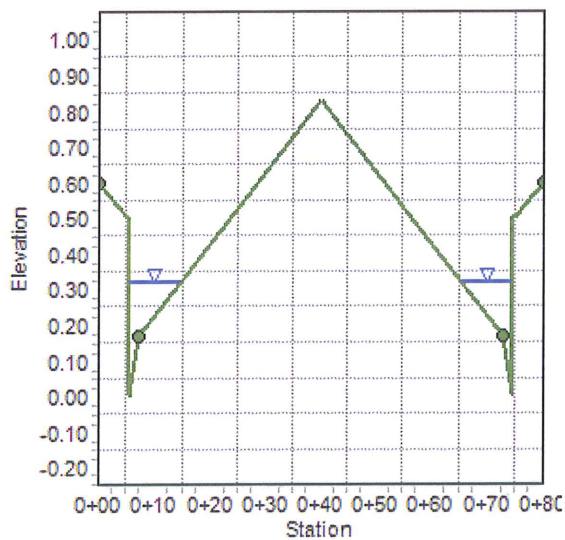
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.63000 %
Normal Depth 0.32 ft
Discharge 3.00 ft³/s

Cross Section Image



DRYLANE = (CL-DEPTH)/0.02 = (0.83-0.32)/0.02 = 25.5' > 19' (MEETS DRY LINE CRITERIA)

Worksheet for B - Grand Canyon 100-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.63000 %
Discharge 30.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+40.0	0.83
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 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 B - Grand Canyon 100-YR

Results

Normal Depth		0.60	ft
Elevation Range	0.00 to 0.83		ft
Flow Area		11.47	ft ²
Wetted Perimeter		58.17	ft
Hydraulic Radius		0.20	ft
Top Width		57.14	ft
Normal Depth		0.60	ft
Critical Depth		0.61	ft
Critical Slope		0.00592	ft/ft
Velocity		2.62	ft/s
Velocity Head		0.11	ft
Specific Energy		0.71	ft
Froude Number		1.03	
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	0.60	ft
Critical Depth	0.61	ft
Channel Slope	0.63000	%
Critical Slope	0.00592	ft/ft

Cross Section for B - Grand Canyon 100-YR

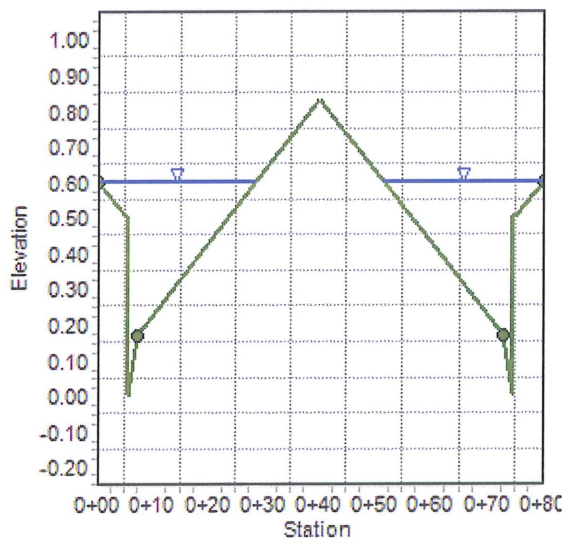
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.63000	%
Normal Depth	0.60	ft
Discharge	30.00	ft³/s

Cross Section Image



Worksheet for C - Grand Canyon 10-YR

Results

Normal Depth		0.44	ft
Elevation Range	0.00 to 0.83 ft		
Flow Area		4.69	ft ²
Wetted Perimeter		30.82	ft
Hydraulic Radius		0.15	ft
Top Width		29.92	ft
Normal Depth		0.44	ft
Critical Depth		0.48	ft
Critical Slope		0.00663	ft/ft
Velocity		2.99	ft/s
Velocity Head		0.14	ft
Specific Energy		0.58	ft
Froude Number		1.33	
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	0.44	ft
Critical Depth	0.48	ft
Channel Slope	1.22000	%
Critical Slope	0.00663	ft/ft

Project Description

Manning Formula

Normal Depth

Channel Slope	1.22000	%
Normal Depth	0.44	ft
Discharge	14.00	ft³/s

1.22000 %

0.44 ft

14.00 ft³/s

1/3/2019 8:15:43 AM

Worksheet for C - Grand Canyon 100-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.22000 %
Discharge 201.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+40.0	0.83
0+73.0	0.17
0+74.5	0.00
0+74.5	0.50
0+75.0	0.50
0+80.0	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+73.0, 0.17)	0.016
(0+73.0, 0.17)	(0+80.0, 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 C - Grand Canyon 100-YR

Results

Normal Depth		0.92	ft
Elevation Range	0.00 to 0.83 ft		
Flow Area		33.98	ft ²
Wetted Perimeter		81.67	ft
Hydraulic Radius		0.42	ft
Top Width		80.00	ft
Normal Depth		0.92	ft
Critical Depth		1.07	ft
Critical Slope		0.00432	ft/ft
Velocity		5.91	ft/s
Velocity Head		0.54	ft
Specific Energy		1.46	ft
Froude Number		1.60	
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	0.92	ft
Critical Depth	1.07	ft
Channel Slope	1.22000	%
Critical Slope	0.00432	ft/ft

Cross Section for C - Grand Canyon 100-YR

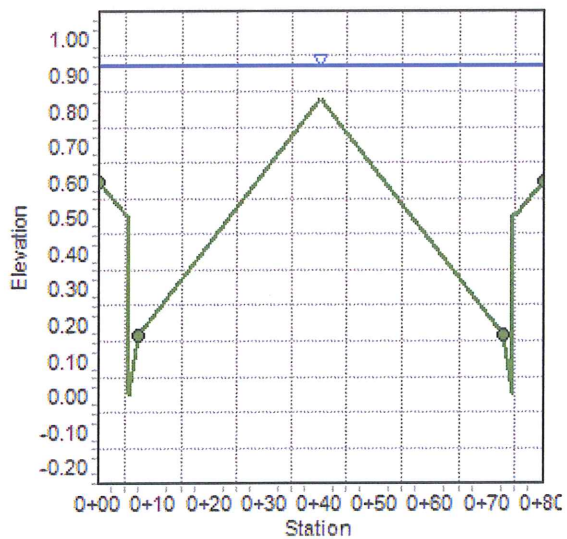
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.22000	%
Normal Depth	0.92	ft
Discharge	201.00	ft ³ /s

Cross Section Image



Worksheet for E - 20' Drainage Easement

Results

Critical Slope	0.00250	ft/ft
Velocity	12.49	ft/s
Velocity Head	2.42	ft
Specific Energy	3.62	ft
Froude Number	2.05	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.20	ft
Critical Depth	1.91	ft
Channel Slope	1.14000	%
Critical Slope	0.00250	ft/ft

Cross Section for E - 20' Drainage Easement

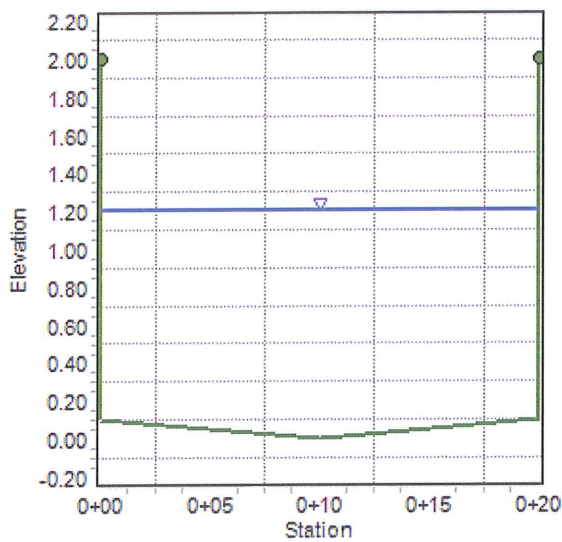
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.14000	%
Normal Depth	1.20	ft
Discharge	287.00	ft ³ /s

Cross Section Image



NOTE THAT THE EASEMENT HAS BEEN WIDENED TO 20' DUE TO PONDING ISSUES THAT WERE OCCURRING AT THE ENTRANCE OF JENSEN.

IT HAS BEEN MADE SURE THAT SOLID GROUTING/RETAINING IN THE EASEMENT IS UP TO 1.7' HIGH (1.2' + 1.5')

Project Description

Input Data

Station (ft)	Elevation (ft)
0+00.0	2549.73
0+01.0	2549.75
0+04.9	2549.71
0+07.7	2549.20
0+08.5	2549.00
0+10.1	2548.76
0+13.0	2548.51
0+15.0	2548.33
0+19.8	2548.22
0+20.3	2548.23
0+24.6	2548.10
0+27.4	2547.75
0+27.8	2547.70
0+28.7	2547.74
0+32.6	2547.91
0+34.8	2548.33
0+36.7	2548.54
0+39.1	2548.60
0+43.6	2548.71
0+44.5	2548.72
0+46.0	2548.89
0+48.9	2549.16
0+51.9	2549.42
0+54.3	2549.87
0+56.1	2550.09
0+57.8	2550.00
0+59.0	2549.88

Worksheet for F - Swale 100-YR

Input Data

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2549.73)	(0+59.0, 2549.88)	0.025

Options

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

Results

Normal Depth	1.91	ft
Elevation Range	2547.70 to 2550.09 ft	
Flow Area	51.96	ft²
Wetted Perimeter	47.74	ft
Hydraulic Radius	1.09	ft
Top Width	47.50	ft
Normal Depth	1.91	ft
Critical Depth	1.70	ft
Critical Slope	0.00937	ft/ft
Velocity	4.45	ft/s
Velocity Head	0.31	ft
Specific Energy	2.22	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

Worksheet for F - Swale 100-YR

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.91	ft
Critical Depth	1.70	ft
Channel Slope	0.50000	%
Critical Slope	0.00937	ft/ft

Cross Section for F - Swale 100-YR

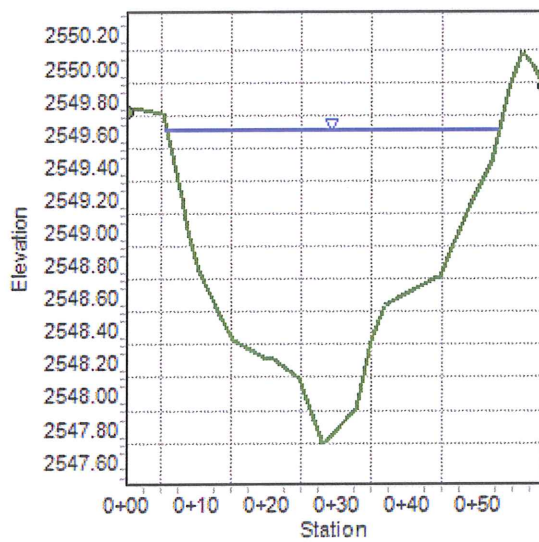
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	1.91	ft
Discharge	231.00	ft ³ /s

Cross Section Image





Flow Splits

Flow Split Calculation

Description: Flow split at the intersection of Jensen and Helena - 10 YR
Project: Jensen & Helena
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 1/3/2019

Main Road: Jensen
Side Road: Helena

10-yr Flow in Main Street (Q_T) = 69 cfs

Depth of Flow in Main Street (d_{10}) =	0.63 ft	}
Main Street 10-yr Flow between Curb Face (Q_M) =	69.0 cfs	
Ave. Depth of Flow to Side Street, $d_{10} - 0.5'$, (y_o) =	0.13 ft	
Estimated Left Overbank Flow (Q_{LOB}) =	0.00 cfs	
Estimated Right Overbank Flow (Q_{ROB}) =	0.00 cfs	

$$Q_L = 0.042 * [(Q_M^{0.93} * W_{SS}^{0.85}) / (S_M^{0.41} * W_M^{0.79})] \quad \text{(Equation 12.3)}$$

Solving for Q_L , where:

$S_M = 0.0200$ ft/ft	[Main street slope]
$W_M = 60$ ft	[Main street width between face-of-curbs]
$W_{SS} = 60$ ft	[Side street width between face-of-curbs]

$$Q_L = 13.7 \text{ cfs} \quad \text{[Lateral flow into the side street]}$$

Equation 12.4 is used to calculate the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_0 from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_0 calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_0 = 46.8(y_o * W_{SS} * S_{SS}^{0.5}) - Q_L \quad \text{(Equation 12.4)}$$

Solving for Q_0 , where:

$S_{SS} = 0.0300$ ft/ft [Side street Slope]

$$Q_0 = 49.5 \text{ cfs} \quad \text{[Overbank flow intercepted by the side street]}$$

If $Q_0 > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

$$Q_{OB} = 0.00 \text{ cfs}$$

$$Q_{SS} = Q_{OB} + Q_L$$

Helena

$$Q_{SS} = \pm 14 \text{ cfs}$$

[Total Developed 10-yr flow entering the side street]

$$Q_{MS} = Q_T - Q_{SS}$$

Jensen

$$Q_{MS} = \pm 55 \text{ cfs}$$

[Total Developed 10-yr flow remaining in main street]

Flow Split Calculation

Description: Flow split at the intersection of Grand Canyon and Helena - 10 YR
Project: Jensen & Helena Area 4
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 1/3/2019

Main Road: Helena
Side Road: Grand Canyon

10-yr Flow in Main Street (Q_T) = 16 cfs

Depth of Flow in Main Street (d_{10}) = 0.40 ft
 Main Street 10-yr Flow between Curb Face (Q_M) = 16.0 cfs
 Ave. Depth of Flow to Side Street, $d_{10} - 0.5'$, (y_o) = 0.00 ft
 Estimated Left Overbank Flow (Q_{LOB}) = 0.00 cfs
 Estimated Right Overbank Flow (Q_{ROB}) = 0.00 cfs

(Refer to FlowMaster Calculations
Section A 10YR)

$$Q_L = 0.042 * [(Q_M^{0.93} * W_{SS}^{0.85}) / (S_M^{0.41} * W_M^{0.79})] \quad \text{(Equation 12.3)}$$

Solving for Q_L , where:

$S_M = 0.0300 \text{ ft/ft}$ [Main street slope]
 $W_M = 60 \text{ ft}$ [Main street width between face-of-curbs]
 $W_{SS} = 80 \text{ ft}$ [Side street width between face-of-curbs]

$$Q_L = 3.8 \text{ cfs} \quad \text{[Lateral flow into the side street]}$$

Equation 12.4 is used to calculate the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_O from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_O calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_O = 46.8(y_o * W_{SS} * S_{SS}^{0.5}) - Q_L \quad \text{(Equation 12.4)}$$

Solving for Q_O , where:

$S_{SS} = 0.0063 \text{ ft/ft}$ [Side street Slope]

$$Q_O = -3.8 \text{ cfs} \quad \text{[Overbank flow intercepted by the side street]}$$

If $Q_O > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

$$Q_{OB} = -3.80 \text{ cfs}$$

$$Q_{SS} = Q_{OB} + Q_L$$

Grand Canyon $Q_{SS} = \pm 2 \text{ cfs}$ [Total Developed 10-yr flow entering the side street]

$$Q_{MS} = Q_T - Q_{SS}$$

Helena $Q_{MS} = \pm 14 \text{ cfs}$ [Total Developed 10-yr flow remaining in main street]

Flow Split Calculation

Description: Flow split at the intersection of Grand Canyon and Helena - 100 YR
Project: Jensen & Helena Area 4
Reference: From the Pima County Drainage Manual (Tuscon, Arizona)
Date: 1/3/2019

Main Road: Helena
Side Road: Grand Canyon

100-yr Flow in Main Street (Q_T) = 76 cfs

Depth of Flow in Main Street (d_{100}) = 0.62 ft
Main Street 100-yr Flow between Curb Face (Q_M) = 35.0 cfs
Ave. Depth of Flow to Side Street, $d_{100} - 0.5'$, (y_o) = 0.12 ft
Estimated Left Overbank Flow (Q_{LOB}) = 20.50 cfs
Estimated Right Overbank Flow (Q_{ROB}) = 20.50 cfs

(Refer to FlowMaster Calculations
Section A 100YR)

$$Q_L = 0.042 * [(Q_M^{0.93} * W_{SS}^{0.85}) / (S_M^{0.41} * W_M^{0.79})] \quad \text{(Equation 12.3)}$$

Solving for Q_L , where:

$S_M = 0.0300$ ft/ft [Main street slope]
 $W_M = 60$ ft [Main street width between face-of-curbs]
 $W_{SS} = 80$ ft [Side street width between face-of-curbs]

$$Q_L = 7.9 \text{ cfs} \quad \text{[Lateral flow into the side street]}$$

Equation 12.4 is used to calculate the maximum amount of "overbank" flow which will also turn and flow down the side street. Note that if Q_o from Equation 12.4 is positive and is greater than the actual overbank flow, it should be assumed that all of the actual overbank flow turns and flows down the side street. Also, if Q_o calculated from Equation 12.4 is negative, it should be assumed that no overbank flow turns and flows down the side street.

$$Q_o = 46.8(y_o * W_{SS} * S_{SS}^{0.5}) - Q_L \quad \text{(Equation 12.4)}$$

Solving for Q_o , where:

$S_{SS} = 0.0063$ ft/ft [Side street Slope]

$$Q_o = 27.8 \text{ cfs} \quad \text{[Overbank flow intercepted by the side street]}$$

If $Q_o > Q_{OB}$, assume HALF of the actual overbank flow goes to side street

$$Q_{OB} = Q_{LOB} + Q_{ROB}$$

$$Q_{OB} = 41.00 \text{ cfs}$$

$$Q_{SS} = Q_{OB} + Q_L$$

Grand Canyon $Q_{SS} = \pm 28 \text{ cfs}$ [Total Developed 100-yr flow entering the side street]

$$Q_{MS} = Q_T - Q_{SS}$$

Helena $Q_{MS} = \pm 48 \text{ cfs}$ [Total Developed 100-yr flow remaining in main street]



Storm Drain

Worksheet for 48" RCP

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.61000	%
Diameter	4.00	ft
Discharge	119.00	ft³/s

Results

Normal Depth	3.56	ft
Flow Area	11.82	ft²
Wetted Perimeter	9.87	ft
Hydraulic Radius	1.20	ft
Top Width	2.50	ft
Critical Depth	3.29	ft
Percent Full	89.1	%
Critical Slope	0.00684	ft/ft
Velocity	10.07	ft/s
Velocity Head	1.58	ft
Specific Energy	5.14	ft
Froude Number	0.82	
Maximum Discharge	120.68	ft³/s
Discharge Full	112.18	ft³/s
Slope Full	0.00686	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	%
Normal Depth Over Rise	89.05	%
Downstream Velocity	Infinity	ft/s

Worksheet for 48" RCP

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.56	ft
Critical Depth	3.29	ft
Channel Slope	0.61000	%
Critical Slope	0.00684	ft/ft

Cross Section for 48" RCP

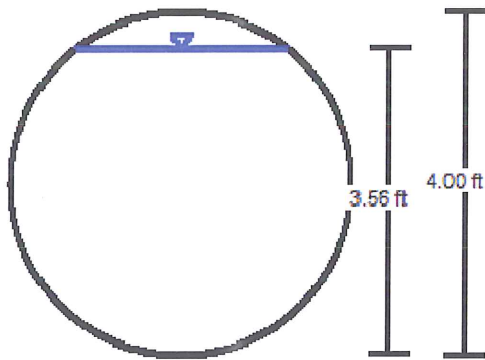
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.61000 %
Normal Depth	3.56 ft
Diameter	4.00 ft
Discharge	119.00 ft³/s

Cross Section Image



V: 1
H: 1



Grate Inlet Calculation

(3) 5'x5' (Double NDOT Type 2) Grate Inlet Calculation

Description: Determine ponding depth at proposed (3) 5'x5' grate inlet
Project: LMT-18-001 Jensen & Helena
Reference: The Clark County Regional Flood Control District (CCRFCD) Manual
Date: 1/3/2019

Orifice Equation: $Q = CA(2gh)^{1/2}$

where:

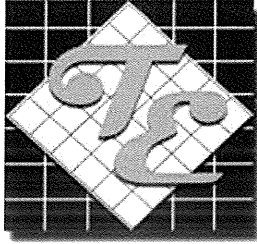
Q = 100-year event discharge	=	119.0
C = discharge coefficient	=	0.6
A = Effective area (ft ²)	=	50.25 ft ²
(3) 5'x5' Grate Inlet		
Clogging Factor =	=	50%
	=	25.13 ft ²
g = gravitational constant	=	32.2 ft/s ²
h = Head, ponding depth (ft), (measured from centerline of orifice)		

Solving for h,
$$h = \frac{(Q/cA)^2}{2g} = \frac{[119\text{cfs} / (0.6*25.13\text{ft}^2)]^2}{2*32.2\text{ft/s}^2} = 0.97 \text{ ft}$$

Comments: Worst Case Scenario Occurs Under Weir Conditions,
the 100-year ponding depth is 0.97 ft.



