

DS #:

5745

APN:

125-21-299-001

PROJECT:

Montecito Offsite Gso Blanca Road

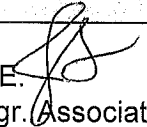
SUBMITTAL:

2nd

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		July 31, 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:
	Montecito Offsite Oso Blanca Road	SHG
Cross Streets:	NEC of Oso Blanca Road and Deer Springs Way	KB Home
File Number:	F:\Depot\DSMemos\DS5145A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-21-299-001	CCRFC
Zoning Action:	TMP-74639	NDOT
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES X NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	5/28/2019	6/25/2019	See Comments Below	\$400.00	3147347: \$400
2 nd Submittal	7/10/2019	7/30/2019		\$0.00	N/C
TOTAL FEES (LDDRS):				\$400.00	----

REMARKS:

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

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

1. **This drainage study is acceptable in concept;** however, City of Las Vegas will not formally accept the study until the Clark County Regional Flood Control District (CCRFC) has issued a letter of concurrence. The engineer should contact the CCRFC to confirm that they have begun their review.
2. The project proposes to construct facilities and/or increase flows within Nevada Department of Transportation (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.
3. Continue coordination with NDOT Project Engineer for existing utility locations and proposed relocations within NDOT right-of-way.

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

the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

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

END OF REMARKS
JKS

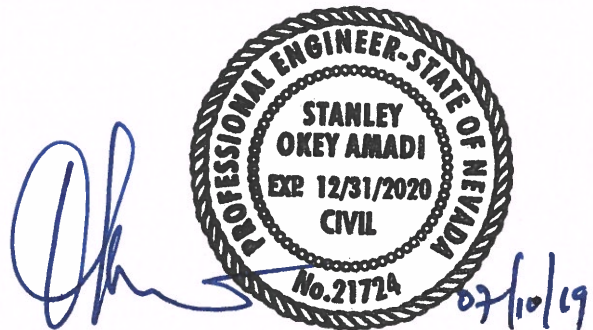
T/R/S: T19S/R60E/21
AREA G-20

**TECHNICAL DRAINAGE STUDY
ADDENDUM
Montecito Offsite Oso Blanca Road
City of Las Vegas, Nevada**

Job No.: KBH1805.006
Date: July 2019

Prepared For:
KB Home
5795 Badura Avenue, Ste 180
Las Vegas, NV 89118
Phone: 702-266-8400 • Fax: 702-266-8623

Prepared By:
Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 • Fax: 702-284-5399



Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724

Assisted by Jonathan S. Rocha, E.I.



KBH1805-006

July 10, 2019

Jennifer Shinn, P.E.– Senior Engineering Associate
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Subject: Technical Drainage Study for Montecito - Offsite Oso Blanca Road - Addendum

Ms. Shinn:

This letter certifies that all items provided on the *Technical Drainage Study for Montecito Offsite – Oso Blanca Road Addendum* submittal CD match the paper version bound into the study.

Respectfully Submitted,
SLATER HANIFAN GROUP

A handwritten signature in blue ink, appearing to read 'Stanley Okey Amadi', is written over the company name.

Stanley Okey Amadi, P.E., CFM
Project Manager – Flood Control Division

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Montecito - Offsite Oso Blanca Road - TDS Addendum Date: July 2019

Location of Development: a) Descriptive (Cross Streets): North/South: Oso Blanca Road

East/West: Deer Springs Way

b) Section: 21 Township: 19 South Range: 60 East

c) APN: 125-21-299-001

Name of Owner: Public Right-of-way/KB Home

Telephone No.: (702) 266-8400 Fax No.: (702) 266-8623 E-mail Address: pchao@kbhome.com

Address: 5795 Badura Ave Ste 180 Las Vegas NV 89118

Contact Person – Name: Stanley Okey Amadi, P.E., CFM Telephone No.: (702) 284-5300

*E-mail Address: Samadi@shg-inc.com Fax No.: (702) 284-5399

Firm: Slater Hanifan Group, A Westwood Team

Address: 5740 S. Arville #216 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

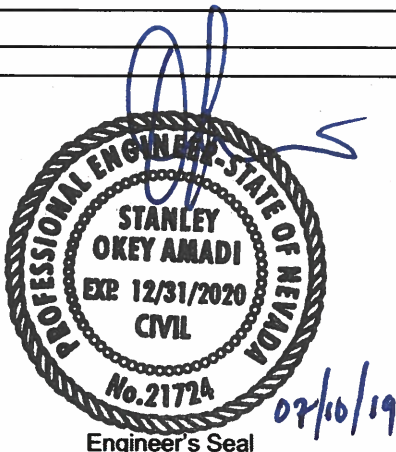
☐ Rezoning	☐ Subdivision Map	☐ Clearing and grading Only
☐ Parcel Map	☐ Planned Unit Development	☒ Other (Please specify below)
☐ Large Parcel Map	☐ Building Permit	☒ Roadway Improvements

1. Total Owned Land Area: At Site: 52.4 +/- acres Being Developed/Disturbed: 3.28 +/- acres
2. Is a portion or all of the subject property located in a 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.): Roadway Improvements
5. Approximate upstream land area which drains to the subject site: 86 +/- acres
6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation: _____

TDS for Montecito Storm Drain Infrastructure (DS-5108)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: To CCRFCD (CN95 000) facility along US95

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



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

***Newly 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

Updated 05/01/2008



KBH1805.006

7/10/2019

Ms. Jennifer Shinn, P.E. – Flood Control Engineering Associate
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Subject: Addendum to the Technical Drainage Study for Montecito - Offsite Oso Blanca Road (DS5145)

Dear Ms. Shinn:

This letter is submitted in response to the comments contained in the June 27, 2019 review memorandum, regarding the above referenced project. A copy of the City of Las Vegas (CLV) comment letter has been provided in Appendix A.

The comments in the review memorandum have been individually addressed as follows:

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

When it is applicable, structural calculations of facilities must be approved by the City prior to submittal to Clark County Regional Flood Control District for their review and concurrence.

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

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

Response: Acknowledged. A copy of the study and pertinent addendum will be submitted to CCRFCD for review and concurrence upon receipt of a condition approval from the City of Las Vegas.

2. **Comment:** *The project proposed to construct facilities and/or increase flows within Nevada Department of Transportation (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the propose project;*

Response: Noted. The study and improvement plans will be submitted to NDOT for review and concurrence as well as encroachment permitting for the project.

3. **Comment:** *Project assumes Montecito Storm Drain Infrastructure is constructed. The drainage study cannot be conditionally approved prior to the conditional approval of the Montecito Storm Drain Infrastructure study (DS5108);*

Response: Acknowledged. Note that the Montecito Storm Drain Infrastructure Study was conditionally approved by CLV on June 20, 2019.

4. **Comment:** *Remove references to CIPCP, including Construction Note 12. The City currently does not allow CIPCP;*

Response: Noted. Please refer to the revised plans provided in Appendix F.

5. **Comment:** *Storm drain manhole required where two or more storm drains converge. Per NDOT standards, care should be taken to ensure manholes are not located within the normal vehicle wheel path;*

Response: Acknowledged. Note that the portion of the mainline storm drain infrastructure per DS5108 traversing across Oso Blanca Road near approximate Station 60+75 has been revised to a 7'x3' RCB. Thus, the proposed drop inlet laterals will now be connected to the transition structures which are provided with access manholes. The lateral loss computations for the drop inlet laterals have been updated to reflect the starting HGL from the referenced WSPGW for the 7'x3' RCB. The revised lateral loss computation is included in Appendix C and the referenced WSPGW model is included in Appendix D.

6. **Comment:** *Continue coordination with NDOT Project Engineer for existing utility locations and proposed relocations within NDOW right-of-way;*

Response: Acknowledged.

7. **Comment:** *The FlowMaster sections for OA-S and OA-N do not appear to match Section Detail D/D-1 (roadside swale). Review and revise accordingly;*

Response: Sections OA-S and OA-N were provided for the improved street section just upstream of the proposed drop inlets (SDDI#1 & SDDI#2). New Swale Section OA-S that reflects Detail D/D-1 with the roadside swale have been provided in Appendix C.

8. **Comment:** *Provide FlowMaster sections to demonstrate NDOT design criteria for Roadway Surfaces, specifically, provide sections downstream of drop inlets where flows bypass the system and remain in the right-of-way;*

Response: Oso Blanca Road adjacent to the site is classified as a frontage road per the 2019 State Maintained Highways of Nevada Descriptions Map. The NDOT Drainage Manual specifies the minimum design return frequency for frontage roads as the 10-year storm event. The Drainage Manual also specifies the maximum allowable spread into the adjacent travel lane to be one-half of the lane width based on the 10-year storm event peak flows. Review of the prior submittal shows that all the proposed 10-year storm event drop inlet computations indicate zero bypass flows with the exception of Facilities FD5-S and FD6-S that shows bypass of 2.5 cfs and 0.5 cfs respectively. Therefore, by inspection, additional hydraulic cross section downstream of the drop inlets with zero bypass flows are not required to demonstrate that the NDOT design criteria are satisfied. However, it should be noted that the street slope utilized at Sections OA (N & S) was 1.80% whereas correct slope adjacent to the site and the proposed drop inlet(s) Facilities FD5-N & FD5-S is 2.19%. Consequently,

the street sections and pertinent inlet capacity calculations have been updated to match the design street slope on the plans. Note that Facility FD5-S has been upsized from a 7.5-ft Type CM2 inlet to a 12.5-ft Type CM2 inlet. Therefore, all the southern street and inlet capacity calculations have been updated to reflect the revised bypass flows from the inlets. The revised calculation for Facility FD5-S shows the maximum bypass flow of 1.3 cfs. An additional street Section OA-S downstream of Facility FD5-S with the bypass flow of 1.3 cfs indicates a flow depth of 0.26-ft and a top width 5.98-ft from the face of curb. Subtracting the gutter width of 1.50-ft yields a spread of 4.48-ft. The design travel lane width is 11.50-ft per the approved tentative map. Therefore, the 1.30 cfs bypass flow satisfies the spread criteria of no more than a travel lane width. Note that the bypass flow from the remainder downstream inlets (Facilities FD6-S, FD7-S & FD8-S) are all less than 1.30 cfs and will likewise satisfy the spread criteria. Hence, no additional calculations have been provided to illustrate that the spread criterium is satisfied downstream of the inlets. Please refer to Appendix C for the revised hydraulic calculations. Reference excerpts from the NDOT 2019 State Maintained Highways of Nevada Descriptions Map and the Drainage Manual have been included in Appendix E.