Riprap Calculations



TANEY ENGINEERING

6030 S. JONES BOULEVARD, SUITE #100

LAS VEGAS, NV 89118

TELEPHONE: 702-362-8844

FAX: 702-362-5233

Rip Rap Calculations for Circular Outlet

Project Name: Jensen & Helena Area 4
Proj. Number: LEN-18-001
Cross Streets: Jensen & Helena
Designed By: JRT
Date: 1/3/2019

Channel Description or Reference Section

Outlet of the 48" RCP

Input Data

Diameter (ft) = 4
Flow (cfs) = 119
Outlet Vel. (ft) = 10.07
Normal Depth (ft) = 3.56
Tailwater Depth (ft) = 2.32
Froude Number = 1.22

Rip Rap Size

Flow Type = Super Critical
 D_a (ft) = 3.78
 $Q/D^{2.5} = 4.28$
 d_{50} (in) = 8.03
Min d_{50} (in) = 9
Thickness (in) = 18

$$(d_{50}/D) (Y_e/D)^{1.2} / (Q/D^{2.5}) = 0.023$$

Mannings Coefficient

$n = 0.038$

$$D_a = 1/2 (D + Y_e)$$

$$n = 0.0395 (d_{50})^{1/6}$$

Reference:

Hydrologic Criteria and Drainage Design Manual, CCRFCD, Aug. 1999
Section 707.4 and equations 732, 760, and 762



APPENDIX E

Reference Material



**LAS VEGAS
CITY COUNCIL**

CAROLYN G. GOODMAN
Mayor

LOIS TARKANIAN
Mayor Pro Tem

STAVROS S. ANTHONY

BOB COFFIN

STEVEN G. SEROKA

MICHELE FIORE

CEDRIC CREAR

SCOTT D. ADAMS
City Manager

DEPARTMENT OF PLANNING
ROBERT SUMMERFIELD
DIRECTOR

**DEVELOPMENT
SERVICES CENTER**
DEPARTMENT OF PLANNING

333 N. RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NV 89106
702.229.6301 | VOICE
702.474.7463 | FAX
711 | TTY



cityoflasvegas
lasvegasnevada.gov

December 20, 2018

Kris Templeton
Lone Mountain Estates, LLC
3311 S. Rainbow Blvd., Ste. 205
Las Vegas, Nevada 89146

**RE: ZON-74626 [PRJ-74586] - REZONING RELATED TO TMP-74627
CITY COUNCIL MEETING OF DECEMBER 19, 2018**

Dear Applicant:

The City Council at a regular meeting held on December 19, 2018 voted to **APPROVE** a request for a Rezoning FROM: U (UNDEVELOPED) [RNP (RURAL NEIGHBORHOOD PRESERVATION) GENERAL PLAN DESIGNATION] TO: R-E (RESIDENCE ESTATES) on 9.92 acres at the southwest and southeast corner of Grand Canyon Drive and Helena Avenue (APN 138-06-301-013), Ward 4 (Anthony) [PRJ-74586].

The Notice of Final Action was filed with the Las Vegas City Clerk on December 20, 2018.

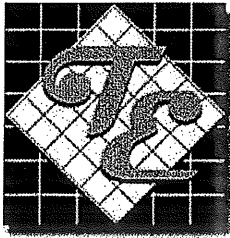
Sincerely,

Robert Summerfield, AICP[®]
Director
Department of Planning

RTS:PL:nl

cc:

Ms. Elisha Scrogum
Taney Engineering
6030 S. Jones Blvd.
Las Vegas, Nevada 89118



TANEY ENGINEERING

6030 SOUTH JONES BLVD.

LAS VEGAS, NV 89118

TELEPHONE: 702-362-8844

FAX: 702-362-5233

January 8, 2018

Linda Hartman-Maynard
City of Las Vegas Planning and Development Department
333 N Rancho Dr.
Las Vegas, NV 89106

JENSEN/HELENA AREA 4 GRADE DIFFERENCE OF 2-FEET FROM EXISTING GRADES

Applicant's Justification

We are requesting to allow for more than a 2-foot grade difference for this project site. The western edge of the lot meets another project site that has raised the grades a tad so that the lots could drain to Jensen Street. If we were to match within the two foot difference, it would cause the driveway slopes for our project site to exceed the 12% maximum entering off of Grand Canyon. In order to make the driveway entrances work off of Grand Canyon Dr., the finish floors were set off of Grand Canyon Drive. Scarping is shown in at the rear of the lots to avoid having to put retaining walls that may be avoided. Please note that in doing this; no drainage patterns have been changed. The site will still slope in an easterly pattern and not deter from any of the patterns that are existing today. Also note that the adjacent project to the west is going to be a part of one big operation with Area 4 under the same ownership. Safety precautions have been taken by scarping at a 2:1 max according to the geotechnical report for slope stability.

Respectfully,
TANEY ENGINEERING

Jeff Thomson

PLANS APPROVED
PLANNING
Dept. of Planning
City of Las Vegas, Nevada
2' +/- Grade Difference ONLY
LHM JAN 15 2019

Conforms to the minimum requirement of
LVMC Title 19; applicable Master Plan
Development standards and/or Conditions of
Approval. Make No Change Without Approval.
Plan is Not a Permit to Violate Any Ordinance.

*City of Las Vegas***AGENDA MEMO - PLANNING**

CITY COUNCIL MEETING DATE: DECEMBER 19, 2018

DEPARTMENT: PLANNING

ITEM DESCRIPTION: APPLICANT/OWNER: LONE MOUNTAIN ESTATES, LLC

**** STAFF RECOMMENDATION(S) ****

CASE NUMBER	RECOMMENDATION	REQUIRED FOR APPROVAL
ZON-74626	Staff recommends APPROVAL.	
TMP-74627	Staff recommends APPROVAL, subject to conditions:	ZON-74626

**** NOTIFICATION ****NEIGHBORHOOD ASSOCIATIONS NOTIFIED 18NOTICES MAILED 90PROTESTS 0APPROVALS 5

Staff Report Page One
December 19, 2018 - City Council Meeting

**** STAFF REPORT ****

PROJECT DESCRIPTION

This is a request to develop the subject site with a six-lot residential subdivision on a 9.92-acre undeveloped parcel located at the southwest and southeast corner of Grand Canyon Drive and Helena Avenue.

ISSUES

- Rezoning (ZON-74626) has been requested to allow a zone change from U (Undeveloped) [RNP (Rural Neighborhood Preservation) General Plan Designation] to R-E (Residence Estates). Staff supports the request.
- A Waiver of Title 19.02.025 has been requested to allow a deferral of off-site improvement requirements. Staff supports the request.

ANALYSIS

The City Council approved the property owner's request to annex the subject site into the City of Las Vegas on 02/15/17 through Annexation (ANX-67643). It is currently zoned U (Undeveloped) [RNP (Rural Neighborhood Preservation) General Plan Designation] and is subject to the development standards of Title 19. While the applicant has submitted a request for a six-lot residential subdivision, the sixth lot located on the east side of Grand Canyon Drive will be re-mapped at a later date. The applicant has proposed to rezone the subject parcel to R-E (Residence Estates). The proposed zone change conforms with the existing RNP (Rural Neighborhood Preservation) General Plan designation. Adjacent properties to the north, east and west are under Clark County jurisdiction and are all zoned R-E (Rural Estates Residential).

The applicant has requested a Waiver of Title 19.06.025 in conjunction with their Tentative Map request. Approval of this Waiver would allow the applicant to defer off-site improvements. The Public Works Department recommends approval of the Waiver request subject to condition. The condition reads as follows, "Construct pavement on Grand Canyon Drive, Hickam Avenue and Helena Avenue meeting Standard Drawing number 209 as modified by the required Drainage Study. All other off-site improvements are hereby deferred. In accordance with Title 19.02.025.F, the applicant shall make an improvement contribution equal to 50% of the City's bond estimate costs for all deferred improvements. The street light contribution on Grand Canyon Drive may be reduced to 25% if a service is provided."

**Staff Report Page Two
December 19, 2018 - City Council Meeting**

The submitted east/west cross section depicts a maximum natural grade greater than 2% across this site. Per the Tables in Subdivision Code 19.06.050 a development with natural slope greater than 2%, is allowed a maximum 6-foot retaining wall. No retaining walls are indicated. The submitted north/south cross section depicts maximum natural grade less than 2% across this site. Per the Tables in Subdivision Code 19.06.050 a development with natural slope less than 2%, is allowed a maximum 4-foot retaining wall. A 4-foot and 3-foot retaining wall are indicated on the north side of the property. The proposed lot on the east side of Grand Canyon Drive does not have any cross sections provided. Those will be required upon future development.

The Clark County School District projects that approximately three primary and secondary school students would be generated by the proposed development on this site. The District notes that all four schools serving the area including, Tarr Elementary School, Garehime Elementary School, Leavitt Middle School and Centennial High School were all over capacity for the 2017-18 school year. In particular, Tarr Elementary School was at 107.75 percent capacity, Garehime Elementary School was at 143.67 percent over capacity, Leavitt Middle School was at 101.18 percent capacity and Centennial High School was at 120.6 percent capacity.

The subject site is located within Planning Area A2 of the Interlocal Agreement. This agreement was adopted by the City of Las Vegas and Clark County on December 21, 2016. It established a joint position on Corporate boundaries, Planning and Public Facilities/Service Provisions within the defined Joint Land Use Planning Area. The Interlocal Agreement stipulates that the area must remain residential and designated at a density of no greater than 2.0 units per gross acre. Furthermore, it states, "The Parties agree that they shall not accept any General Plan Amendment (GPA) nor amend their respective comprehensive plans, rezone such properties or approve special or conditional use permits to allow industrial or commercial uses or residential densities above 2.0 Units per Gross Acre and each lot will maintain a minimum buildable net lot area of at least 18,000 square feet with a goal of at least 18,500 square feet." The proposed entitlements adhere to this agreement.

FINDINGS (ZON-74626)

In order to approve a Rezoning application, pursuant to Title 19.16.090(L), the Planning Commission or City Council must affirm the following:

1. The proposal conforms to the General Plan.

The proposed zone change conforms with the existing RNP (Rural Neighborhood Preservation) General Plan land use designation.

Staff Report Page Three
December 19, 2018 - City Council Meeting

2. **The uses which would be allowed on the subject property by approving the rezoning will be compatible with the surrounding land uses and zoning districts.**

The large-lot residential uses allowed with the proposed zone change would be compatible with the existing residential uses in the surrounding area.

3. **Growth and development factors in the community indicate the need for or appropriateness of the rezoning.**

The proposed zone change to R-E (Residence Estates) is appropriate and compatible with the existing development in the community.

4. **Street or highway facilities providing access to the property are or will be adequate in size to meet the requirements of the proposed zoning district.**

The site will be accessed by Grand Canyon Drive, Helena Avenue and Hickam Avenue. The applicant has requested a deferral of off-site improvements. Once dedicated and paved, the streets will be adequate to serve the needs of the proposed zoning district.

FINDINGS (TMP-74627)

The proposed Tentative Map conforms to Nevada Revised Statutes and adheres to all applicable requirements of Title 19 and the Interlocal Agreement; therefore, staff recommends approval, subject to conditions.

BACKGROUND INFORMATION

<i>Related Relevant City Actions by Planning, Fire, Bldg., etc</i>	
02/15/17	The City Council approved a petition to Annex (ANX-67643) 9.92 acres on the northside of Hickam Avenue, approximately 330 feet west of Park Street. Staff recommended approval of the request.
11/13/18	The Planning Commission voted (7-0) to recommends APPROVAL of ZON-74626 and TMP-74627 [prj-74586].

<i>Most Recent Change of Ownership</i>	
09/13/18	A deed was recorded for a change in ownership.

Staff Report Page Four
December 19, 2018 - City Council Meeting

Related Building Permits/Business Licenses

There are no related building permits/business licenses on file associated with the subject site.

Pre-Application Meeting

09/19/18	Staff conducted a pre-application meeting with the applicant where the submittal requirements and deadlines were reviewed for a proposed Rezoning and Tentative Map.
----------	--

Neighborhood Meeting

A Neighborhood meeting was not required, nor was one held.

Field Check

10/04/18	Staff conducted a routine field check and found an undeveloped lot. No issues were noted.
----------	---

Details of Application Request
Site Area

Net Acres	9.92
-----------	------

Surrounding Property	Existing Land Use Per Title 19.12	Planned or Special Land Use Designation	Existing Zoning District
Subject Property	Undeveloped	RNP (Rural Neighborhood Preservation)	U (Undeveloped) [RNP (Rural Neighborhood Preservation) General Plan Designation]
North	Single Family, Detached – Clark County	RNP (Rural Neighborhood Preservation) – Clark County	R-E (Rural Estates Residential) – Clark County
South	Undeveloped	RNP (Rural Neighborhood Preservation) – Clark County	R-E (Rural Estates Residential) – Clark County

Staff Report Page Five
December 19, 2018 - City Council Meeting

<i>Surrounding Property</i>	<i>Existing Land Use Per Title 19.12</i>	<i>Planned or Special Land Use Designation</i>	<i>Existing Zoning District</i>
		DR (Desert Rural Density)	U (Undeveloped)
East	Undeveloped	PF (Public Facilities) – Clark County	R-E (Rural Estates Residential) – Clark County
West	Undeveloped	RNP (Rural Neighborhood Preservation) – Clark County	R-E (Rural Estates Residential) – Clark County

<i>Master and Neighborhood Plan Areas</i>	<i>Compliance</i>
No Applicable Master Plan Area	N/A
<i>Special Area and Overlay Districts</i>	<i>Compliance</i>
No Applicable Special Area or Overlay Districts	N/A
<i>Other Plans or Special Requirements</i>	<i>Compliance</i>
Trails	N/A
Las Vegas Redevelopment Plan Area	N/A
Interlocal Agreement – Area 2	Y
Project of Significant Impact (Development Impact Notification Assessment)	N/A
Project of Regional Significance	N/A

DEVELOPMENT STANDARDS

Pursuant to Title 19.06, the following standards apply:

<i>Standard</i>	<i>Required/Allowed</i>	<i>Provided</i>	<i>Compliance</i>
Min. Lot Size	20,000 SF	31,930 SF	Y
Min. Lot Width	100 Feet	112 Feet	Y

<i>Existing Zoning</i>	<i>Permitted Density</i>	<i>Units Allowed</i>
U (Undeveloped) [RNP (Rural Neighborhood Preservation) General Plan Designation]	1 du/lot	6

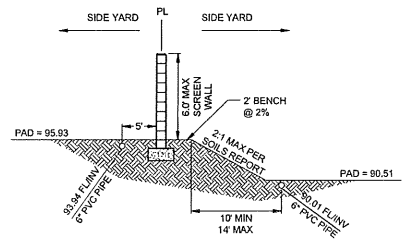
Staff Report Page Six
December 19, 2018 - City Council Meeting

<i>Proposed Zoning</i>	<i>Permitted Density</i>	<i>Units Allowed</i>
R-E (Residence Estates)	1 du/lot	6
<i>General Plan</i>	<i>Permitted Density</i>	<i>Units Allowed</i>
RNP (Rural Neighborhood Preservation)	2 du/ac	19.84

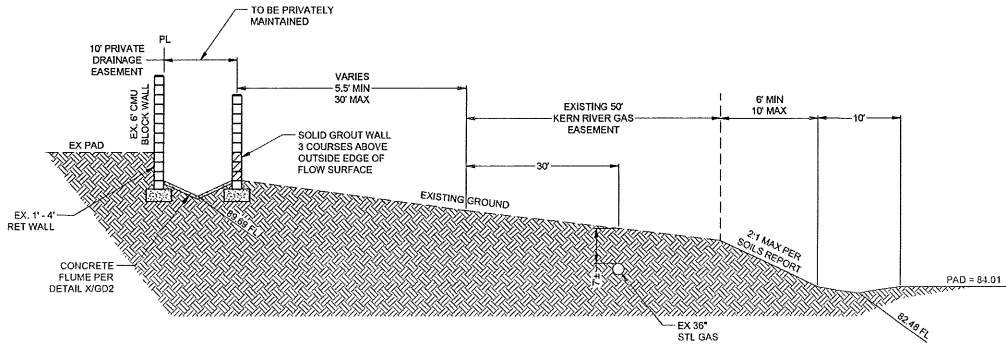
<i>Street Name</i>	<i>Functional Classification of Street(s)</i>	<i>Governing Document</i>	<i>Actual Street Width (Feet)</i>	<i>Compliance with Street Section</i>
Grand Canyon Drive	Major Collector	Master Plan of Streets and Highways Map	N/A	*N/A
Helena Avenue	Local	Title 13	N/A	*N/A
Hickam Avenue	Local	Title 13	N/A	*N/A

*The applicant has requested a Waiver to defer off-site improvements.

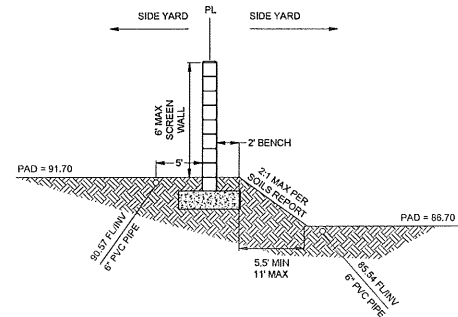
<i>Waivers</i>		
<i>Requirement</i>	<i>Request</i>	<i>Staff Recommendation</i>
Installation of essential off-site improvements as directed by the City.	Deferral of all off-site improvements.	Approval, subject to condition



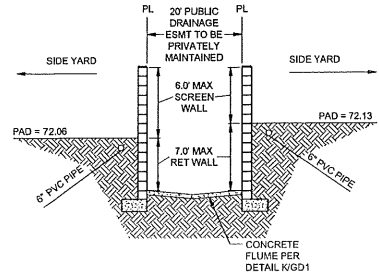
SECTION A
SIDE TO SIDE YARD
NTS



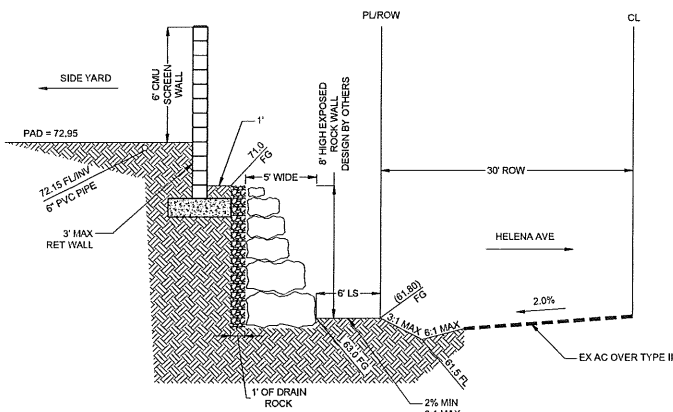
SECTION B
LOT 12 REAR YARD
NTS



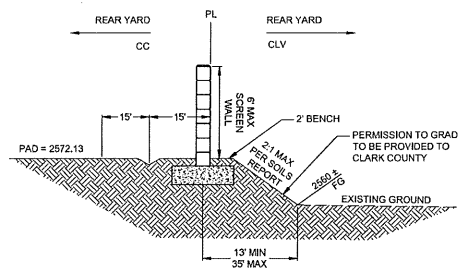
SECTION C
SIDE TO SIDE YARD
NTS



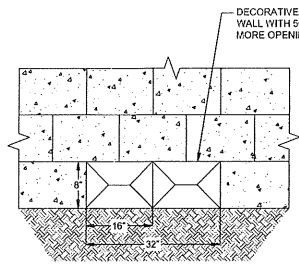
SECTION D
15' DRAINAGE EASEMENT
NTS



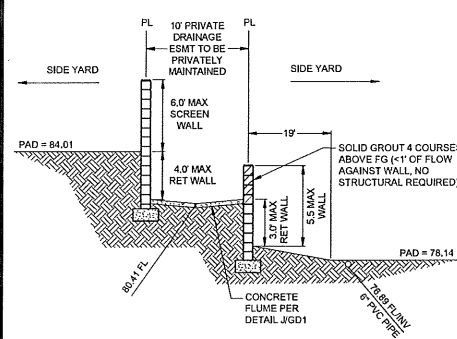
SECTION E
NORTH BOUNDARY
NTS



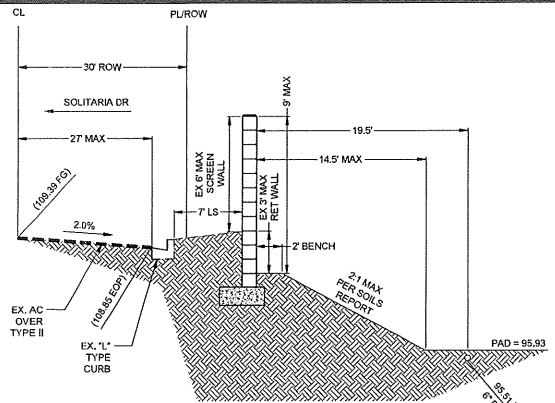
SECTION F
REAR YARD / EAST BOUNDARY LOTS 1-5
NTS



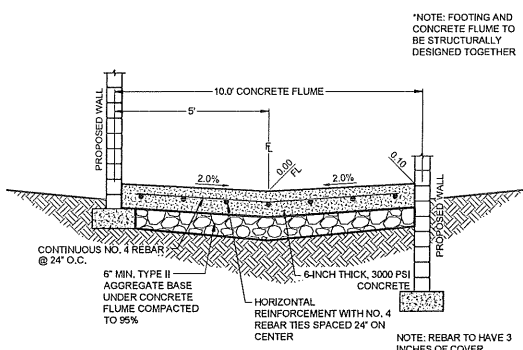
DETAIL G
DECORATIVE BLOCK WALL OPENING
NTS



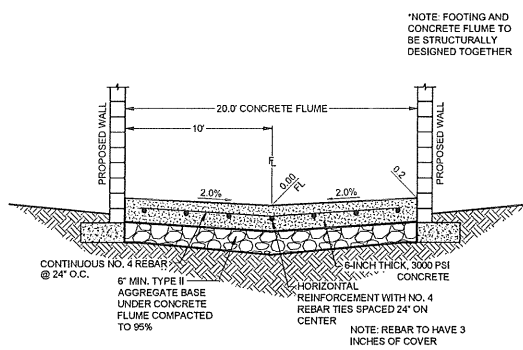
SECTION H
10' DRAINAGE EASEMENT
NTS



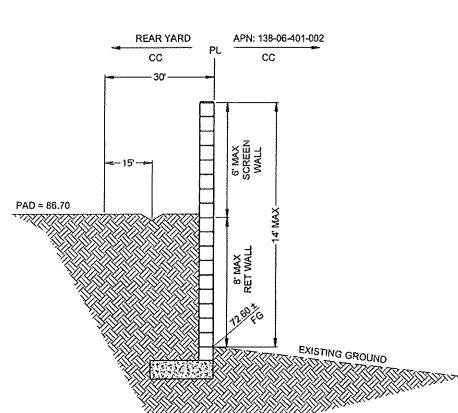
SECTION I
LOT 10 SOUTH BOUNDARY
NTS



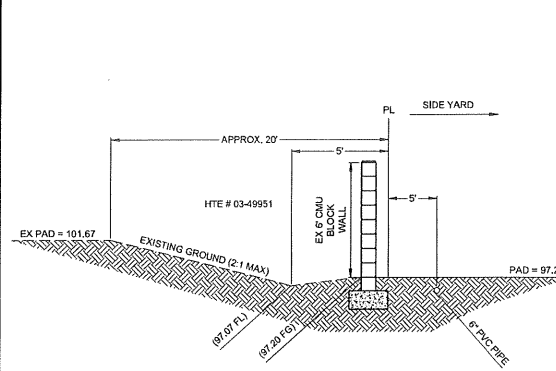
DETAIL J
10.0' CONCRETE FLUME
NTS



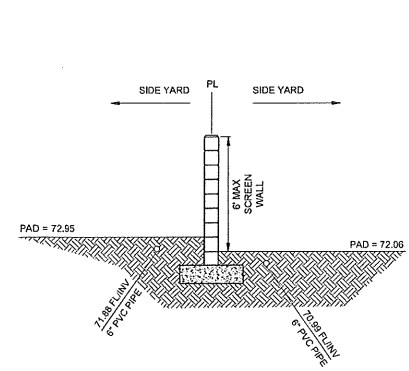
DETAIL K
20.0' CONCRETE FLUME
NTS



SECTION L
REAR YARD / EAST BOUNDARY LOTS 5-9
NTS



SECTION M
LOT 9 SOUTH BOUNDARY
NTS

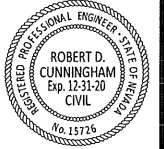


SECTION N
SIDE TO SIDE YARD
NTS

LOVE MOUNTAIN ESTATES LLC
3311 S. RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
(702) 874-4700 FAX: (702) 874-4700



JENSEN & HELENA
SINGLE-FAMILY RESIDENTIAL
GRADING DETAILS



DATE:	1/28/2019
SCALE:	1"=30'
JOB NO:	LMT-18-001
DESIGNED BY:	NB
CHECKED BY:	RC
SHEET NAME:	GD1
SHEET NUMBER:	6 OF 10
CC:	PW-18898

FAST
Call before you Dig
Underground
1-702-432-5300
FREEDAY & ARTISAN
SYSTEM OF TRANSPORTATION

Avoid overhead power
line contact. It's costly.
Call
before you
Overhead
1-702-227-2929

Call before you Dig
Avoid cutting underground
utility lines. It's costly.
CALL
811
OR
1-800-227-2800



APPENDIX F

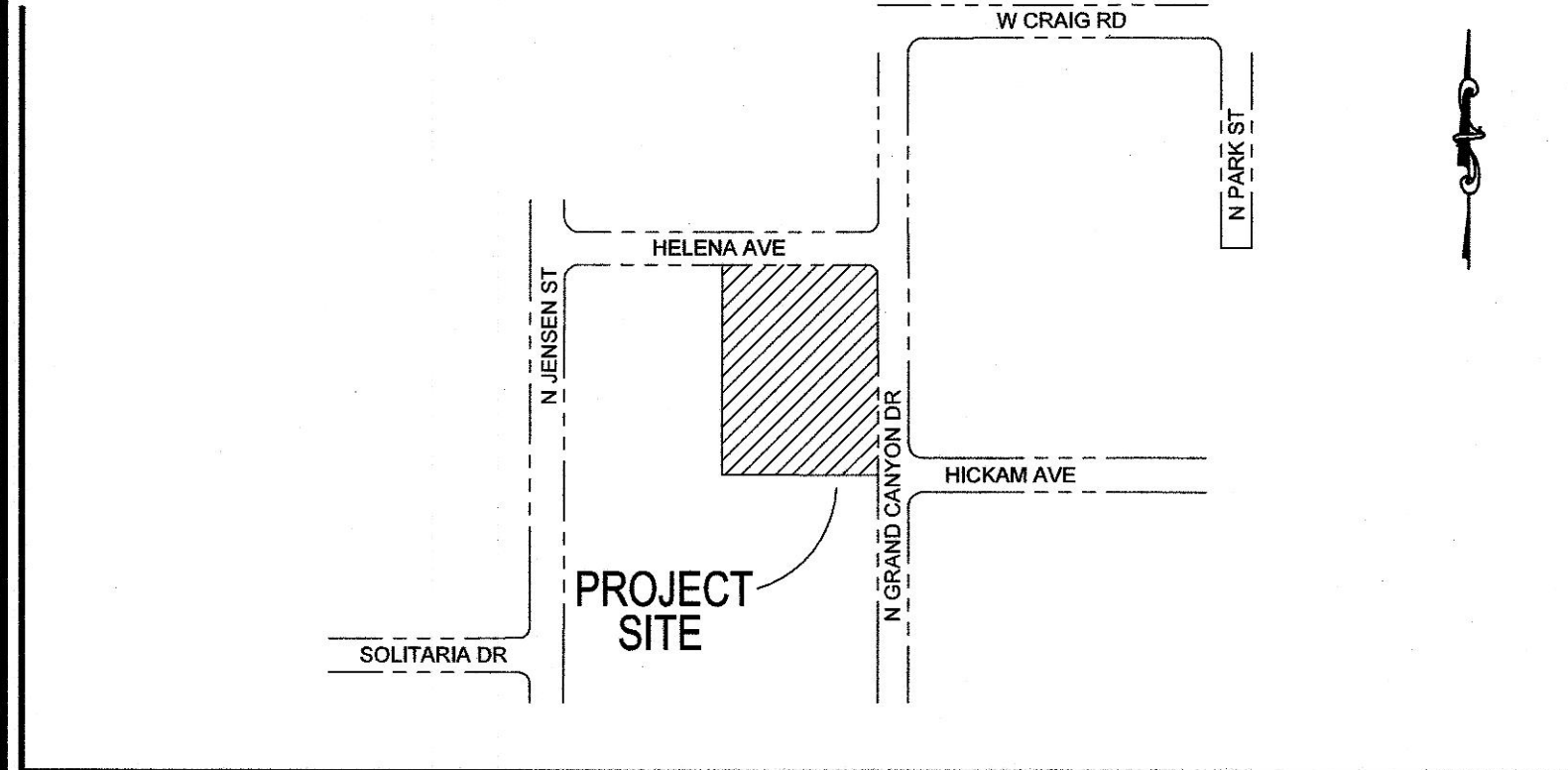
Improvement Plans

IMPROVEMENT PLANS FOR JENSEN & HELENA AREA 4 A RESIDENTIAL SUBDIVISION CITY OF LAS VEGAS, NEVADA A PORTION OF APN 138-06-301-013