We believe the above responses and revisions provided on the plans have adequately satisfied your concerns in the subject review memorandum. The revised plan, profile, and detail sheets adopting the revisions addressed in in this letter have been included in Appendix F. If you have any questions or require additional information, please do not hesitate to contact our office at (702) 284-5300.

Respectfully Submitted,

SLATER HANIFAN GROUP A WESTWOOD TEAM



Stanley Okey Amadi, P.E., CFM
Project Manager – Flood Control Division

cc: Mark Failla, P.E., CFM – SHG
Tim Mulrooney, P.E. – SHG
Matt Key, E.I. – SHG

APPENDIX

Appendix A – CLV Comment Letter

Appendix B – Revised Drainage Exhibits

Appendix C – Revised & Additional Hydraulic Calculations

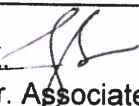
Appendix D – Referenced WSPGW Model

Appendix E – Referenced NDOT Materials

Appendix F – CD of Electronic Files & Revised Improvement Plans

APPENDIX A

CLV Comment Letter

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		June 27, 2019
TO: Land Development Services Department of Building & Safety		FROM: Jennifer Shinn, P.E.  Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for: Montecito Offsite Oso Blanca Road	COPIES TO: SHG
Cross Streets:	NEC of Oso Blanca Road and Deer Springs Way	KB Home
File Number:	F:\Depot\DSMemos\DS5145A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-21-299-001	CCRFCD
Zoning Action:	TMP-74639	NDOT
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES X NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	5/28/2019	6/25/2019	See Comments Below	\$400.00	3147347: \$400
TOTAL FEES (LDDRS):				\$400.00	----

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3. Project assumes Montecito Storm Drain Infrastructure is constructed. The drainage study cannot be conditionally approved prior to the conditional approval of the Montecito Storm Drain Infrastructure study (DS5108).

4. Remove references to CIPCP, including Construction Note 12. The City currently does not allow CIPCP.
5. Storm drain manhole required where two or more storm drains converge. Per NDOT standards, care should be taken to ensure manholes are not located within the normal vehicle wheel path.
6. Continue coordination with NDOT Project Engineer for existing utility locations and proposed relocations within NDOT right-of-way.
7. The FlowMaster sections for OA-S and OA-N does not appear to match Section Detail D/D-1 (roadside swale). Review and revise accordingly.
8. Provide FlowMaster sections to demonstrate NDOT design criteria for Roadway Surfaces, specifically, provide sections downstream of drop inlets where flows bypass the system and remain in the right-of-way.

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

END OF REMARKS
JKS

T/R/S: T19S/R60E/21
AREA G-20

APPENDIX B

Revised Drainage Exhibits

APPENDIX C

Revised & Additional Hydraulic Calculations

Worksheet for Swale Section OA-S - 100Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.00 %
Discharge 11.50 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.67
0+05.00	0.00
0+10.00	1.70
0+19.00	1.88

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.67)	(0+10.00, 1.70)	0.025
(0+10.00, 1.70)	(0+19.00, 1.88)	0.016

Options

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

Results

Normal Depth	1.03 ft
Elevation Range	0.00 to 1.88 ft
Flow Area	3.13 ft ²
Wetted Perimeter	6.43 ft
Hydraulic Radius	0.49 ft
Top Width	6.09 ft
Normal Depth	1.03 ft
Critical Depth	0.99 ft

Worksheet for Swale Section OA-S - 100Yr

Results

Critical Slope	0.01238	ft/ft
Velocity	3.68	ft/s
Velocity Head	0.21	ft
Specific Energy	1.24	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	1.03	ft
Critical Depth	0.99	ft
Channel Slope	1.00	%
Critical Slope	0.01238	ft/ft

Cross Section for Swale Section OA-S - 100Yr

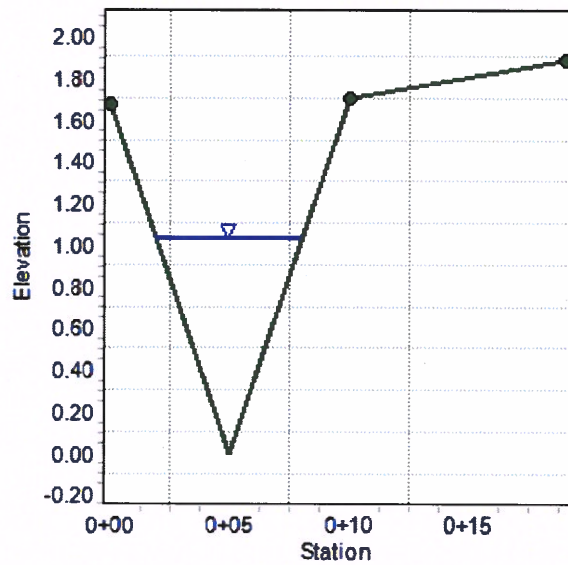
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Normal Depth	1.03	ft
Discharge	11.50	ft ³ /s

Cross Section Image



Worksheet for OA-N - 100Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.19 %
Discharge 3.50 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+23.50	1.01
0+35.50	1.01
0+35.50	0.60
0+57.00	0.17
0+57.00	0.13
0+58.50	0.00
0+58.50	0.48
0+59.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+23.50, 1.01)	(0+35.50, 0.60)	0.013
(0+35.50, 0.60)	(0+57.00, 0.13)	0.016
(0+57.00, 0.13)	(0+59.00, 0.50)	0.013

Options

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

Results

Normal Depth 0.34 ft
Elevation Range 0.00 to 1.01 ft
Flow Area 1.09 ft²

Worksheet for OA-N - 100Yr

Results

Wetted Perimeter	10.16	ft
Hydraulic Radius	0.11	ft
Top Width	9.78	ft
Normal Depth	0.34	ft
Critical Depth	0.39	ft
Critical Slope	0.00714	ft/ft
Velocity	3.21	ft/s
Velocity Head	0.16	ft
Specific Energy	0.50	ft
Froude Number	1.69	
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	0.34	ft
Critical Depth	0.39	ft
Channel Slope	2.19	%
Critical Slope	0.00714	ft/ft

Cross Section for OA-N - 100Yr

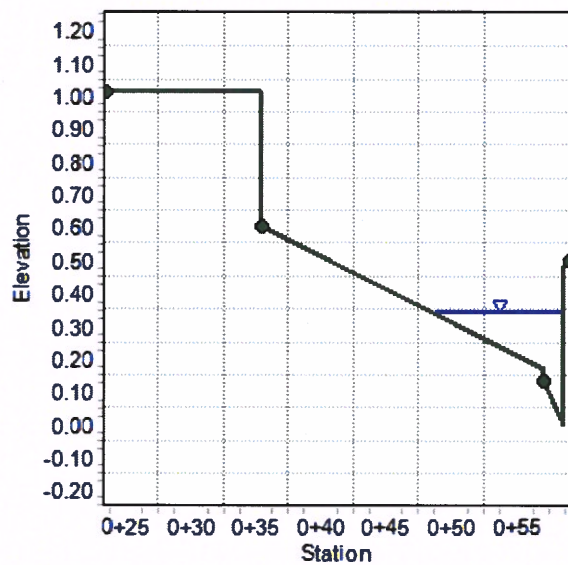
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.34	ft
Discharge	3.50	ft ³ /s

Cross Section Image



Worksheet for OA-N - 10Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.19 %
Discharge 2.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+23.50	1.01
0+35.50	1.01
0+35.50	0.60
0+57.00	0.17
0+57.00	0.13
0+58.50	0.00
0+58.50	0.48
0+59.00	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+23.50, 1.01)	(0+35.50, 0.60)	0.013
(0+35.50, 0.60)	(0+57.00, 0.13)	0.016
(0+57.00, 0.13)	(0+59.00, 0.50)	0.013

Options

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

Results

Normal Depth 0.29 ft
Elevation Range 0.00 to 1.01 ft
Flow Area 0.70 ft²

Worksheet for OA-N - 10Yr

Results

Wetted Perimeter	7.86	ft
Hydraulic Radius	0.09	ft
Top Width	7.52	ft
Normal Depth	0.29	ft
Critical Depth	0.33	ft
Critical Slope	0.00755	ft/ft
Velocity	2.86	ft/s
Velocity Head	0.13	ft
Specific Energy	0.42	ft
Froude Number	1.65	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.33	ft
Channel Slope	2.19	%
Critical Slope	0.00755	ft/ft