ENGINEER
TANEY ENGINEERING
6030 SOUTH JONES BLVD
LAS VEGAS, NV 89118
(702) 362-8844 PHONE (702) 362-5233 FAX

DEVELOPER
LONE MOUNTAIN ESTATES LLC
3311 S RAINBOW BLVD, STE 205
LAS VEGAS, NV 89146
(702) 873-6700 PHONE

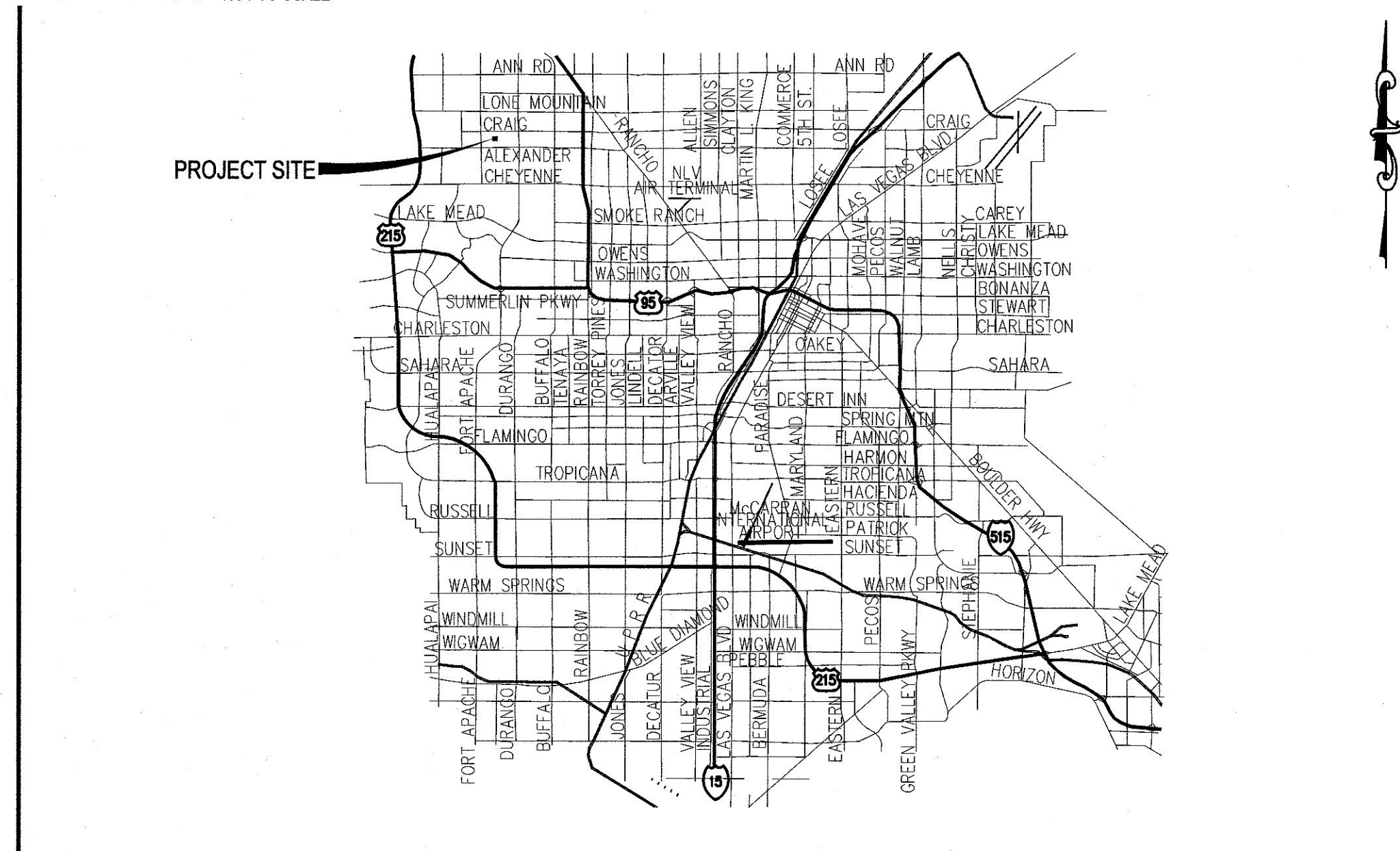
SITE MAP NOT TO SCALE



ABBREVIATIONS

AC ASPHALTIC CONCRETE	FG FINISH GRADE	R RADIUS
AVE AVENUE	FH FIRE HYDRANT	RCB REINFORCED CONCRETE BOX
BC BACK OF CURB	FL FLOW LINE	RCP REINFORCED CONCRETE PIPE
BCR BACK OF CURB RADIUS	FT FEET	ROW RIGHT-OF-WAY
BFE BASE FLOOD ELEVATION	G GRADING	RT RIGHT
BFP BACK FLOW PREVENTOR	GB GRADE BREAK	SD STORM DRAIN
BLM BUREAU OF LAND MANAGEMENT	GFF GARAGE FINISH FLOOR	SHT SHEET
BM BENCHMARK	HP HIGH POINT	SHTL STREETLIGHT
BRPM BLUE RAISED PAVEMENT MARKER	HPG HIGH PRESSURE GAS	SWA SOUTHERN NEVADA WATER AUTHORITY
BVC BEGIN VERTICAL CURVE	INV INVERT	SS SANITARY SEWER
BW BOTTOM OF EXISTING WALL	LF LINEAR FEET	ST STREET
CATV CABLE TELEVISION	LN LINE	STA STATION
CC CLARK COUNTY	LS LANDSCAPE	STD STANDARD
CCFD CLARK COUNTY FIRE DEPARTMENT	LT LEFT	SVZ SIGHT VISIBILITY ZONE
CONRD CLARK COUNTY WATER RECLAMATION DISTRICT	LWWD LAS VEGAS VALLEY WATER DISTRICT	SW SIDEWALK
CL CENTERLINE	MAX MAXIMUM	SY SQUARE YARD
CLSM CONTROLLED LOW STRENGTH MATERIAL	MH MANHOLE	TC TOP OF CURB
CLV CITY OF LAS VEGAS	MIN MINIMUM	TELE TELEPHONE
CMP CORRUGATED METAL PIPE	NO NUMBER	TF TOP OF FOOTING
CMLV CITY OF NORTH LAS VEGAS	NTS NOT TO SCALE	T.O.P. TOP OF PIPE
CO CLEAN OUT, SEWER	OC ON CENTER	TR TOP OF RETAINING
COH CITY OF HENDERSON	PB PULL BOX	TW TOP OF WALL
CY CUBIC YARD	PC POINT OF CURVE	TYP TYPICAL
CDNCS DESIGN AND CONSTRUCTION STANDARDS FOR	PCC POINT OF COMPOUND CURVE	UDCS UNIFORM DESIGN AND CONSTRUCTION
WASTE WATER COLLECTION SYSTEMS	PE POLYETHYLENE	STD STANDARDS
CL CENTERLINE	PI POINT OF INTERSECTION	UT UTILITY
DI DROP INLET	PL PROPERTY LINE	USD UNIFORM STANDARD DRAWING
DIP DUCTILE IRON PIPE	PLT PLATE	VC VERTICAL CURVE
DR DRIVE	POC POINT OF CONNECTION	VCP VITRIFIED CLAY PIPE
EC END OF CURVE	PP POWER POLE	VG VALLEY GUTTER
EG EXISTING GRADE	P&P PLAN AND PROFILE	W WATER
ELEC ELECTRICAL	PRC POINT OF REVERSE CURVE	ZC ZERO LIP CURB
EP EDGE OF PAVEMENT	PROJ PROJECT	
EVC END VERTICAL CURVE	PRV PRESSURE REDUCING VALVE	
EX EXISTING	PT POINT OF TANGENCY	
FF FINISH FLOOR ELEVATION	PVC POLYVINYL CHLORIDE	

VICINITY MAP

 NOT TO SCALE

SUBDIVISION INFORMATION

ACRES: 4.95 AC
AREA DISTURBED: 4.95 AC
LOTS: 5
LOT SIZE: 20,000 SF MIN.
ZONING: R-E
FMP: XX
TMP: 74627

SETBACKS:
FRONT: 50 FT (PUBLIC) 30 FT (PRIVATE)
REAR: 35 FT
SIDE: 10 FT
CORNER: 15 FT

UTILITY DISCLAIMER

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

BASIS OF BEARING

NORTH 00°54'51" EAST, BEING THE BEARING OF EAST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 6, TOWNSHIP 20 SOUTH, RANGE 60 EAST M.D.B. & M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN IN FILE 101, PAGE 86 OF SURVEYS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK - MONUMENT ID NUMBER SLV007M4
RIVET & PLATE IN TOP OF CURB AT SE CORNER OF ALEXANDER & GRAND CANYON
ELEVATION 792.842 METERS / 2601.18 FEET (NAVE88)

LEGAL DESCRIPTION

EAST HALF (E 1/2) OF THE SOUTHWEST QUARTER (SE 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 6, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

SAID PARCEL CONTAINS 4.95 ACRES, MORE OR LESS.

Avoid overhead power line contact. It's costly.
Call before you Overhead
1-702-227-2929

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

LEGEND

	EXISTING	PROPOSED
PROJECT BOUNDARY	---	---
RIGHT-OF-WAY	---	---
CENTERLINE	---	---
PROPERTY LINE	---	---
EDGE OF PAVEMENT	---	---
SIDEWALK	---	---
CURB AND GUTTER	---	---
FENCE	---	---
CONTOUR (1' INTERVAL)	---	---
CONTOUR (5' INTERVAL)	---	---
DIRECTION OF FLOW	---	---
CUT LINE-ASPHALT	---	---
SCARP (SLOPE VARIES)	---	---
DESIGN ELEVATION	(10.00)	10.00
FUTURE ELEVATION		[10.00]
NUMBER OF RETAINING COURSES		10
RETAINING WALL	---	---
CMU WALL	---	---
SOLID GROUTED WALL - NO RETAINING	---	---
CUT-OFF WALL	---	---
POWER POLE	---	---
SIDEWALK RAMP	---	---
CURB DROP INLET	---	---
STORM DRAIN W/ MANHOLE	---	---
CUT-FILL LINE	---	---
SIGHT VISIBILITY ZONE	---	---
CAP & 2" BLOW OFF VALVE	---	---
WATERLINE FITTINGS	---	---
GATE VALVE	---	---
FIRE HYDRANT	---	---
SEWER LINE W/ MANHOLE	---	---
SEWER LATERAL	---	---
WATER LINE	---	---
WATER LATERAL W/ METER	---	---
PRESSURE REDUCING VALVE	---	---
BACKWATER VALVE	---	---
200A SERVICE PEDESTAL	---	---
STREET LIGHT CONDUIT	---	---
F.A.S.T. CONDUIT	---	---
TRAFFIC SIGN	---	---
STOP SIGN W/ STREET NAME SIGN	---	---
100W HPS LUMINAIRE W/ 1 GA. POLE	---	---
250W HPS LUMINAIRE W/ 1 GA. POLE	---	---
400W HPS LUMINAIRE W/ 1 GA. POLE	---	---

APPROVAL SIGNATURES

APPROVED FOR CONSTRUCTION

COX COMMUNICATIONS LAS VEGAS, INC. DATE

SOUTHWEST GAS CORPORATION DATE

CENTRAL TELEPHONE COMPANY dba CENTURYLINK DATE
THE AFFIXED CENTURYLINK 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 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 CONFLICT WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

LAS VEGAS FIRE AND RESCUE DATE

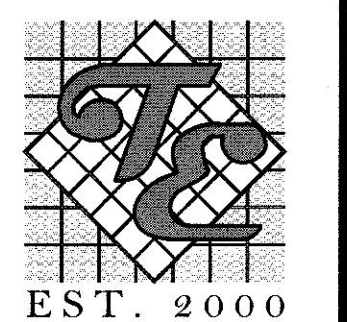
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES DATE
FIRST APPROVED DATE: PROJECT# 1220XX
LWVWD APPROVED FIRE FLOW: 1500 GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW N/A GPM
SHEETS:

CITY ENGINEER - ALLEN PAVELKA, PE #8029 DATE
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARD IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.

CITY OF LAS VEGAS, PLANNING DEPARTMENT DATE
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

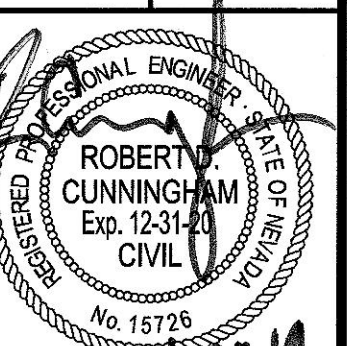
LONE MOUNTAIN ESTATES LLC
3311 S RAINBOW BLVD STE 205
LAS VEGAS, NV 89146
(702) 873-6700 FAX

TANEY ENGINEERING
8830 S. JONES BOULEVARD
LAS VEGAS, NV 89118
(702) 362-8844 FAX (702) 362-5233



N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL

COVER SHEET



DATE: 1/29/2019

SCALE: 1"=30'

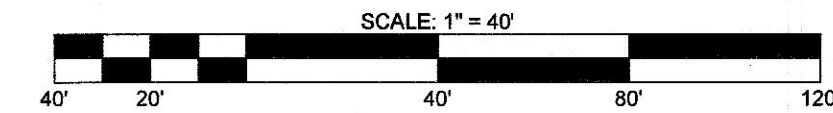
JOB NO: LMT-18-001

DESIGNED BY: NB CHECKED BY: RC

SHEET NAME: C1

SHEET NUMBER: 1 OF 7

CLV 000000



- 1 15" CONCRETE FLUME (DETAIL F/GD1)
- 2 DRIVEWAY "4" CONCRETE OVER 6" TYPE II (SECTION B/GD1)
- 3 INSTALL REMOVABLE LOCKING BOLLARDS (DETAIL C/GD1)
- 4 INSTALL ROCK RETAINING WALL (SECTION H/GD1)
- 5 INSTALL RETAINING WALL (SECTION A/GD1)
- 6 INSTALL 5'X5' JENSEN PRECAST DROP INLET & CONCRETE APRON (SEE GD2)
- 7 RIPRAP PAD (18" THICKNESS, D50 = 9")
- 8 INSTALL RCP END SECTION (SEE GD1)

GEOTEK RESIDENTIAL, LLC
6835 SOUTH ESCONDIDO STREET, SUITE B
LAS VEGAS, NV 89119
(702) 897-1424

REPORT NO: 14434-LVR
DATE: 11/01/18

TOTAL FOR OVERALL DEVELOPMENT: 4,269 CY CUT / 5,548 CY FILL / 1,279 CY NET

NOTE: THIS OPINION OF THE CUT AND FILL QUANTITIES IS PROVIDED AS REQUIRED BY THE GOVERNING ENTITY. THIS INFORMATION SHOULD NOT BE USED FOR BIDDING PURPOSES. ALL CONTRACTORS ARE RESPONSIBLE FOR THEIR OWN QUANTITIES. THESE TOTALS ARE RAW AND DO NOT ACCOUNT FOR SHRINKAGE AND SUBSIDENCE.

THIS PROJECT IS LOCATED IN FLOOD ZONE "X", AN AREA DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD PLAIN PER FIRM PANEL 32003C2135F, REVISED NOVEMBER 16, 2011.

UTILITY DISCLAIMER

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

COMPLETION OF SECTION II OF DRAINAGE COMPLIANCE REPORT REQUIRED FOR LOTS:

ADD 2500 FEET TO ALL GRADE TAGS TO GET ACTUAL ELEVATION.

THE ELEVATION DIFFERENCE BETWEEN THE PAD AND FINISH FLOOR IS DETERMINED FROM THE MINIMUM THICKNESS REQUIRED PER THE GEOTECHNICAL REPORT. FINISH FLOORS MAY INCREASE DEPENDING ON THE TYPE OF SOIL AND FOUNDATION PLAN USED. NOTE THAT THE STRUCTURAL PLANS & GEOTECHNICAL REPORT SHALL SUPERSEDE THE CIVIL IMPROVEMENT PLANS.

ALL PRIVATE STREETS AND DRAINAGE EASEMENTS ARE TO BE PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION (H.O.A.).

ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENTS HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO THE GOVERNING ENTITY.

CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL LOCATION OF EXISTING UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

[illegible]

CITY OF LAS VEGAS BENCHMARK - MONUMENT ID NUMBER 9LV007N4
RIVET & PLATE IN TOP OF CURB AT SE CORNER OF ALEXANDER & GRAND CANYON
ELEVATION 792.842 METERS / 2601.18 FEET (NAVE88)

I CERTIFY THIS GRADING PLAN COMPLIES WITH THE APPROVED DRAINAGE STUDY. HTE#

I CERTIFY THIS SUBMITTAL COMPLIES WITH THE APPROVED DRAINAGE STUDY, FILE# XX-XXXX, ON FILE WITH CLARK COUNTY FOR THIS PROJECT.

9 | ROBERT D. CUNNINGHAM, PE DATE

ACCEPTANCE OF PLANS

1000

SOUTHWEST GAS CORPORATION DATE _____

ACCEPTANCE OF PLANS FOR FILING

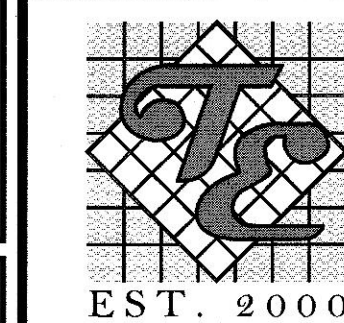
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BY: _____
DEVELOPMENT AND FLOOD CONTROL _____ DATE _____

LONE MOUNTAIN ESTATES LLC

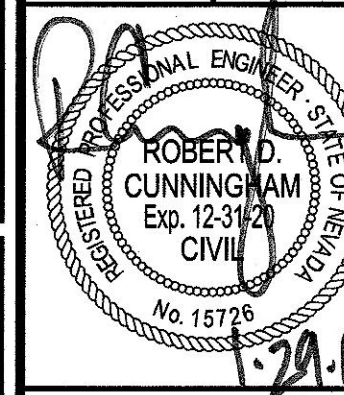
MOUNTAIN ESTATE
3311 S. RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
702/873-6700 FAX:

107



**N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL**

**N JENSEN ST & I
SINGLE-FAMILY
GRADING PLAN**



DATE: 1/29/2019

SCALE: 1"=40'

JOB NO.

FORM NO.	LMT-18-001
REV.	

DESIGNED BY: NB	CHECKED BY: RC
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SHEET NAME: **C1**

G1

SHEET NUMBER: **27**

3 OF 7

Downloaded from <http://ajph.org/> at University of California, San Diego on June 11, 2015

CLV	0000000
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10

FILE NAME: S:\ACTIVE\ONE MOUNTAIN ESTATES LLC\MT-18-001 - JENSEN & HELENA\ENG\IPS\DWGS\SHEET DWGS\AREA 4\1\MT001_SHT_G_A4.DWG

Avoid overhead power line contact. It's costly.

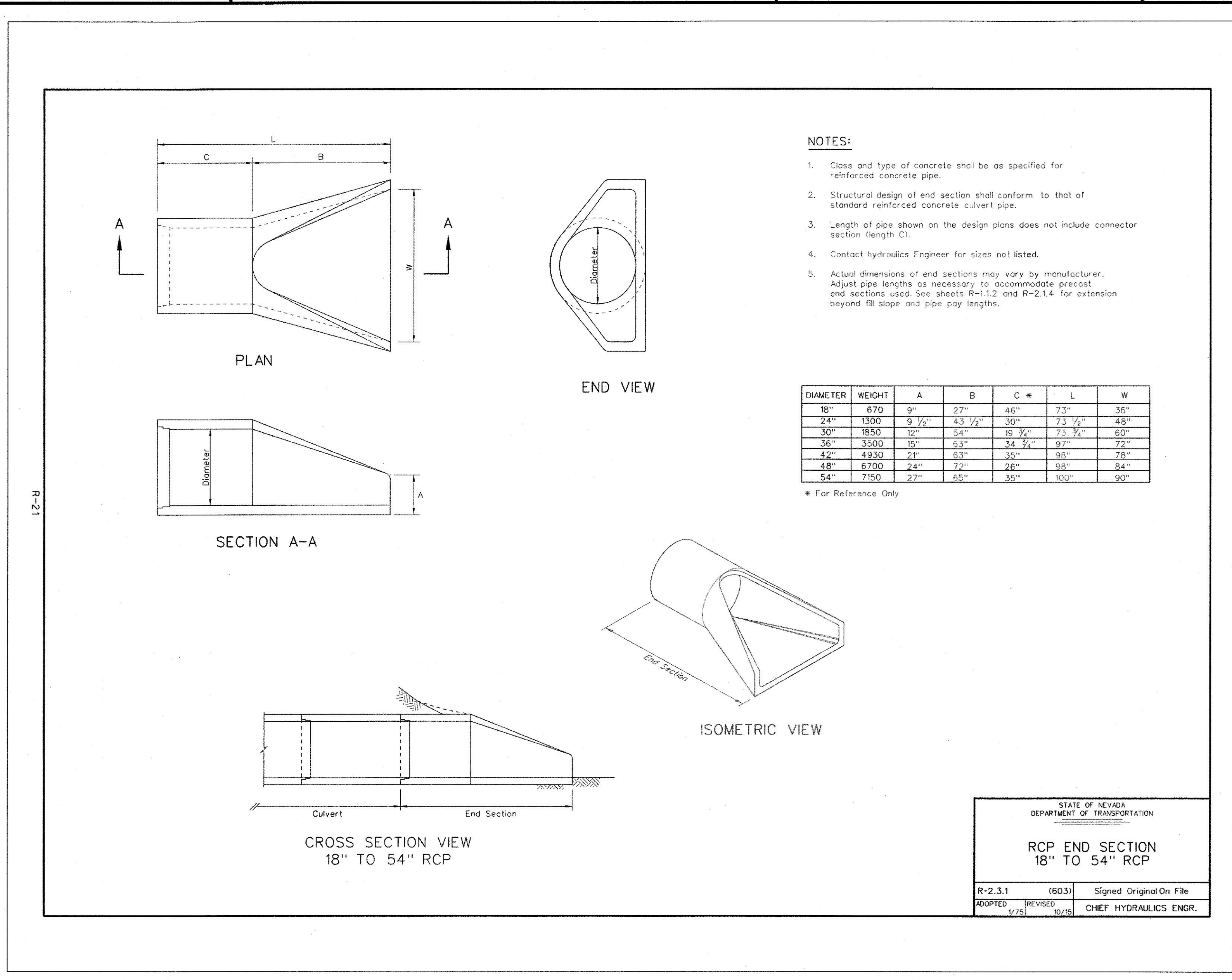
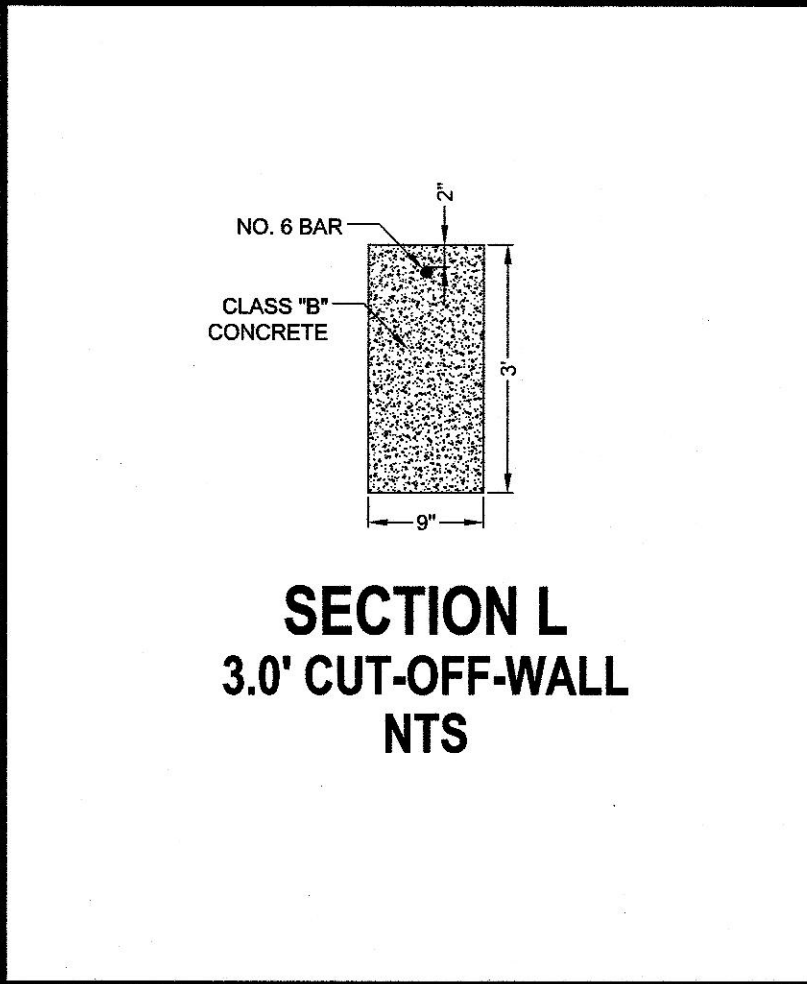
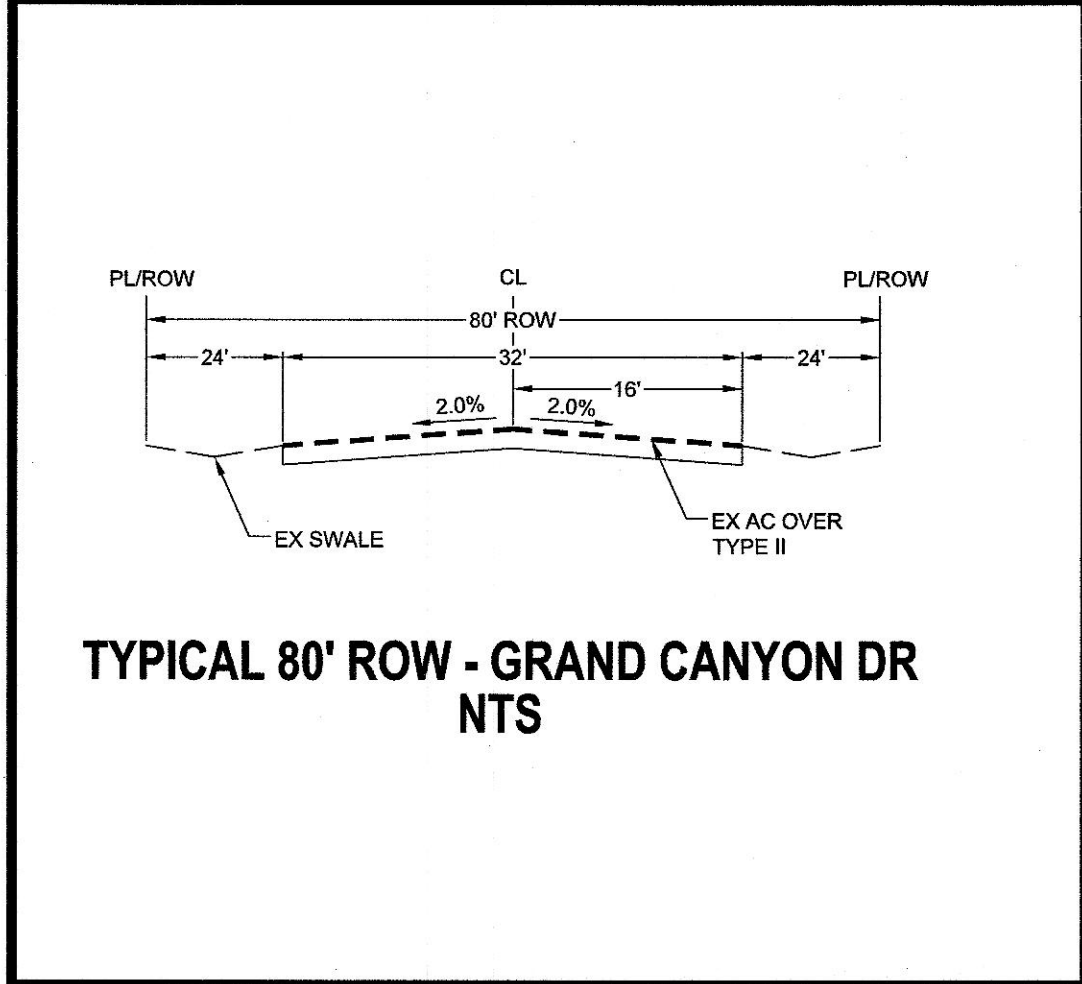
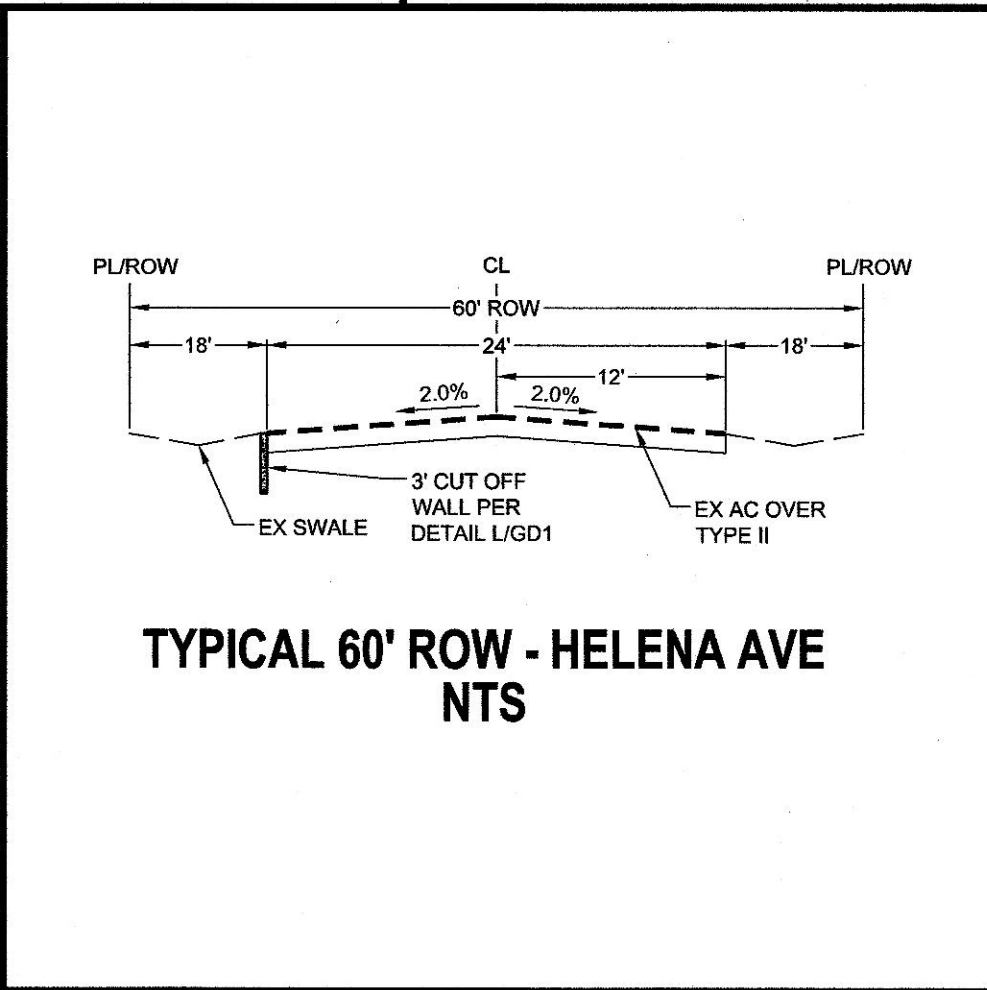
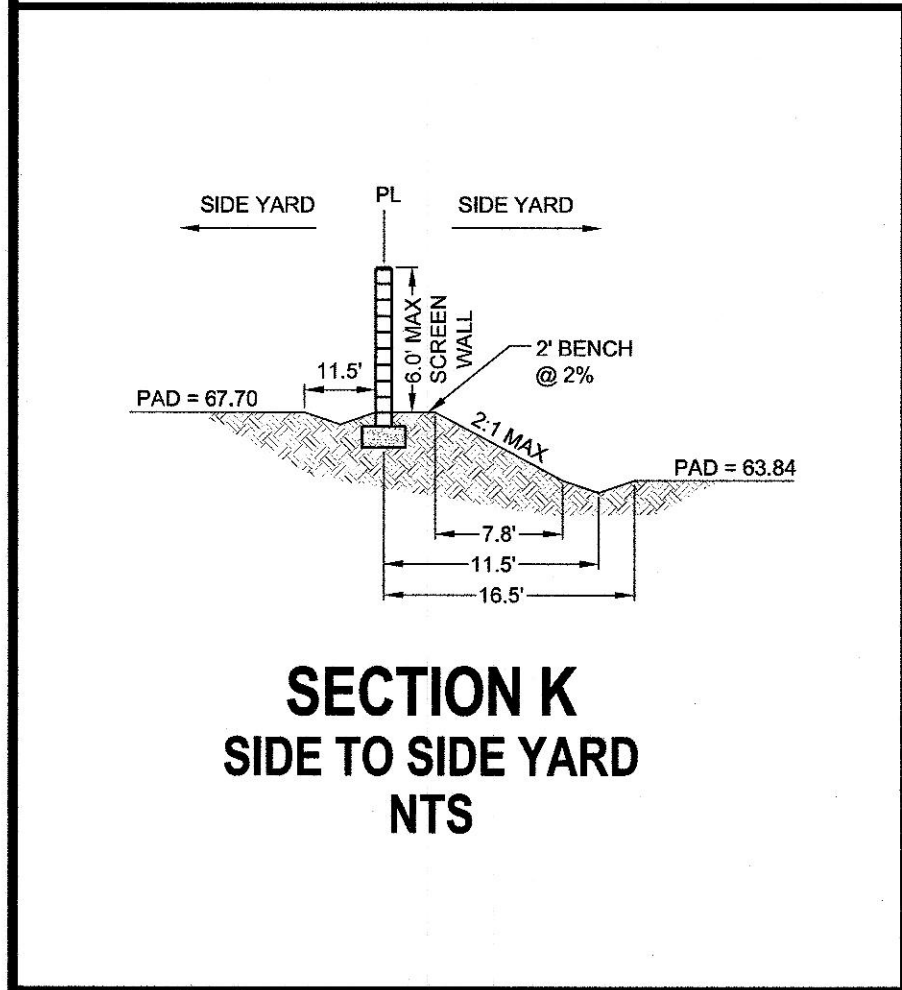
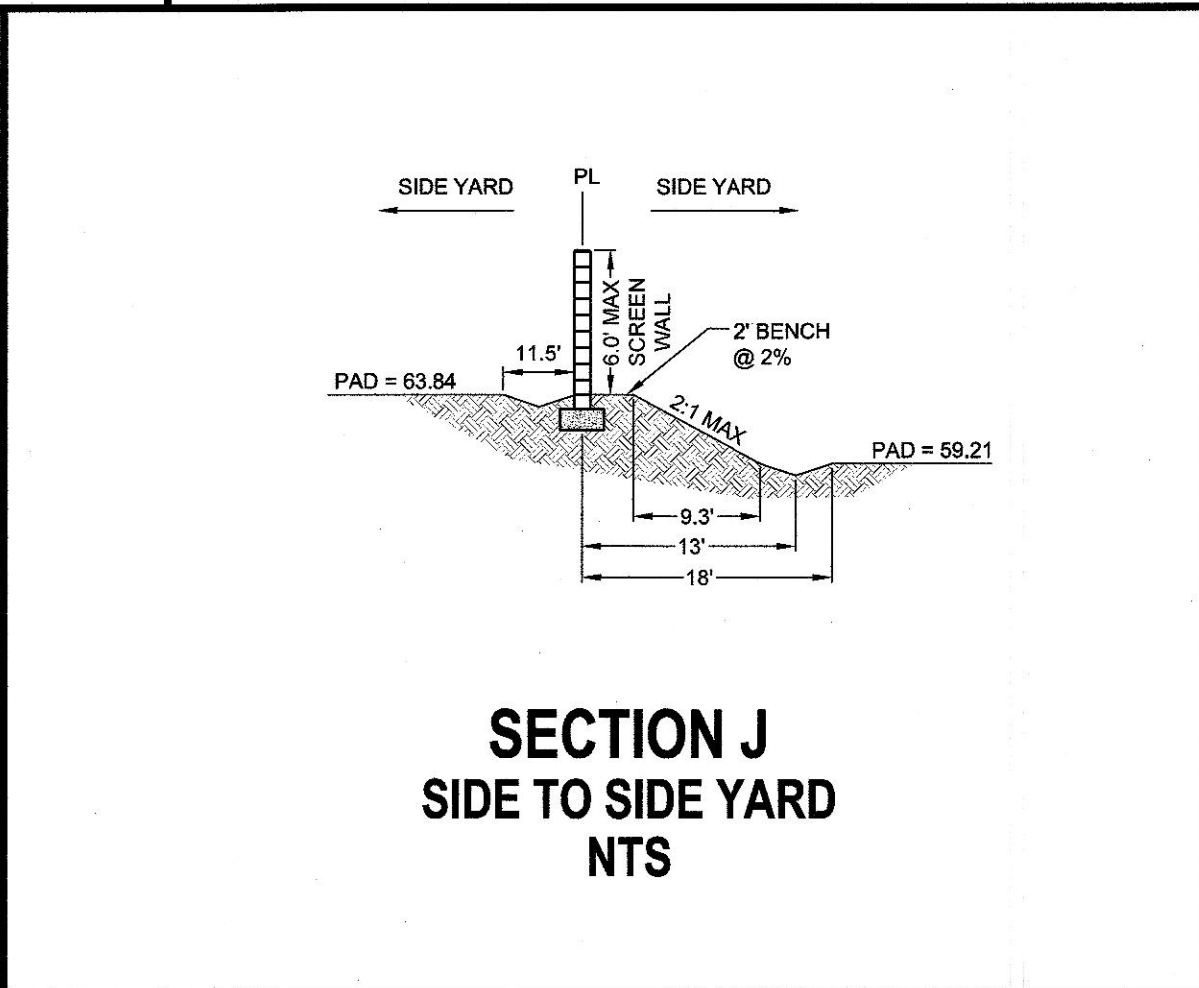
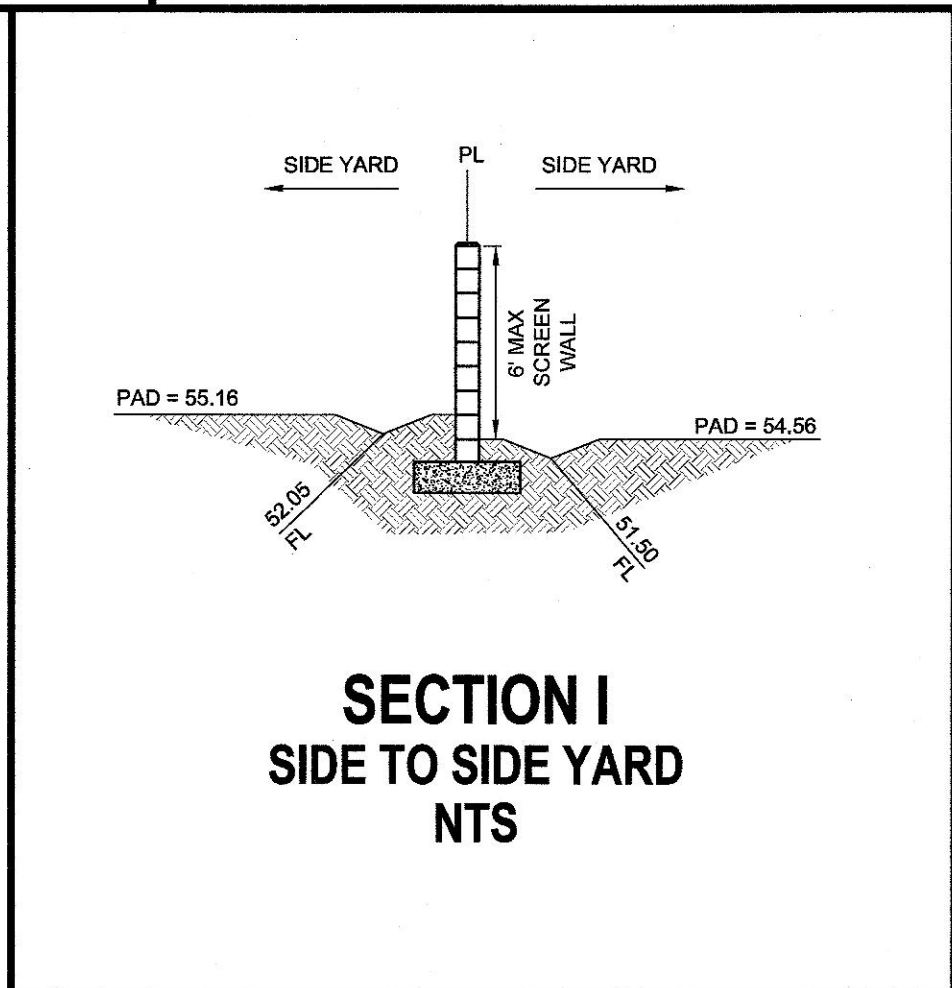
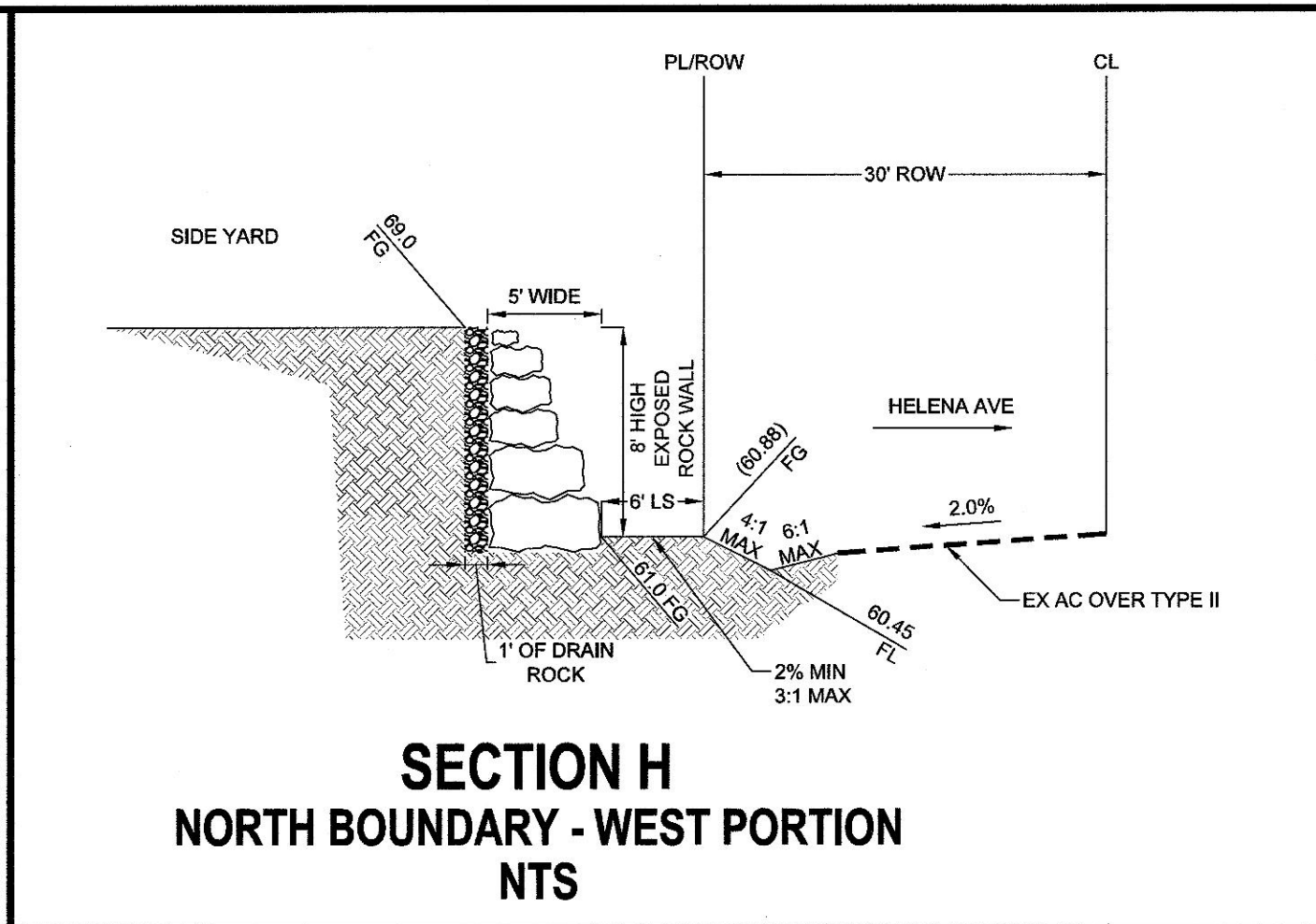