Cross Section for OA-N - 10Yr

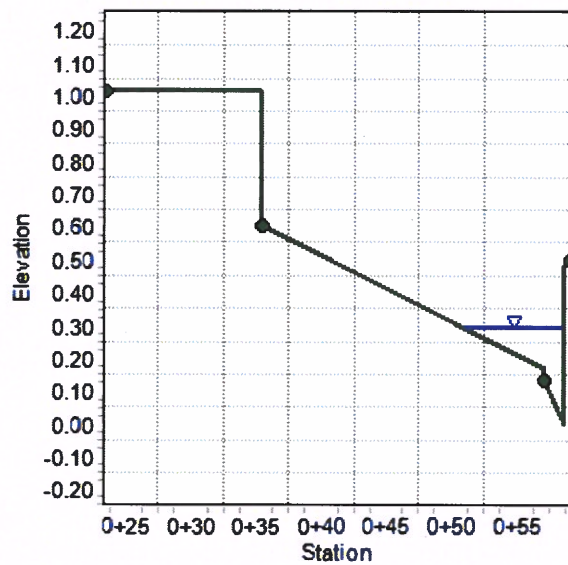
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.19 %
Normal Depth 0.29 ft
Discharge 2.00 ft³/s

Cross Section Image



Worksheet for OA-S - 100Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.19 %
Discharge 11.50 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+23.50	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+23.50, 0.60)	0.016

Options

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

Results

Normal Depth 0.46 ft
Elevation Range 0.00 to 0.60 ft
Flow Area 2.74 ft²
Wetted Perimeter 16.64 ft
Hydraulic Radius 0.16 ft
Top Width 16.13 ft

Worksheet for OA-S - 100Yr

Results

Normal Depth	0.46	ft
Critical Depth	0.55	ft
Critical Slope	0.00625	ft/ft
Velocity	4.20	ft/s
Velocity Head	0.27	ft
Specific Energy	0.74	ft
Froude Number	1.80	
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	0.46	ft
Critical Depth	0.55	ft
Channel Slope	2.19	%
Critical Slope	0.00625	ft/ft

Cross Section for OA-S - 100Yr

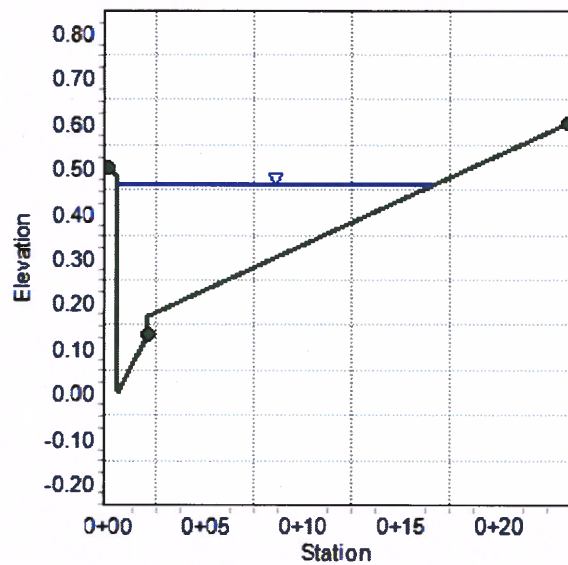
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.46	ft
Discharge	11.50	ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+23.50	0.60

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+23.50, 0.60)	0.016

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

Normal Depth	0.39	ft
Elevation Range	0.00 to 0.60 ft	
Flow Area	1.66	ft²
Wetted Perimeter	12.78	ft
Hydraulic Radius	0.13	ft
Top Width	12.35	ft

Worksheet for OA-S - 10Yr

Results

Normal Depth	0.39	ft
Critical Depth	0.45	ft
Critical Slope	0.00673	ft/ft
Velocity	3.61	ft/s
Velocity Head	0.20	ft
Specific Energy	0.59	ft
Froude Number	1.74	
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	0.39	ft
Critical Depth	0.45	ft
Channel Slope	2.19	%
Critical Slope	0.00673	ft/ft

Cross Section for OA-S - 10Yr

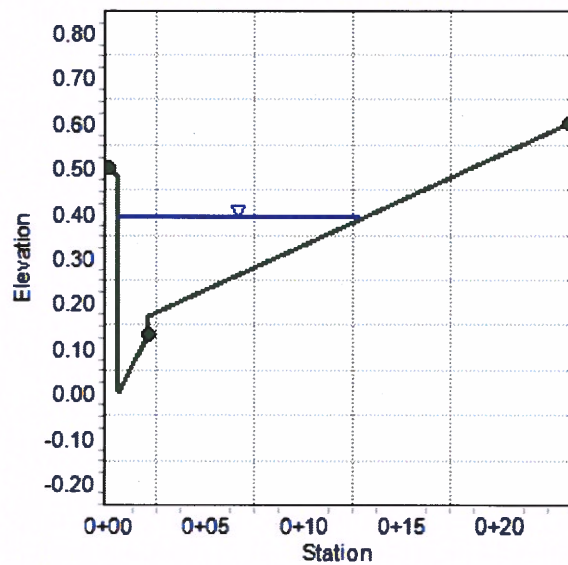
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.39	ft
Discharge	6.00	ft ³ /s

Cross Section Image



Project Description

Input Data

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

Roughness Segment Definitions

Options

Results

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

Worksheet for OB-S - 100Yr

Results

Normal Depth	0.38	ft
Critical Depth	0.44	ft
Critical Slope	0.00681	ft/ft
Velocity	3.54	ft/s
Velocity Head	0.19	ft
Specific Energy	0.57	ft
Froude Number	1.73	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.44	ft
Channel Slope	2.19	%
Critical Slope	0.00681	ft/ft

Cross Section for OB-S - 100Yr

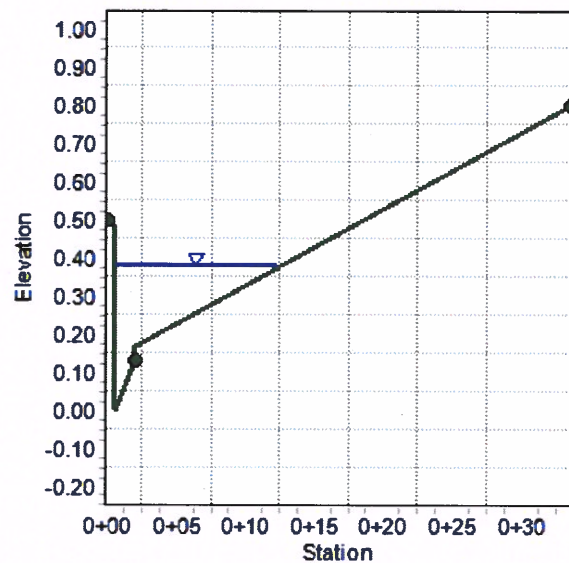
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.38	ft
Discharge	5.40	ft ³ /s

Cross Section Image



Worksheet for OB-S - 10Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.19 %
Discharge 2.30 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+23.50	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+23.50, 0.60)	0.016

Options

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

Results

Normal Depth 0.30 ft
Elevation Range 0.00 to 0.60 ft
Flow Area 0.78 ft²
Wetted Perimeter 8.40 ft
Hydraulic Radius 0.09 ft
Top Width 8.05 ft

Worksheet for OB-S - 10Yr

Results

Normal Depth	0.30	ft
Critical Depth	0.35	ft
Critical Slope	0.00746	ft/ft
Velocity	2.94	ft/s
Velocity Head	0.13	ft
Specific Energy	0.44	ft
Froude Number	1.66	
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	0.30	ft
Critical Depth	0.35	ft
Channel Slope	2.19	%
Critical Slope	0.00746	ft/ft

Cross Section for OB-S - 10Yr

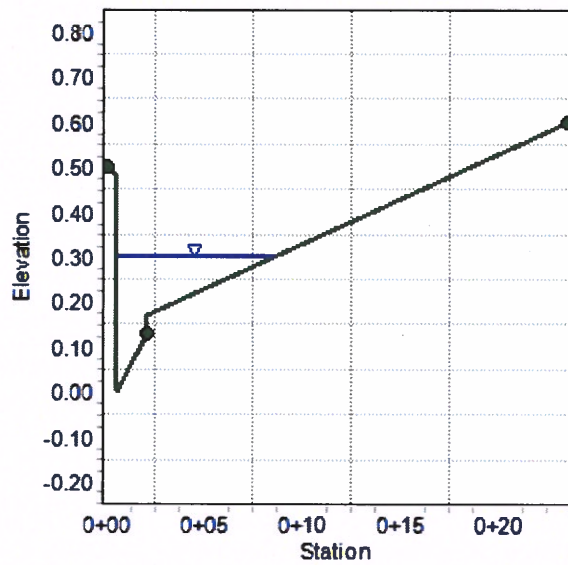
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.30	ft
Discharge	2.30	ft ³ /s

Cross Section Image



Worksheet for OC-S - 100Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.19 %
Discharge 4.80 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+23.50	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+23.50, 0.60)	0.016

Options

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

Results

Normal Depth 0.36 ft
Elevation Range 0.00 to 0.60 ft
Flow Area 1.40 ft²
Wetted Perimeter 11.65 ft
Hydraulic Radius 0.12 ft
Top Width 11.23 ft