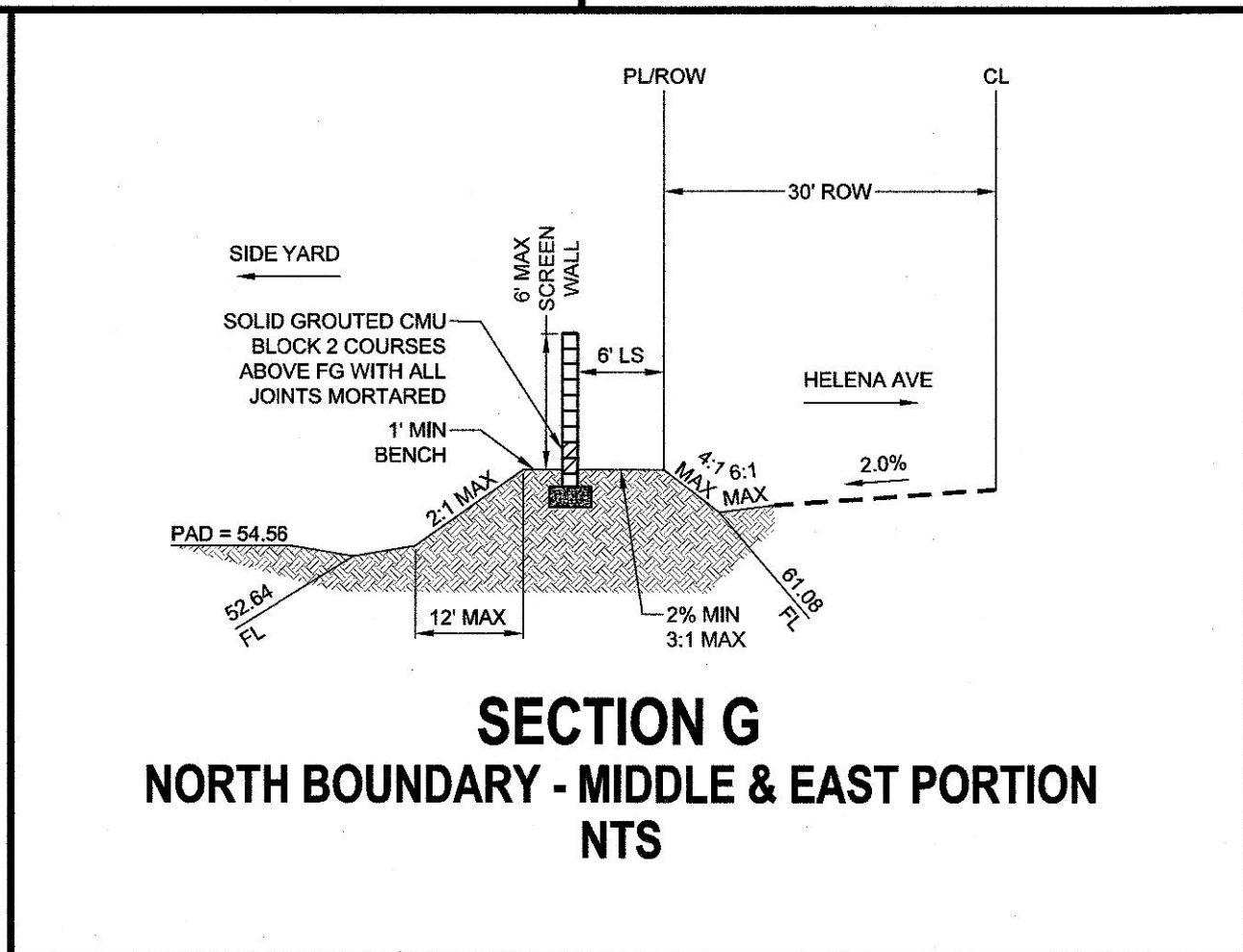
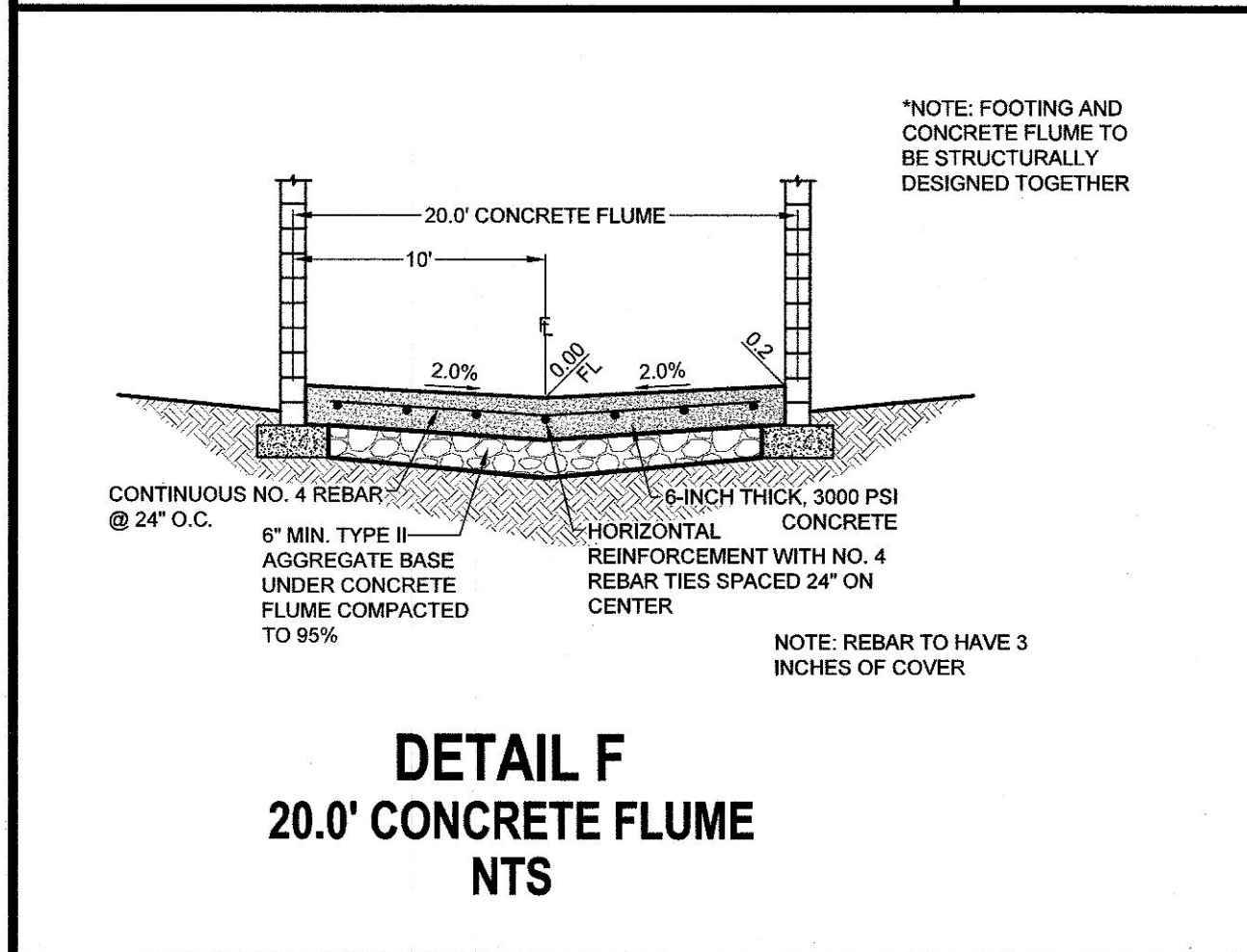
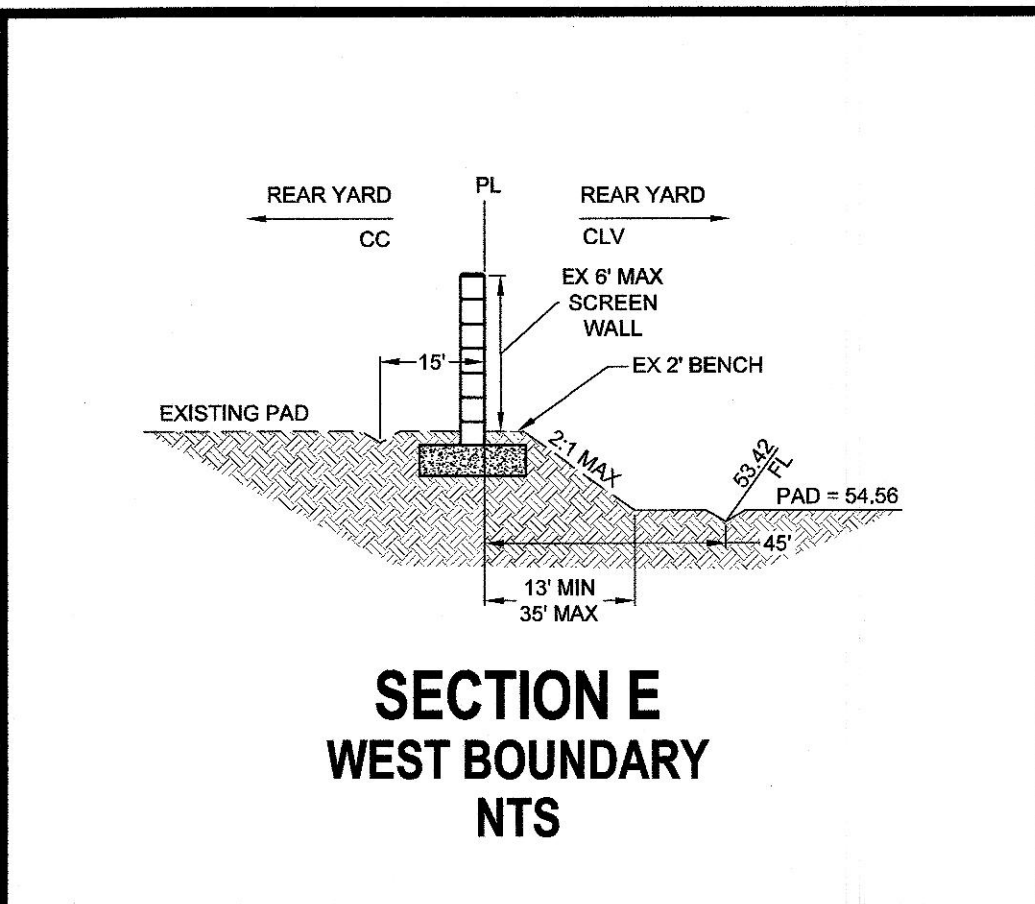
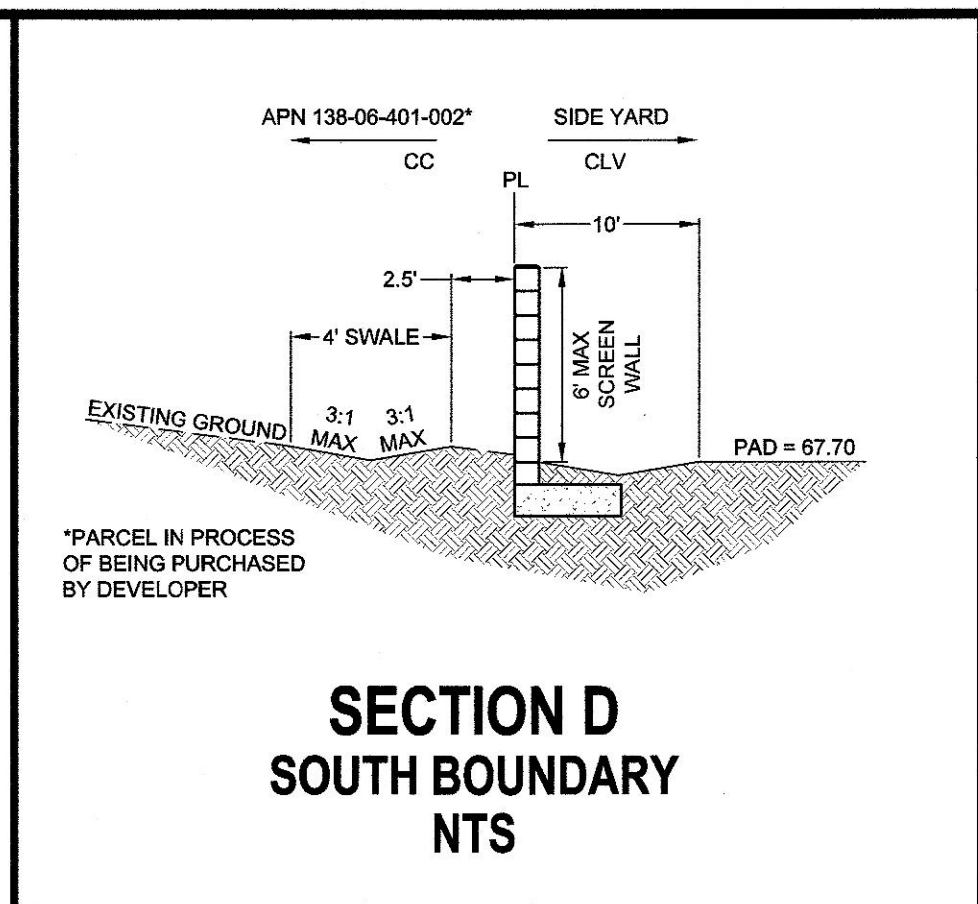
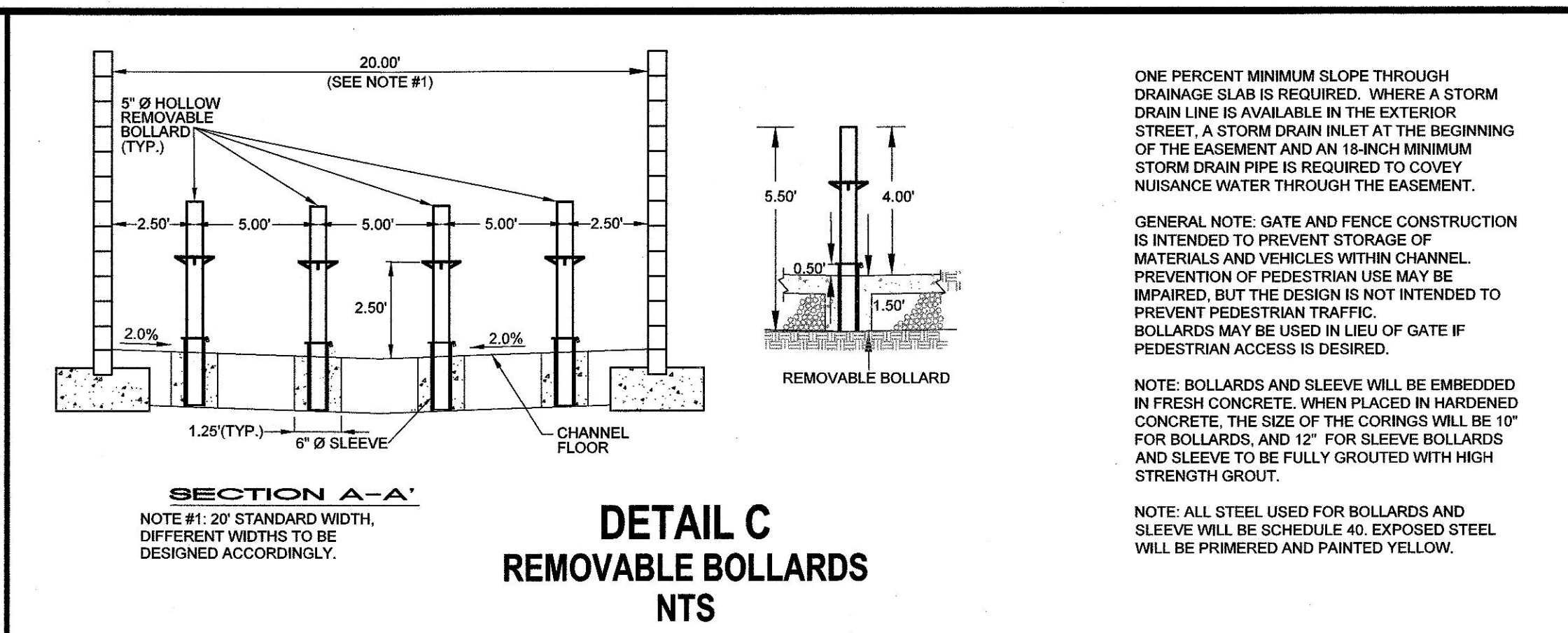
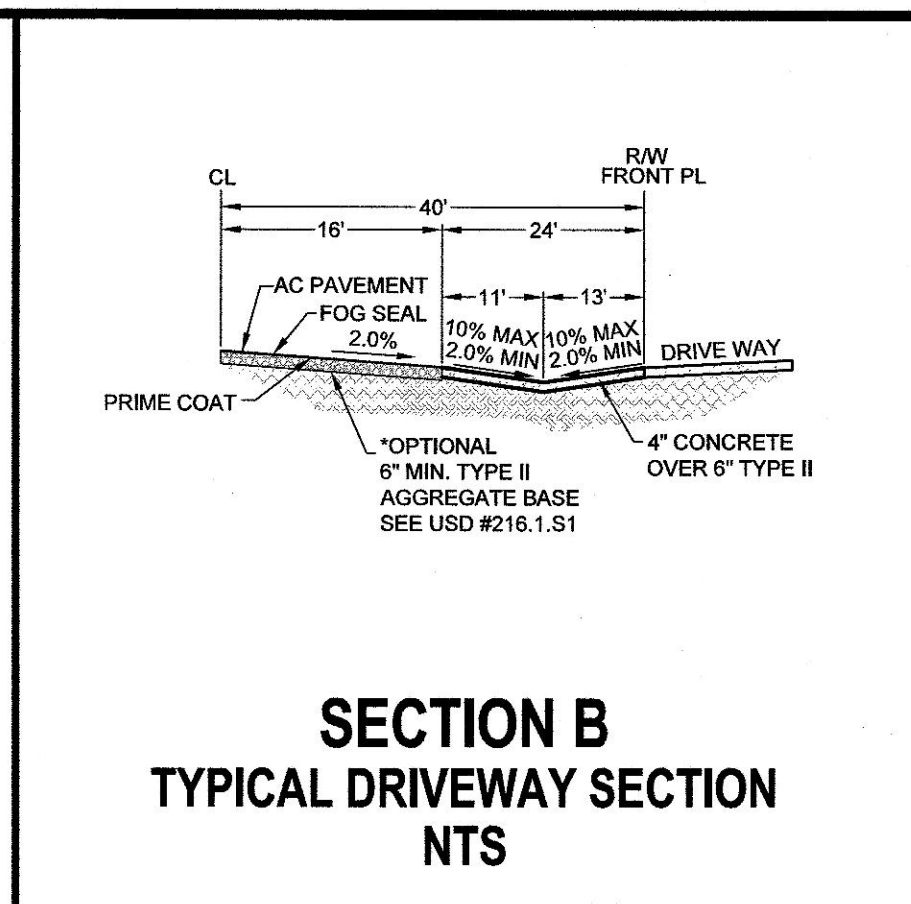
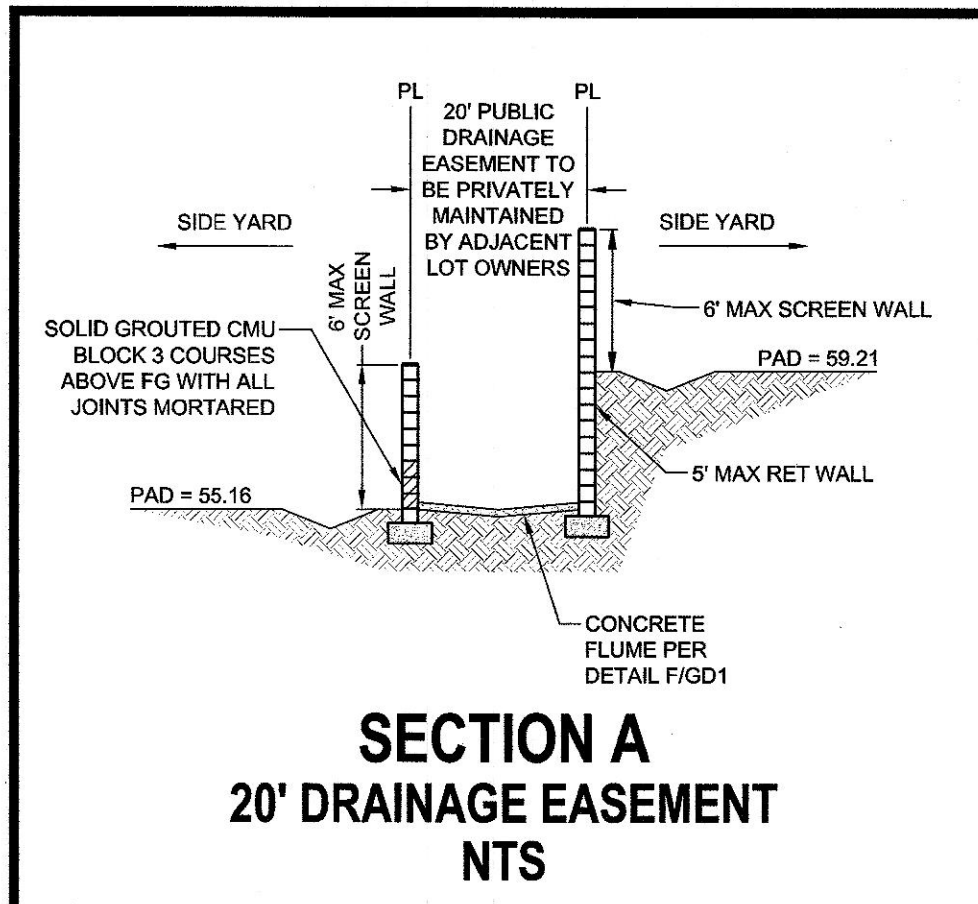
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Overhead
1-702-227-2929

Call before you Dig.
Avoid cutting underground
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811

OR
1-800-227-2600

FILE NAME: S:\ACTIVELONE MOUNTAIN ESTATES\18-001 - JENSEN & HELENA\DWGS\DWG\SSHEET\DWG\AREA 4\MTD01_SHT_CD_4.DWG



LONE MOUNTAIN ESTATES LLC
3311 S. RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
(702) 872-5700 FAX:
TANEY & ENGINEERING
6800 S. JENSEN AVE
(702) 362-2844 FAX: (702) 362-5233

EST. 2000

N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL

GRADING DETAILS

DATE: 1/29/2019
SCALE: 1"=40'
JOB NO: LMT-18-001
DESIGNED BY: NB CHECKED BY: RC
SHEET NAME: GD1
SHEET NUMBER: 4 OF 7
CLV 0000000

DROP INLETS
12"x12" TO 60"x60"
(NOMINAL INSIDE DIMENSIONS)

GALVANIZED STEEL GRATE AND COVER OPTIONS AVAILABLE IN PEDESTRIAN AND TRAFFIC LOAD RATINGS.

OPTIONAL GRATE LOCKING DEVICE AVAILABLE ON REQUEST

GALVANIZED STEEL CAST IN FRAME SHOWN. LOOSE FRAME DESIGNS ALSO AVAILABLE

OPTIONAL RISER SECTIONS AVAILABLE TO MATCH GRADE VARIATIONS

6"

CUSTOM PIPE OPENINGS OR THINWALL KNOCKOUTS AVAILABLE

The diagram illustrates a drop inlet assembly. At the top, a square grate with a grid pattern is shown, labeled 'A'. Below it, a rectangular frame is shown, labeled 'B'. The frame is made of galvanized steel cast in place. A riser section is shown on the side, labeled 'C'. A custom pipe opening or thinwall knockout is shown at the bottom, labeled '6"'. The diagram also shows optional riser sections and a grate locking device.

FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT JENSEN PRECAST.

Junco Precast reserves the right to make changes to product design and/or dimensions without notice. Please contact Junco Precast whenever necessary for confirmations or advice on product design.

[illegible]

GENERAL NOTES:

1. CONCRETE SHALL BE CLASS A (3,000 PSI) OR AA (4,000 PSI).

STATION & OFFSET

3'

6"

8"

SLOPE TO MATCH GRADING

6"

6"

8"

6"

DRAINAGE STRUCTURE AS SPECIFIED ON PLANS

DROP INLET AS SPECIFIED ON PLANS
SEE DROP INLET DETAILS

SECTION A-A

DROP INLET
CONCRETE APRON

Diagram illustrating a cross-section of a 20' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY ADJACENT LOT OWNERS. The easement is flanked by SIDE YARD areas. The structure consists of a 2' MAX RET WALL and a CONCRETE FLUME PER DETAIL F/GS1. The ground level on the left is PAD = 55.16, and on the right is PAD = 59.21. The structure is supported by SOLID GROUTED CMU BLOCK 3 COURSES ABOVE FG WITH ALL JOINTS MORTARED. The height of the structure is 1.75' MAX RET WALL.

[illegible]

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



GRADING DETAILS 2



SCALE: 1"=40'

JOB NO: LMT-18-001

DESIGNED BY:	CHECKED BY:
NR	RC

NO	RC
SHEET NAME:	

GD2

SHEET NUMBER:
5 OF 7

CLV	0000000
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utility lines. it's costly.

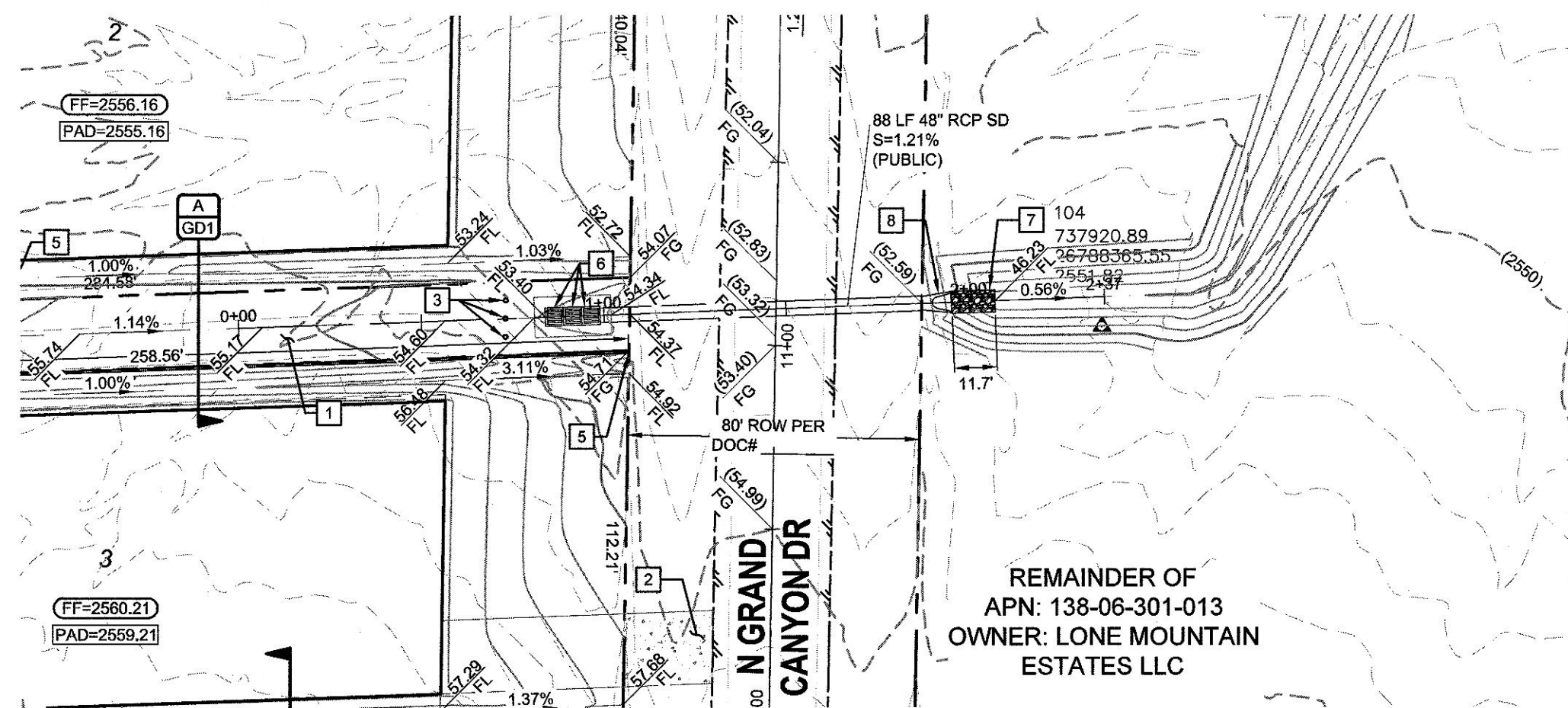
CALL

811

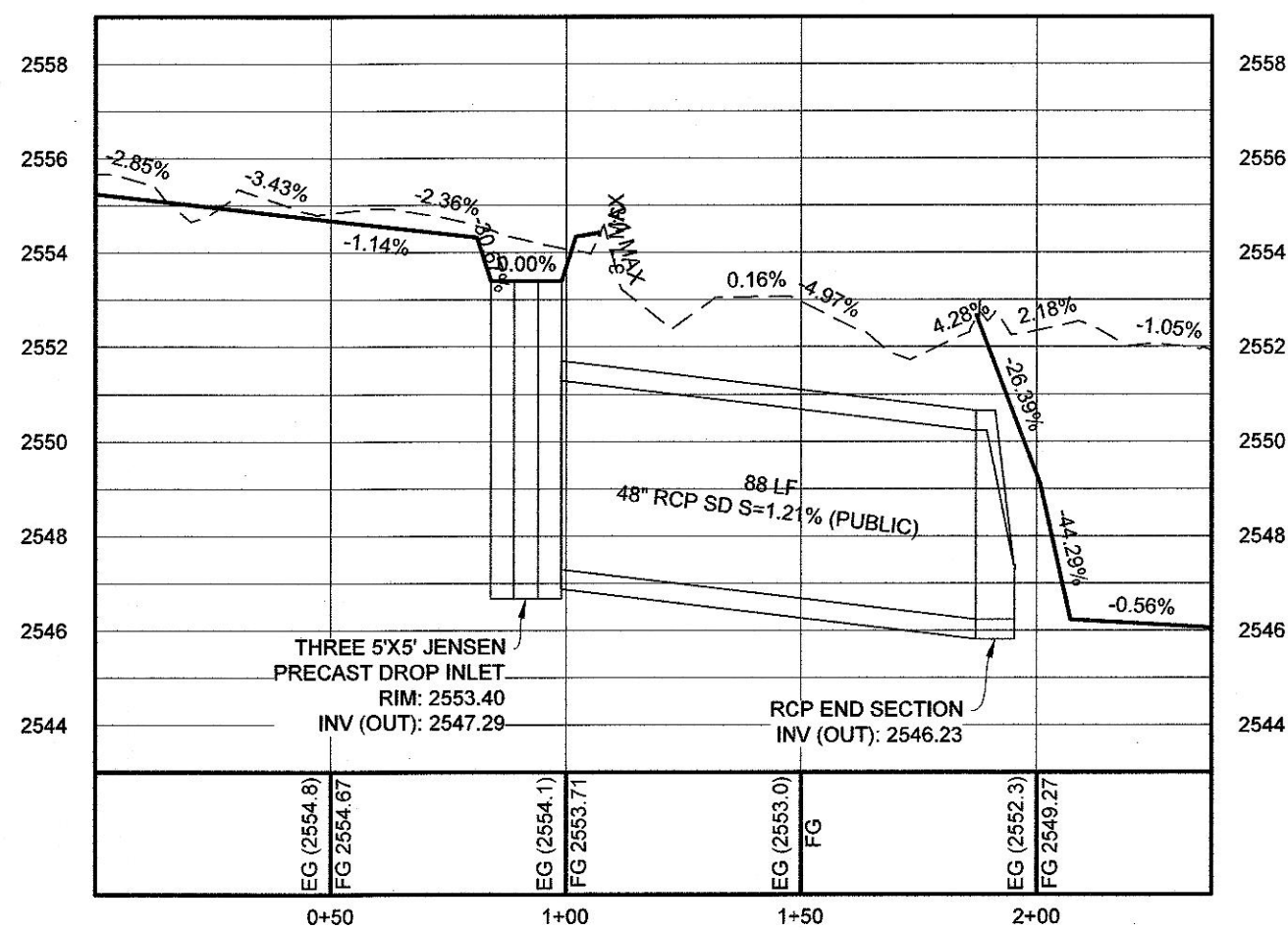
OR

1-800-227-2600

FILE NAME: S:\ACT\VELONE MOUNTAIN ESTATES LLC\18-001 - JENSEN & HELENA\ENGR\DWG\SSSHEET\DWG\AREA 4\LMT001_SHT_PP_A4.DWG



48-INCH RCP STORM DRAIN (PUBLIC) - PLAN
STA: 0+00.00 TO 2+37.00



48-INCH RCP STORM DRAIN (PUBLIC) - PROFILE
STA: 0+00.00 TO 2+37.00
SCALE: 1"=40' HORIZONTAL; 1"=4' VERTICAL

GRADING CONSTRUCTION NOTES

- 15' CONCRETE FLUME (DETAIL F/GD1)
- DRIVEWAY 4" CONCRETE OVER 6" TYPE II (SECTION B/GD1)
- INSTALL REMOVABLE LOCKING BOLLARDS (SECTION C/GD1)
- INSTALL ROCK RETAINING WALL (SECTION H/GD1)
- INSTALL RETAINING WALL (SECTION A/GD1)
- INSTALL 5'X5' JENSEN PRECAST DROP INLET & CONCRETE APRON (SEE GD2)
- RIPRAP PAD (18" THICKNESS, D50 = 9")
- INSTALL RCP END SECTION (SEE GD1)

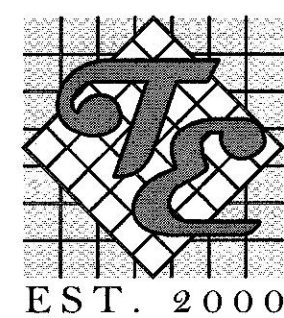
SCALE: 1" = 40'

LONE MOUNTAIN ESTATES LLC

3311 S. RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
(702) 873-5700 FAX:

JANEY ENGINEERING

880 S. JONES BLVD
LAS VEGAS, NV 89118
(702) 362-3844 FAX: (702) 362-3233



EST. 2000

N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL

48-IN RCP SD
STA: 0+00 TO 2+37
PLAN & PROFILE 1

GEOTECHNICAL

GEOTEX RESIDENTIAL, LLC
6835 SOUTH ESCONDIDO STREET, SUITE B
LAS VEGAS, NV 89119
(702) 897-1424
REPORT NO: 14434-LVR
DATE: 11/01/18

UTILITY DISCLAIMER

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

LINE AND CURVE DATA

FOR LINE AND CURVE DATA TABLES, SEE THE GRADING PLAN SHEETS FOR THIS PROJECT.