Worksheet for OC-S - 100Yr

Results

Normal Depth	0.36	ft
Critical Depth	0.43	ft
Critical Slope	0.00690	ft/ft
Velocity	3.44	ft/s
Velocity Head	0.18	ft
Specific Energy	0.55	ft
Froude Number	1.72	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.43	ft
Channel Slope	2.19	%
Critical Slope	0.00690	ft/ft

Cross Section for OC-S - 100Yr

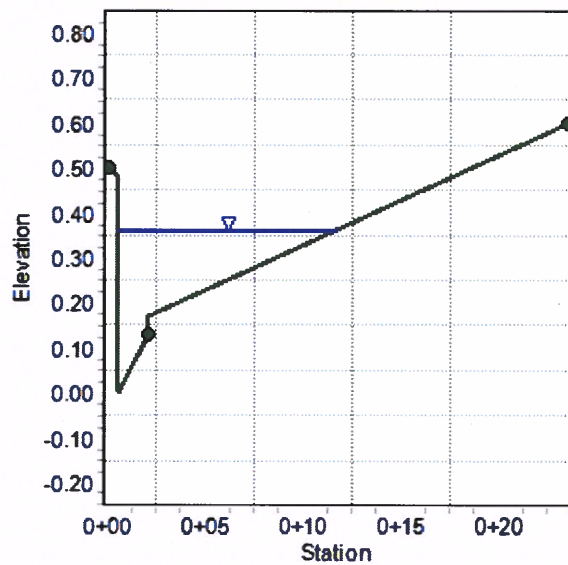
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.36	ft
Discharge	4.80	ft ³ /s

Cross Section Image



Worksheet for OC-S - 10Yr

Results

Normal Depth	0.28	ft
Critical Depth	0.32	ft
Critical Slope	0.00766	ft/ft
Velocity	2.76	ft/s
Velocity Head	0.12	ft
Specific Energy	0.40	ft
Froude Number	1.64	
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	0.28	ft
Critical Depth	0.32	ft
Channel Slope	2.19	%
Critical Slope	0.00766	ft/ft

Cross Section for OC-S - 10Yr

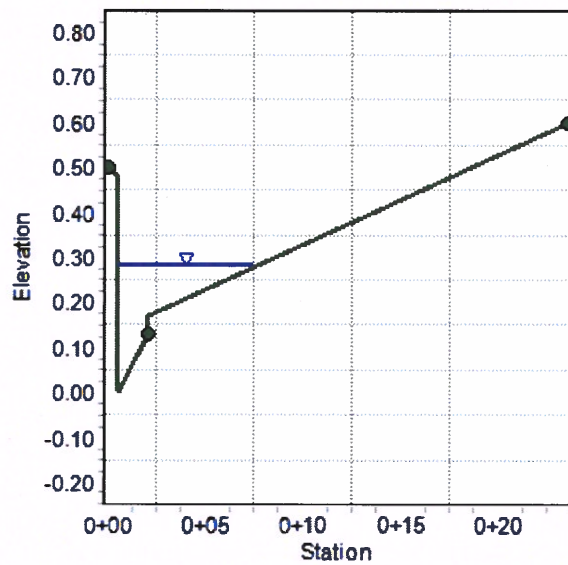
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.28	ft
Discharge	1.70	ft ³ /s

Cross Section Image



Worksheet for OD-S - 100Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.06 %
Discharge 3.80 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+23.50	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+23.50, 0.60)	0.016

Options

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

Results

Normal Depth 0.35 ft
Elevation Range 0.00 to 0.60 ft
Flow Area 1.19 ft²
Wetted Perimeter 10.67 ft
Hydraulic Radius 0.11 ft
Top Width 10.27 ft

Worksheet for OD-S - 100Yr

Results

Normal Depth	0.35	ft
Critical Depth	0.40	ft
Critical Slope	0.00709	ft/ft
Velocity	3.19	ft/s
Velocity Head	0.16	ft
Specific Energy	0.50	ft
Froude Number	1.65	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.40	ft
Channel Slope	2.06	%
Critical Slope	0.00709	ft/ft

Cross Section for OD-S - 100Yr

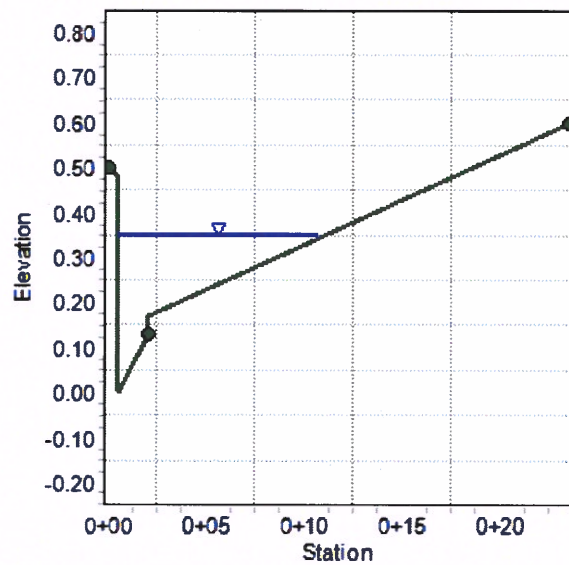
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.06	%
Normal Depth	0.35	ft
Discharge	3.80	ft ³ /s

Cross Section Image



Worksheet for OD-S - 10Yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.06 %
Discharge 1.20 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+23.50	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+23.50, 0.60)	0.016

Options

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

Results

Normal Depth 0.26 ft
Elevation Range 0.00 to 0.60 ft
Flow Area 0.47 ft²
Wetted Perimeter 6.10 ft
Hydraulic Radius 0.08 ft
Top Width 5.80 ft

Worksheet for OD-S - 10Yr

Results

Normal Depth	0.26	ft
Critical Depth	0.29	ft
Critical Slope	0.00788	ft/ft
Velocity	2.55	ft/s
Velocity Head	0.10	ft
Specific Energy	0.36	ft
Froude Number	1.58	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.29	ft
Channel Slope	2.06	%
Critical Slope	0.00788	ft/ft

Worksheet for OA-S - 10Yr {D/S of FD5-S (SDDI#1)}

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 2.19 %
Discharge 1.30 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+23.50	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+23.50, 0.60)	0.016

Options

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

Results

Normal Depth 0.26 ft
Elevation Range 0.00 to 0.60 ft
Flow Area 0.49 ft²
Wetted Perimeter 6.29 ft
Hydraulic Radius 0.08 ft
Top Width 5.98 ft

Worksheet for OA-S - 10Yr {D/S of FD5-S (SDDI#1)}

Results

Normal Depth	0.26	ft
Critical Depth	0.30	ft
Critical Slope	0.00782	ft/ft
Velocity	2.64	ft/s
Velocity Head	0.11	ft
Specific Energy	0.37	ft
Froude Number	1.62	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.30	ft
Channel Slope	2.19	%
Critical Slope	0.00782	ft/ft

Cross Section for OA-S - 10Yr {D/S of FD5-S (SDDI#1)}

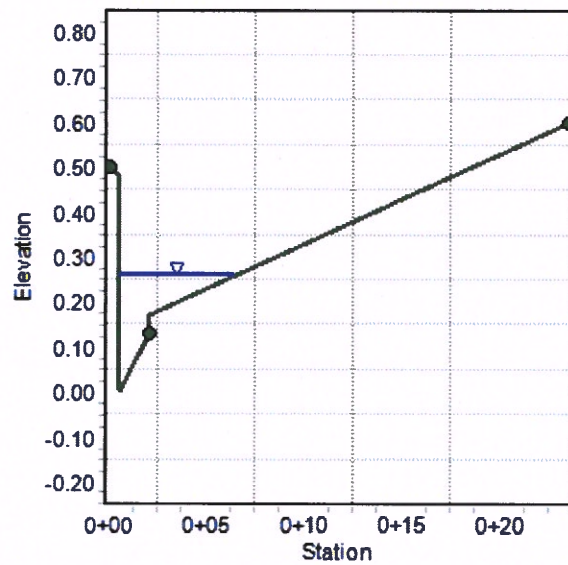
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	2.19	%
Normal Depth	0.26	ft
Discharge	1.30	ft ³ /s

Cross Section Image



Curb Inlet Sizing Computation



Project Name & Number: KBH1805.006 Montecito Oso Blanca Road
 Date: 7/10/2019
 By: J. Rocha

Notes:

Facility ID: Facility FD5-North
 Source of Flow: Q100 (Ult): $(1/2) \cdot \text{OSO}(A)$
 Q10 (Ult): $(1/2) \cdot \text{OSO}(A)$
 Inlet Type: Type CM2 (Continuous Grade)
 Inlet Length: 7.5-ft
 Number of Grates: 2

Input:

Variable:

Q100 (Ult): Q10 (Ult):

Street Flow (cfs)	Q	3.5	2.0
Longitudinal Slope (ft/ft)	S_o	0.0219	
Manning's Coefficient	n	0.016	
Street Flow Velocity (fps)	V	3.21	2.86
Street Flow Depth (ft)	D	0.34	0.29
Street Cross Slope (ft/ft)	S_x	0.02	
Grate Width (ft)	W	1.5	
Grate Depression (in)	D_g	2.0	
Length of Grate (ft)	L_g	5.0	
Length of Curb Opening (ft)	L_c	7.50	
Clogging Factor - Grate (%)	CF_g	50%	
Clogging Factor - Curb (%)	CF_c	50%	
Effective Grate Length (ft)	L_{ge}	2.5	
Effective Curb Opening Length (ft)	L_{ce}	3.75	

Output (Grate):

Equation:

Output (Grate):

¹ R_f - Frontal Flow Factor	$1 - 0.09 \cdot (V - V_x)$ if $V > V_x$; else Frontal Flow Factor=1	1.00	1.00
² V_o - Splash Over Velocity (fps)	$V_x = p + q \cdot L_g - r \cdot L_{ge}^2 + s \cdot y \cdot L_{ge}^3$; where $p = 0.30, q = 4.85, r = 1.31, s = 0.15$ (for Vane Grate)	6.58	
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.40	0.52
² Q_w - Frontal Flow (cfs)	$Q_w = Q [1 - (1 - (W/T))^{2.67}]$	1.39	1.05
¹ Q_s - Side Flow (cfs)	$Q_s = Q - Q_w$	2.1	1.0
T - Side Flow Spread (ft)	$(D - D_g) / S_x$	8.67	6.17
¹ R_s - Side Flow Factor	$1 / (1 + (0.15 \cdot V^{1.8}) / (S_x \cdot L_{ge}^{2.3}))$	0.12	0.14
¹ Q_{gi} - Intercepted Flow (cfs)	$(R_f \cdot E + R_s \cdot (1 - E)) \cdot Q$	1.6	1.2

Output (Curb):

Equation:

Output (Curb):

¹ S_e - Equivalent Cross Slope (ft/ft)	$S_x + S_g \cdot E$	0.064	0.078
Q_{sx} - Remaining Flow After Grate Interception	$Q - Q_{gi}$	1.857	0.815
S_g - Gutter Cross Slope (ft/ft)	D_g / W	0.111	
¹ L_i - Effective Interception Length (ft)	$0.60 \cdot Q_{sx}^{0.42} \cdot S_o^{0.30} \cdot (1/n \cdot S_e)^{0.6}$	15.35	9.64
¹ Q_{ci} - Intercepted Flow (cfs)	$(1 - (1 - L_{ce}/L_i)^{1.8}) \cdot Q_{sx}$ or Q_{sx} if L_i is less than L_{ce}	0.7	0.5

Output (Combination):

Equation:

Q100 (Ult): Q10 (Ult):

Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	2.4	2
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	1.1	0

¹ Formula referenced from the CCRFCD Manual

² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Curb Inlet Sizing Computation



Project Name & Number: KBH1805.006 Montecito Oso Blanca Road
 Date: 7/10/2019
 By: J. Rocha

Notes:

Facility ID: Facility FD5-South
 Source of Flow: Q100 (Ult): NWBB1-4(B) + (1/2)*OSO(A)
 Q10 (Ult): (1/2)*OSO(A)
 Inlet Type: Type CM2 (Continuous Grade)
 Inlet Length: 12.5-ft
 Number of Grates: 4

Input:

Variable:

Q100 (Ult): Q10 (Ult):

Street Flow (cfs)	Q	11.5	6.0
Longitudinal Slope (ft/ft)	S _o	0.0180	
Manning's Coefficient	n	0.016	
Street Flow Velocity (fps)	V	4.20	3.61
Street Flow Depth (ft)	D	0.46	0.39
Street Cross Slope (ft/ft)	S _x	0.02	
Grate Width (ft)	W	1.5	
Grate Depression (in)	D _g	2.0	
Length of Grate (ft)	L _g	10.0	
Length of Curb Opening (ft)	L _c	12.50	
Clogging Factor - Grate (%)	CF _g	50%	
Clogging Factor - Curb (%)	CF _c	50%	
Effective Grate Length (ft)	L _{ge}	5.0	
Effective Curb Opening Length (ft)	L _{ce}	6.25	

Output (Grate):

Equation:

Output (Grate):

¹ R _f - Frontal Flow Factor	1-0.09*(V-V _x) if V>V _x ; else Frontal Flow Factor=1	1.00	1.00
² V _o - Splash Over Velocity (fps)	V _x =p+q*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	10.55	
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.25	0.32
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	2.88	1.92
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	8.6	4.1
¹ T - Side Flow Spread (ft)	(D-D _g)/S _x	14.67	11.17
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.29	0.35
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	5.4	3.3

Output (Curb):

Equation:

Output (Curb):

¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.048	0.056
Q _{sx} - Remaining Flow After Grate Interception	Q-Q _{gi}	6.123	2.658
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111	
¹ L _i - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	28.52	18.36
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _i) ^{1.8})*Q _{sx} or Q _{sx} if L _i is less than L _{ce}	2.2	1.4

Output (Combination):

Equation:

Q100 (Ult): Q10 (Ult):

Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	7.6	4.7
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	3.9	1.3

¹ Formula referenced from the CCRFCD Manual

² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Curb Inlet Sizing Computation



Project Name & Number: KBH1805.006 Montecito Oso Blanca Road
 Date: 7/10/2019
 By: J. Rocha

Notes:

Facility ID: Facility FD6-South
 Source of Flow: Q100 (Ult): FD5-S BYPASS + (1/2)*OSO(B)
 Q10 (Ult): FD5-S BYPASS + (1/2)*OSO(B)
 Inlet Type: Type CM2 (Continuous Grade)
 Inlet Length: 5.-ft
 Number of Grates: 1

Input:

Variable:

Q100 (Ult): Q10 (Ult):

Street Flow (cfs)	Q	5.4	2.3
Longitudinal Slope (ft/ft)	S _o	0.0219	
Manning's Coefficient	n	0.016	
Street Flow Velocity (fps)	V	3.54	2.94
Street Flow Depth (ft)	D	0.38	0.30
Street Cross Slope (ft/ft)	S _x	0.02	
Grate Width (ft)	W	1.5	
Grate Depression (in)	D _g	2.0	
Length of Grate (ft)	L _g	2.5	
Length of Curb Opening (ft)	L _c	5.00	
Clogging Factor - Grate (%)	CF _g	50%	
Clogging Factor - Curb (%)	CF _c	50%	
Effective Grate Length (ft)	L _{ge}	1.3	
Effective Curb Opening Length (ft)	L _{ce}	2.50	

Output (Grate):

Equation:

Output (Grate):

¹ R _f - Frontal Flow Factor	1-0.09*(V-V _x) if V>V _x ; else Frontal Flow Factor=1	1.00	1.00
² V _o - Splash Over Velocity (fps)	V _x =p+q*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	4.61	
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.33	0.49
² Q _w - Frontal Flow (cfs)	Q _w = Q[1-(1-(W/T)) ^{2.67}]	1.80	1.14
¹ Q _s - Side Flow (cfs)	Q _s = Q-Q _w	3.6	1.2
¹ T - Side Flow Spread (ft)	(D-D _g)/S _x	10.67	6.67
¹ R _s - Side Flow Factor	1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.02	0.03
¹ Q _{gi} - Intercepted Flow (cfs)	(R _f *E+R _s *(1-E))*Q	1.9	1.2

Output (Curb):

Equation:

Output (Curb):

¹ S _e - Equivalent Cross Slope (ft/ft)	S _x +S _g *E	0.057	0.075
Q _{sx} - Remaining Flow After Grate Interception	Q-Q _{gi}	3.522	1.128
S _g - Gutter Cross Slope (ft/ft)	D _g /W	0.111	
¹ L _i - Effective Interception Length (ft)	0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _e) ^{0.6}	21.58	11.36
¹ Q _{ci} - Intercepted Flow (cfs)	(1-(1-L _{ce} /L _i) ^{1.8})*Q _{sx} or Q _{sx} if L _i is less than L _{ce}	0.7	0.4

Output (Combination):

Equation:

Q100 (Ult): Q10 (Ult):

Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	2.6	1.6
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	2.8	0.7

¹ Formula referenced from the CCRFCD Manual

² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Curb Inlet Sizing Computation



Project Name & Number: KBH1805.006 Montecito Oso Blanca Road
 Date: 7/10/2019
 By: J. Rocha

Notes:

Facility ID: Facility FD7-South
 Source of Flow: Q100 (Ult): FD6-S BYPASS + (1/2)*OSO(C)
 Q10 (Ult): FD6-S BYPASS + (1/2)*OSO(C)
 Inlet Type: Type CM2 (Continuous Grade)
 Inlet Length: 7.5-ft
 Number of Grates: 2

Input:

Variable:

Q100 (Ult): Q10 (Ult):

Street Flow (cfs)	Q	4.8	1.7
Longitudinal Slope (ft/ft)	S_o	0.0219	
Manning's Coefficient	n	0.016	
Street Flow Velocity (fps)	V	3.44	2.76
Street Flow Depth (ft)	D	0.36	0.28
Street Cross Slope (ft/ft)	S_x	0.02	
Grate Width (ft)	W	1.5	
Grate Depression (in)	D_g	2.0	
Length of Grate (ft)	L_g	5.0	
Length of Curb Opening (ft)	L_c	7.50	
Clogging Factor - Grate (%)	CF_g	50%	
Clogging Factor - Curb (%)	CF_c	50%	
Effective Grate Length (ft)	L_{ge}	2.5	
Effective Curb Opening Length (ft)	L_{ce}	3.75	

Output (Grate):

Equation:

Output (Grate):