PROFILE NOTES

ADD 2500 FEET TO ALL GRADE TAGS TO GET ACTUAL ELEVATION.
ALL PRIVATE STREETS AND DRAINAGE EASEMENTS ARE TO BE PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION (H.O.A.).
ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENTS HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO GOVERNING ENTITY.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK - MONUMENT ID NUMBER 81V007M
RIVET & PLATE IN TOP OF CURB AT SE CORNER OF ALEXANDER & GRAND CANYON
ELEVATION 732.842 METERS / 2601.18 FEET (NAVE88)

ACCEPTANCE OF PLANS

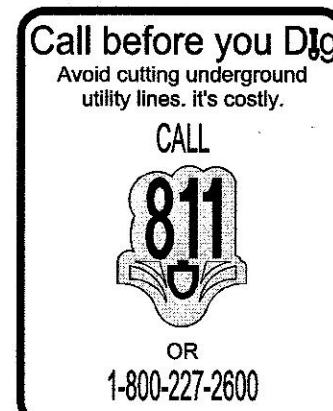
SOUTHWEST GAS CORPORATION DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
FIRST APPROVED DATE PROJECT# 1222XXX
LWVWD APPROVED FIRE FLOW: 1500 GPM AT 20 PSI RESIDUAL

ACCEPTANCE OF PLANS FOR FILING

BY: DEVELOPMENT AND FLOOD CONTROL DATE



DEPTH OF COVER DURING CONSTRUCTION
MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

WATER MAIN JOINT DEFLECTION NOTE (PVC 4'-24")
PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) DEGREE PER JOINT WITH A MAXIMUM RADIUS OF CURVATURE OF 1.150 FEET, PER UDACS 2.07.01 AND 2.07.02.

FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTINGS SHALL BE USED.

DATE: 1/29/2019

SCALE: 1"=40'

JOB NO: LMT-18-001

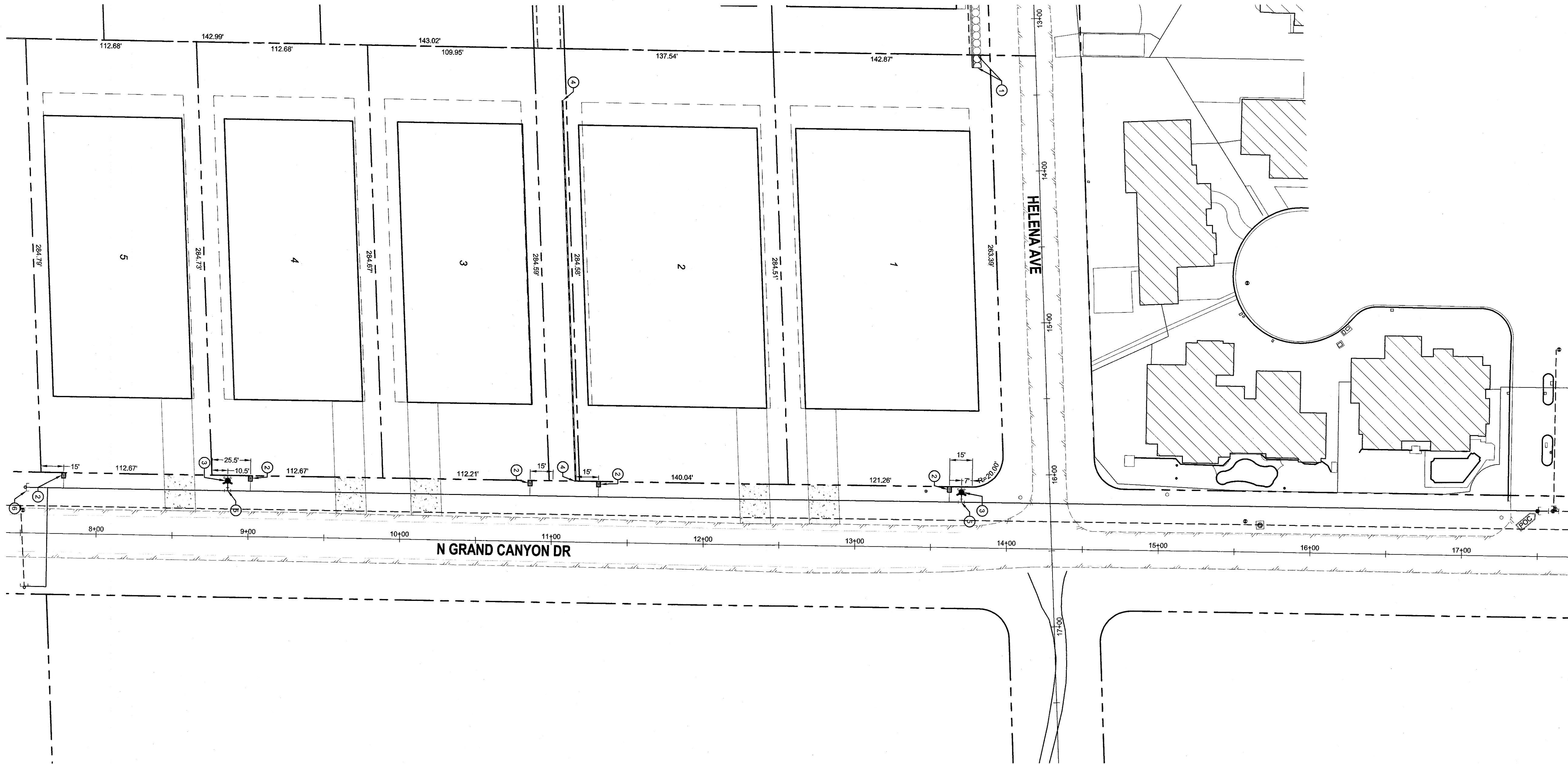
DESIGNED BY: NB CHECKED BY: RC

SHEET NAME: PP1

SHEET NUMBER: 6 OF 7

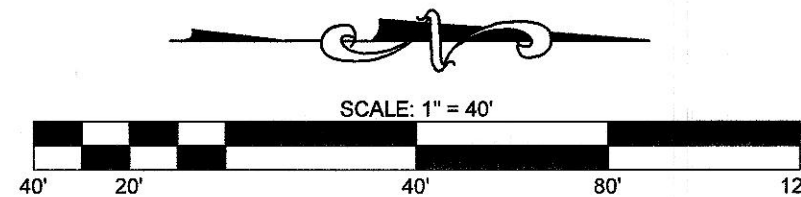
CLV 0000000

FILE NAME: S:\ACTIVE\LONE MOUNTAIN ESTATES LLC\UT-18-001 - JENSEN & HELENA\ENGINEERING\DWG\SHEET DWG\AREA 4\UT001_SHT_UT_A4.DWG



GRADING CONSTRUCTION NOTES

1. INSTALL ROCK WALL
2. INSTALL 1" WATER SERVICE WITH 1" WATER METER PER UDACS PLT. 2
3. FIRE HYDRANT ASSEMBLY W/ 6" GATE VALVE (UDACS PLATE NO. 40)
4. INSTALL RETAINING WALL
5. 8" X 6" TEE
6. INSTALL END CAP & 2" BLOW-OFF ASSEMBLY (UDACS PLATE NO. 36)



WATER MAIN JOINT DEFLECTION NOTE (PVC 4"-24")

PVC PIPE SHALL BE DEFLECTED AT THE JOINT ONLY. THE MAXIMUM ALLOWABLE DEFLECTION SHALL BE ONE (1) DEGREE PER JOINT WITH A MAXIMUM RADIUS OF CURVATURE OF 1,150 FEET, PER UDACS 2.07.01 AND 2.07.02.
FOR CHANGES IN DIRECTION EXCEEDING THE MAXIMUM ALLOWABLE JOINT DEFLECTION, FITTING SHALL BE USED.

FIRE FLOW CALCULATIONS

FIRE FLOW REQUIREMENT IS 1500 GPM @ 20 PSI RESIDUAL.

BASED ON:
SQUARE FOOTAGE: XXXX SQ FT
OF STORIES/FLOORS: 1-2
HEIGHT: 35-FT
SPRINKLER SYSTEM: YES
ANTICIPATED FIRE SPRINKLER FLOW DEMAND: XX
IF THE ANTICIPATED FIRE FLOW IS INSUFFICIENT, AND HOMES EXCEED THE DECLARED SQUARE FOOTAGE NOTED ABOVE, A NFPA 13D SPRINKLER SYSTEM SHALL BE REQUIRED.
NUMBER OF HYDRANTS PROVIDED: 2

UTILITY NOTES

1. ALL WATER FACILITIES CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE "UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS" (UDACS), LATEST EDITION.
2. FIRE, WATER, AND SEWER SERVICES, AS APPROVED ON THIS PLAN, ARE INTENDED SPECIFICALLY FOR THE LOT AND USE SHOWN, AND ARE NOT INTENDED TO SERVICE 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, WATER, & SEWER SERVICES TO EACH.
3. WATER AND SEWER LATERALS SHALL BE INSTALLED A MINIMUM OF 48" APART IN SEPARATE TRENCHES. WATER LATERALS SHALL BE A MINIMUM OF 12" ABOVE THE SEWER LATERAL. (REF. UNIFORM PLUMBING CODE)
4. LOCATOR RIBBON SHALL BE USED FOR ALL SERVICE LATERALS NOT PERPENDICULAR TO THE MAIN. (TYPICAL)
5. ALL SEWER/STORM DRAINS CROSSING WATER LINES MUST CONFORM TO SECTION 2.22 OF "UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS" (UDACS) FOR WATER AND STORM MAIN CROSSINGS AND CLEARANCES.
6. ALL WORK TO BE PERFORMED OUTSIDE OF THE PROJECT BOUNDARY AND ON PRIVATE PROPERTY SHALL NOT BE PERFORMED UNTIL WRITTEN PERMISSION AND EASEMENTS HAVE BEEN OBTAINED FROM THE OFFSITE OWNER AND GIVEN TO CLARK COUNTY.
7. ALL ONSITE STREETS AND DRAINAGE EASEMENTS ARE TO BE PRIVATELY OWNED AND MAINTAINED.
8. INSTALL PIPELINE MARKER BALLS IN TRENCH ABOVE EACH HORIZONTAL ELBOW FITTING. (UDACS PLT 15.)
9. 3' MIN. HORIZONTAL CLEARANCE REQUIRED BETWEEN WATER MAINS AND DRY UTILITIES PER UDACS SECTION 2.04.02
10. 12' MIN. VERTICAL CLEARANCE REQUIRED BETWEEN WATER MAINS AND DRY UTILITIES AND 6' MIN. BETWEEN WATER LATERALS AND DRY UTILITIES PER UDACS SECTION 2.04.05

UTILITY DISCLAIMER

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BENCHMARK

CITY OF LAS VEGAS BENCHMARK - MONUMENT ID NUMBER 9LV007N4
RIVER & PLATE IN TOP OF CURB AT SE CORNER OF ALEXANDER & GRAND CANYON
ELEVATION 792.842 METERS / 2601.18 FEET (NAVE88)

ACCEPTANCE OF PLANS

SOUTHWEST GAS CORPORATION DATE

APPROVED FOR CONSTRUCTION

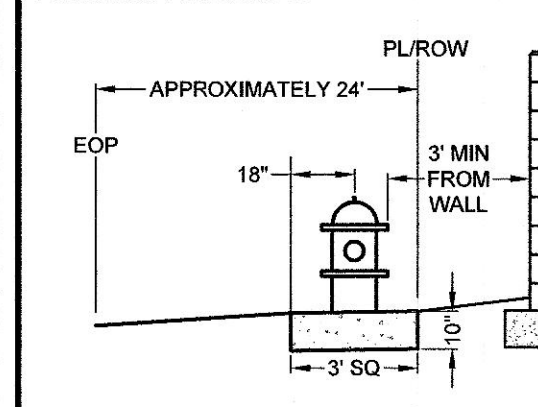
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
FIRST APPROVED DATE PROJECT# 1222XX
LVWD APPROVED FIRE FLOW: 1500 GPM AT 20 PSI RESIDUAL

APPROVED FOR CONSTRUCTION

CITY OF LAS VEGAS FIRE DEPARTMENT 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 = 1500 G.P.M. AT 20 PSI RESIDUAL.

TYPICAL FIRE HYDRANT LAYOUT

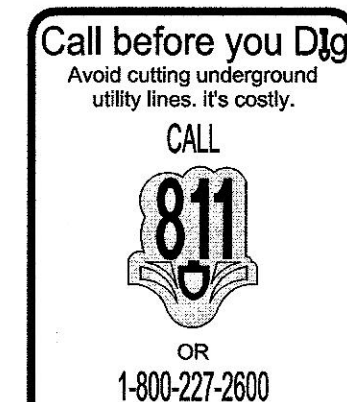
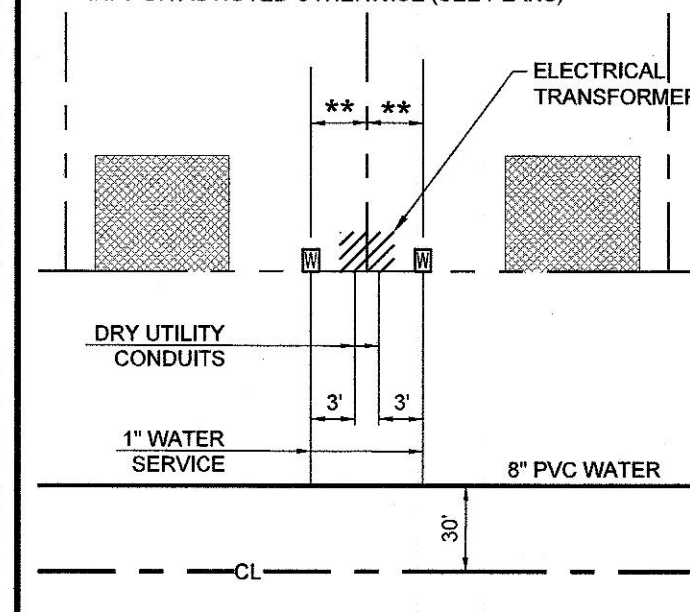
PER UDACS PLATE NO. 40



TYPICAL LATERAL LAYOUT N.T.S

FOR LOTS LESS THAN 70' WIDE UNLESS OTHERWISE NOTED (SIZES AS NOTED ON PLANS)

- * ALL LOTS TO HAVE AN INDIVIDUAL SEPTIC SYSTEM WITH LEACH FIELD
- ** 4" OR AS NOTED OTHERWISE (SEE PLANS)

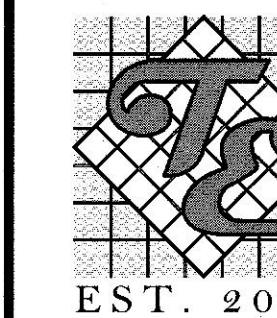


LONE MOUNTAIN ESTATES LLC

3311 S. RAINBOW BLVD STE 225
LAS VEGAS, NV 89146
(702) 875-6100 FAX: (702) 362-5844

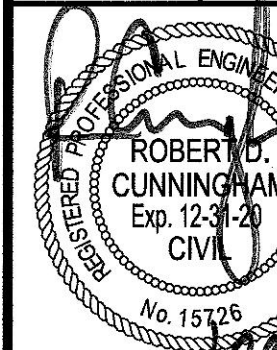
TANEY ENGINEERING

8800 S. JONES BOULEVARD
LAS VEGAS, NV 89118
(702) 362-5844 FAX: (702) 362-5233



N JENSEN ST & HELENA AVE AREA 4
SINGLE-FAMILY RESIDENTIAL

UTILITY PLAN



DATE: 1/29/2019

SCALE: 1"=40'

JOB NO: LMT-18-001

DESIGNED BY: NB CHECKED BY: RC

SHEET NAME: UT1

SHEET NUMBER: 7 OF 7

CLV 000000