¹ R_f - Frontal Flow Factor	$1 - 0.09 \cdot (V - V_x)$ if $V > V_x$; else Frontal Flow Factor=1	1.00	1.00
² V_o - Splash Over Velocity (fps)	$V_x = p + q \cdot L_g - r \cdot L_{ge}^2 + s \cdot y \cdot L_{ge}^3$; where $p = 0.30, q = 4.85, r = 1.31, s = 0.15$ (for Vane Grate)	6.58	
¹ E - Grate Flow Ratio	Frontal Flow/Side Flow	0.36	0.56
² Q_w - Frontal Flow (cfs)	$Q_w = Q[1 - (1 - (W/T))^{2.67}]$	1.74	0.95
¹ Q_s - Side Flow (cfs)	$Q_s = Q - Q_w$	3.1	0.7
T - Side Flow Spread (ft)	$(D - D_g)/S_x$	9.67	5.67
¹ R_s - Side Flow Factor	$1 / (1 + (0.15 \cdot V^{1.8}) / (S_x \cdot L_{ge}^{2.3}))$	0.11	0.15
¹ Q_{gi} - Intercepted Flow (cfs)	$(R_f \cdot E + R_s \cdot (1 - E)) \cdot Q$	2.1	1.1

Output (Curb):

Equation:

Output (Curb):

¹ S_o - Equivalent Cross Slope (ft/ft)	$S_x + S_g \cdot E$	0.060	0.082
Q_{sx} - Remaining Flow After Grate Interception	$Q - Q_{gi}$	2.735	0.636
S_g - Gutter Cross Slope (ft/ft)	D_g/W	0.111	
¹ L_t - Effective Interception Length (ft)	$0.60 \cdot Q_{sx}^{0.42} \cdot S_o^{0.30} \cdot (1/n \cdot S_o)^{0.6}$	18.76	8.44
¹ Q_{ci} - Intercepted Flow (cfs)	$(1 - (1 - L_{ce}/L_t)^{1.8}) \cdot Q_{sx}$ or Q_{sx} if L_t is less than L_{ce}	0.9	0.4

Output (Combination):

Equation:

Q100 (Ult): Q10 (Ult):

Total Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	3.0	1.5
Bypass Flow (cfs)	Street Flow - Total Intercepted Flow	1.8	0.2

¹ Formula referenced from the CCRFCD Manual

² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Curb Inlet Sizing Computation			 SLATER HANIFAN GROUP a Westwood team	
Project Name & Number:		KBH1805.006 Montecito Oso Blanca Road		
Date:		7/10/2019		
By:		J. Rocha		
Notes:				
Facility ID:		Facility FD8-South		
Source of Flow:		Q100 (Ult): FD7-S BYPASS + (1/2)*OSO(D) Q10 (Ult): FD7-S BYPASS + (1/2)*OSO(D)		
Inlet Type:		Type CM2 (Continuous Grade)		
Inlet Length:		12.5-ft		
Number of Grates		4		
Input:		Variable:	Q100 (Ult): Q10 (Ult):	
Street Flow (cfs)		Q	3.8	1.2
Longitudinal Slope (ft/ft)		S _o	0.0206	
Manning's Coefficient		n	0.016	
Street Flow Velocity (fps)		V	3.19	2.55
Street Flow Depth (ft)		D	0.35	0.26
Street Cross Slope (ft/ft)		S _x	0.02	
Grate Width (ft)		W	1.5	
Grate Depression (in)		D _g	2.0	
Length of Grate (ft)		L _g	10.0	
Length of Curb Opening (ft)		L _c	12.50	
Clogging Factor - Grate (%)		CF _g	50%	
Clogging Factor - Curb (%)		CF _c	50%	
Effective Grate Length (ft)		L _{ge}	5.0	
Effective Curb Opening Length (ft)		L _{ce}	6.25	
Output (Grate):		Equation:	Output (Grate):	
1 R _f - Frontal Flow Factor		1-0.09*(V-V _x) if V>V _x ; else Frontal Flow Factor=1	1.00	1.00
2 V _o - Splash Over Velocity (fps)		V _x =p+q*L _g -r*L _{ge} ² +sy*L _{ge} ³ ; where p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate)	10.55	
1 E - Grate Flow Ratio		Frontal Flow/Side Flow	0.38	0.64
2 Q _w - Frontal Flow (cfs)		Q _w = Q[1-(1-(W/T)) ^{2.67}]	1.44	0.77
1 Q _s - Side Flow (cfs)		Q _s = Q-Q _w	2.4	0.4
1 T - Side Flow Spread (ft)		(D-D _g)/S _x	9.17	4.67
1 R _s - Side Flow Factor		1/(1+(0.15*V ^{1.8})/(S _x *L _{ge} ^{2.3}))	0.40	0.50
1 Q _{gi} - Intercepted Flow (cfs)		(R _f *E+R _s *(1-E))*Q	2.4	1.0
Output (Curb):		Equation:	Output (Curb):	
1 S _e - Equivalent Cross Slope (ft/ft)		S _x +S _g *E	0.062	0.092
Q _{sx} - Remaining Flow After Grate Interception		Q-Q _{gi}	1.413	0.213
S _g - Gutter Cross Slope (ft/ft)		D _g /W	0.111	
1 L _t - Effective Interception Length (ft)		0.60*Q _{sx} ^{0.42} *S _o ^{0.30} *(1/n*S _o) ^{0.6}	13.70	4.90
1 Q _{ci} - Intercepted Flow (cfs)		(1-(1-L _{ce} /L _t) ^{1.8})*Q _{sx} or Q _{sx} if L _t is less than L _{ce}	0.9	0.2
Output (Combination):		Equation:	Q100 (Ult): Q10 (Ult):	
Total Intercepted Flow (cfs)		Intercepted (Grate) + Intercepted (Curb)	3.3	1.2
Bypass Flow (cfs)		Street Flow - Total Intercepted Flow	0.5	0

¹ Formula referenced from the CCRFCD Manual
² Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

Project Name:	Montecito Oso Blanca Road
Project Number:	KBH1805.006
Date:	7/10/2019 8:45
By:	J. Rocha



STORM SEWER HYDRAULIC CALCULATIONS

STATION		CONDUIT DATA			FLOW DATA							LOSS		HGL		COMMENTS	
FROM	TO	SIZE / TYPE	D/S ELEV.	INVERTS	LENGTH	A	R	Φ	Q	V	H _v = V ² /2g (FT)	S _i	PIPE H _f (FT)	D/S HGL ELEV.	PIPE U/S HGL ELEV.	PRESS. FLOW?	OTHER
1000	1043.46	Round 30" RCP	2510.88	2511.05	43.46	4.908738	0.625	0.004925	29.6	6.030063	0.564622	0.005195384	0.226	2513.15	2513.374	No	LATERAL #1 (FD5-S)
1000	1071.10	Round 18" RCP	2511.36	2512.31	71.1	1.767146	0.375	0.004925	2.5	1.414711	0.031078	0.000564116	0.040	2513.06	2513.096	No	LATERAL #2 (FD5-N)
1000	1077.10	Round 18" RCP	2504.00	2504.77	77.1	1.767146	0.375	0.004925	1.5	0.848826	0.011188	0.000203082	0.016	2505.50	2505.516	No	LATERAL #3 (FD6-N)
1000	1019.95	Round 18" RCP	2504.00	2504.20	19.95	1.767146	0.375	0.004925	2.6	1.471299	0.033614	0.000610147	0.012	2505.50	2505.512	No	LATERAL #4 (FD6-S)
1000	1071.69	Round 18" RCP	2486.00	2486.72	71.69	1.767146	0.375	0.004925	2.0	1.131769	0.01989	0.000361034	0.026	2487.50	2487.526	No	LATERAL #5-L (FD7-N)
1000	1009.76	Round 36" RCP	2484.50	2484.71	9.76	7.068583	0.75	0.004925	3.0	0.424413	0.002797	2.01949E-05	0.000	2487.50	2487.500	No	LATERAL #5-R (FD7-S)
1000	1012.87	Round 18" RCP	2475.69	2476.00	12.87	1.767146	0.375	0.004925	3.0	1.697653	0.044752	0.000812326	0.010	2477.19	2477.200	No	LATERAL #6 (FD8-N)
1000	1017.99	Round 18" RCP	2480.02	2480.39	17.99	1.767146	0.375	0.004925	3.3	1.867418	0.05415	0.000982915	0.018	2481.52	2481.538	No	LATERAL #7 (FD8-S)

Sf = Φ Hv / R^{1.33}

Φ = 2g (n²) / 2.21

1 - Where pipes are not under pressure, assume U/S HGL is at top of pipe

APPENDIX D

Reference NDOT Materials

STATE MAINTAINED HIGHWAYS OF NEVADA

DESCRIPTIONS AND MAPS

JANUARY 2019



NEVADA DEPARTMENT OF TRANSPORTATION

1263 S. STEWART ST.

CARSON CITY, NV 89712

Published by the Planning Division, Roadway Systems Section

For information please call (775) 888-7447

Maps produced by the Nevada Department of Transportation, Cartography Section

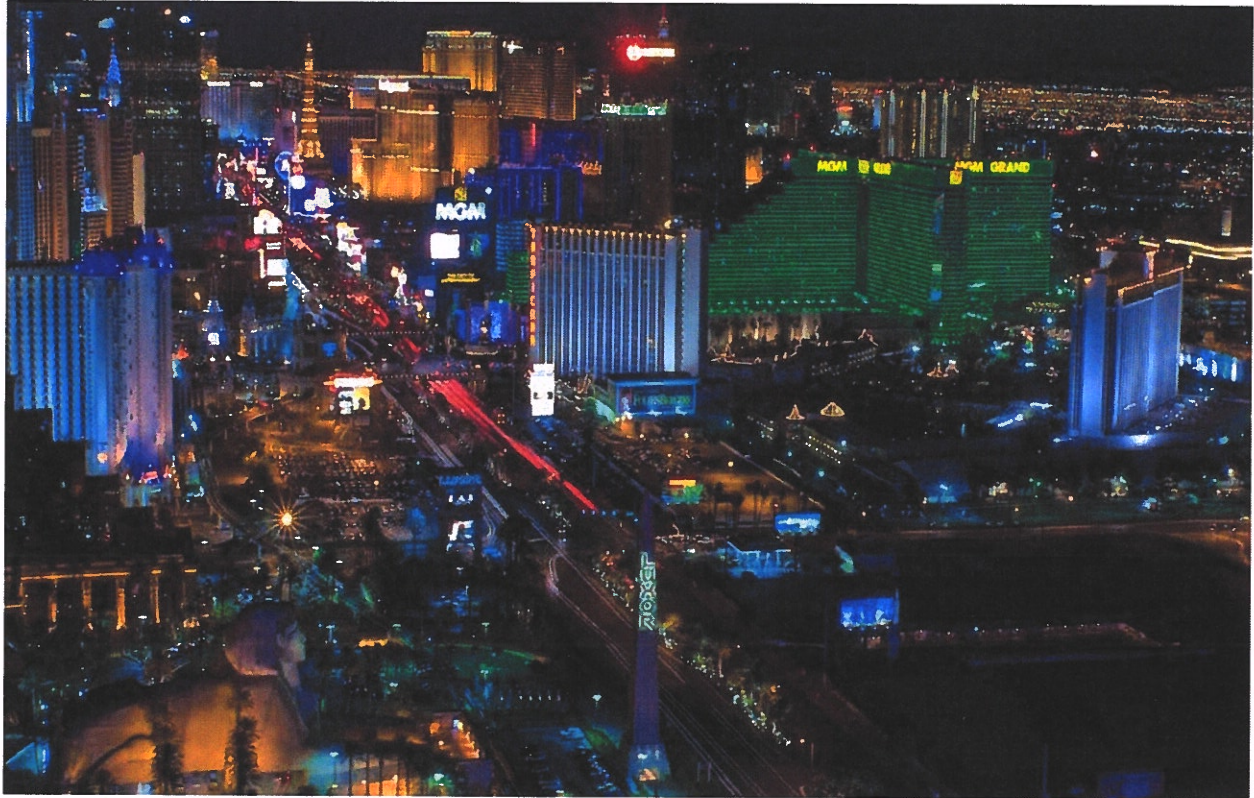
in cooperation with the U.S. Dept. of Transportation and the Federal Highway Administration

Nevada Division



Kristina Swallow, P.E., Director

Clark County



POPULATION 2,145,354

Photo By: Sydney Martinez/travelnevada.com

CLARK COUNTY

ROUTE	RMID	DESCRIPTION	MILEAGE
<u>ESCAPE RAMPS</u>			
ERCL01	11321	Escape Ramp on SR163 @ MP 18.05	0.395
ER TOTAL			0.395
<u>FRONTAGE ROADS</u>			
FRCL01	271	0.262 miles north of Jct Primm Blvd., east side near IR15, Primm Intg, Exit #1 to R/W fence 0.551 miles north @ EOP	0.551
FRCL02	270	Primm Blvd., from R/W fence west of Ramps 3 & 4, IR15, Primm Intg, Exit #1 to 0.098 miles east of Ramps 1 & 2	0.231
FRCL05	1059	Highland Dr., from 0.033 miles east of Cinder Ln. to 0.078 miles north near Spring Mtn Intg, Exit #39	U* 0.078
FRCL06	218	Martin Luther King Blvd., from Oakey Blvd. to Charleston Blvd.	U* 0.599
FRCL07	375	IR15, Ramps 3 & 4, Apex Intg, Exit #58 to 5.749 miles north of US93, west side IR15	11.819
FRCL08	267	IR15, Ramps 1 & 2, Garnet Intg, Exit #64 to EOP	1.753
FRCL09	266	IR15, 0.010 miles south of Ramps 1 & 2 @ cattleguard, Ute Intg, Exit #80 to cattleguard 0.037 miles north of Ramps 3 & 4	0.199
FRCL10	257	Hidden Valley Rd., from IR15, Hidden Valley Intg, Exit #88 @ cattleguard 0.014 miles east of Ramps 1 & 2 to 1.892 miles northwest of Ramps 1 & 2 @ Muddy River	1.906
FRCL11	264	Dude Dr., west side of IR15, Moapa Valley Intg, Exit #90, 0.346 miles south of SR168 to SR168	0.346
FRCL12	272	From the cattleguard @ the east R/W fence, IR15, Carp Elgin Intg, Exit #100 to 3.971 miles north of the cattleguard	3.971
FRCL13	262	0.683 miles south of FRCL14 @ EOP, IR15, E Mesa Intg to Jct of Ramps 3 & 4	1.417
FRCL14	261	FRCL13, IR15, E Mesa Intg, Exit #109 to Jct of Ramps 1 & 2	0.860
FRCL17	259	Ramps 3 & 4, IR15, Valley of Fire Intg, Exit #75 to 0.169 miles southwest of cattleguard @ Ramps 1 & 2	0.339
FRCL18	258	Ramps 3 & 4, IR15, Byron Intg, Exit #84 to Ramps 1 & 2	0.511
FRCL22	1060	Ann Rd., from Buffalo Dr. to Drexel Rd.	U* 0.571
FRCL23	1061	Oso Blanca Rd., CC215 to 0.740 miles north of SR157/Kyle Canyon Rd.	U* 5.229

Map Legend



State maintained portion of the
National Highway System (NHS)



Non-maintained portion of the
National Highway System (NHS)

Interchange number and
Interchange symbol



Interstate route or controlled access



United States route



Nevada State route



Frontage road



Collector / Distributor road



State park, rest park, escape ramp and other



Ramp



Non-maintained route (reference only)



Proposed route



Enlarged area boundary



NDOT Maintenance District boundary



NDOT Maintenance Station (staffed only)



State Capital

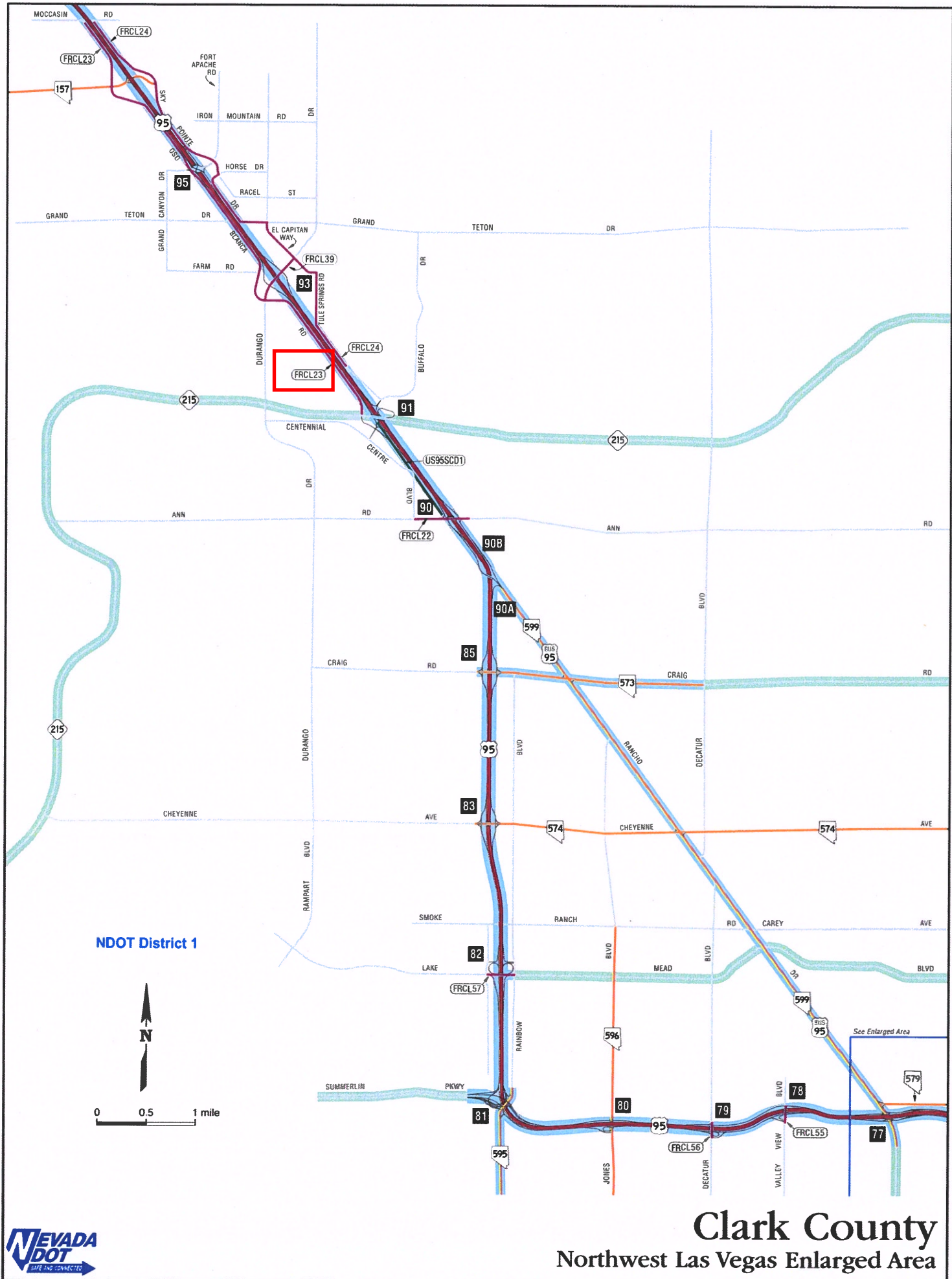


City, Town or Site



Rest Park

NOTE: Maps are not to scale



NEVADA DEPARTMENT OF TRANSPORTATION



Jeff Fontaine, P.E.
Director

DRAINAGE MANUAL



Kenny Guinn
Governor



Prepared By: Hydraulics Section
2nd Edition
December 2006

A design storm frequency shall be selected based on the facility to be designed and the roadway classification. Design storm frequency tables for various facilities are as follows:

Table 3-1 Roadway Surface Drainage Facilities		
Roadway Classification ⁽¹⁾	Minimum Design Return Frequency (Years)	Maximum Allowable Spread Into Adjacent Travel Lane ⁽³⁾
Interstate Highways ⁽²⁾	25	0
Principal Arterials & Other Freeways and Expressways ⁽²⁾	25	0
Other Principal Arterial	25	½ lane
Minor Arterial	10	½ lane
Rural Major Collector	10	½ lane
Urban or Rural Minor Collector	10	½ lane
Frontage Roads (if not classified)	10	½ lane

- (1) Contact the NDOT Planning Division for the latest roadway [functional classification maps](#).
- (2) Including ramps
- (3) Spread limits specified are as measured into the traveled lane beyond any available parking lanes, bike lanes, and shoulder widths. Turn pockets and bus turnouts are not considered as the travel lane. Auxiliary lanes are considered as travel lane.

Table 3-2 Design Storm Selection Guidelines for Off-Site Flow Facilities (Culverts, Channels, Bridges)	
Roadway Classification ⁽¹⁾	Minimum Design Return Frequency (years) ⁽²⁾
Interstate Highways ⁽³⁾	50
Principal Arterials & Other Freeways and Expressways ⁽³⁾	50
Other Principal Arterial	25
Minor Arterial	25
Rural Major Collector	25
Urban or Rural Minor Collector	10
Frontage Roads (if not classified)	10

- (1) Contact the NDOT Planning Division for the latest roadway [functional classification maps](#).
- (2) If an existing roadway is known to have been designed for a higher return frequency than indicated in the above table, the higher return frequency shall be used for design.
- (3) Including ramps.

The hydrologic analysis shall consider the existing and future 20-year development or ultimate build-out condition in the contributing watershed. Verify assumptions with the Principal Hydraulic Engineer (PHE). The existing conditions shall be evaluated based on current development and current flood control facilities in place. If proposed flood control

APPENDIX E

Reference WSPGW Model
Technical Drainage Study Update for Montecito Storm Drain
Infrastructure (CLV DS 5108)

**TECHNICAL DRAINAGE STUDY
UPDATE**

Montecito Storm Drain Infrastructure
City of Las Vegas, Nevada

Job No.: KBH1805.004

Date: June 2019

Prepared For:

KB Home
5795 Badura Avenue, Ste 180
Las Vegas, NV 89118
Phone: 702-266-8400 • Fax: 702-266-8623

Prepared By:

Slater Hanifan Group, A Westwood Team
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Las Vegas, Nevada 89118
Phone: 702-284-5300 • Fax: 702-284-5399



Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724

Assisted by Jonathan S. Rocha, E.I.
Caitlyn Alcantara, E.I.
D'Amato Hyche

SDN

T1 KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update

T2 SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

T3 STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

SO	-2918.3702501.500	63		2505.180					
R	-2878.0702510.100	63	.013		.000	-15.000	0		
TS	-2868.0702510.240	73	.013		.000				
R	-2820.0102510.880	73	.013			.000	1		
JX	-2820.0102510.880	73 30	.013	37.000	2510.880	64.0	.000		
R	-2788.0402511.310	73	.013		.000	13.000	1		
TS	-2778.0402511.470	60	.013		.000				
R	-2512.1002516.940	60	.013		.000	.000	0		
R	-2437.3502517.310	60	.013		.000	.000	0		
R	-2430.7602517.343	60	.013		.000	15.000	0		
R	-2417.5802517.409	60	.013		.000	15.000	0		
R	-2411.0902517.440	60	.013		.000	.000	0		
R	-2403.7402517.477	60	.013		.000	-15.000	0		
R	-2389.0402517.551	60	.013		.000	-15.000	0		
R	-2381.8102517.590	60	.013		.000	.000	0		
R	-2275.5502518.120	60	.013		.000	.000	0		
R	-2266.8902518.160	60	.013		.000	-15.000	0		
R	-2249.5702518.250	60	.013		.000	-15.000	0		
R	-2232.2502518.330	60	.013		.000	-15.000	0		
R	-2214.9302518.420	60	.013		.000	-15.000	0		
R	-2206.6602518.460	60	.013		.000	.000	1		
R	-2198.0002518.512	60	.013		.000	15.000	0		
R	-2180.6802518.616	60	.013		.000	15.000	0		
R	-2163.3602518.720	60	.013		.000	15.000	0		
R	-2146.0402518.824	60	.013		.000	15.000	0		
R	-2137.7602518.880	60	.013		.000	.000	0		
R	-1913.3802520.220	60	.013			0.0	1		
R	-1632.8402527.480	60	.013			0.0	1		
R	-1368.0002533.440	60	.013		.000	.000	0		
R	-1360.0102533.620	60	.013		.000	2.090	0		
R	-1352.0202533.824	60	.013		.000	15.000	0		
R	-1333.0402534.183	60	.013		.000	15.000	0		
R	-1320.0602534.543	60	.013		.000	15.000	0		
R	-1304.0802534.902	60	.013		.000	15.000	0		
R	-1296.4802535.050	60	.013		.000	.000	0		
R	-1252.8002536.030	60	.013		.000	-15.000	1		
R	-1252.7992536.031	60	.013		.000	-12.000	0		
R	-1225.8112536.819	60	.013		.000	-15.000	1		
R	-1225.8092536.820	60	.013		.000	-15.000	0		
R	-1225.8082536.821	60	.013		.000	-15.000	0		
R	-1140.0002539.320	60	.013		.000	.000	1		
TS	-1130.0002539.610	85	.013		.000				
R	-1129.9992539.611	85	.013		.000	15.000	0		
R	-1129.9982539.612	85	.013		.000	1.200	0		
R	-1005.0302543.720	85	.013			0.0	0		
SH	-1005.0302543.720	85							
CD	18	4	1	0.000	1.500	0.000	0.000	0.000	0.000
CD	24	4	1	0.000	2.000	0.000	0.000	0.000	0.000
CD	30	4	1	0.000	2.500	0.000	0.000	0.000	0.000
CD	36	4	1	0.000	3.000	0.000	0.000	0.000	0.000
CD	54	4	1	0.000	4.500	0.000	0.000	0.000	0.000
CD	60	4	1	0.000	5.000	0.000	0.000	0.000	0.000
CD	63	3	0	0.000	3.000	6.000	0.000	0.000	0.000
CD	73	3	0	0.000	3.000	7.000	0.000	0.000	0.000
CD	85	3	0	0.000	5.000	8.000	0.000	0.000	0.000
Q				227.000	.0				

SDN
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 CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP
 CD 18 4 1 1.500
 CD 24 4 1 2.000
 CD 30 4 1 2.500
 CD 36 4 1 3.000
 CD 54 4 1 4.500
 CD 60 4 1 5.000
 CD 63 3 0 .000 3.000 6.000 .000 .000 .00
 CD 73 3 0 .000 3.000 7.000 .000 .000 .00
 CD 85 3 0 .000 5.000 8.000 .000 .000 .00
 W S P G W
 WATER SURFACE PROFILE - TITLE CARD LISTING

PAGE NO 1

HEADING LINE NO 1 IS -
 KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update
 HEADING LINE NO 2 IS -
 SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
 HEADING LINE NO 3 IS -
 STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

PAGE NO 2

W S P G W
 WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO 1 IS A SYSTEM OUTLET
 U/S DATA STATION INVERT SECT W S ELEV
 -2918.370 2501.500 63 2505.180
 ELEMENT NO 2 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2878.070 2510.100 63 .013 .000 .000 -15.000 0
 ELEMENT NO 3 IS A TRANSITION
 U/S DATA STATION INVERT SECT N RADIUS ANGLE
 -2868.070 2510.240 73 .013 .000 .000
 ELEMENT NO 4 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2820.010 2510.880 73 .013 .000 .000 .000 1
 ELEMENT NO 5 IS A JUNCTION
 U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
 -2820.010 2510.880 73 30 0 .013 37.000 .000 2510.880 .000 64.000 .000
 RADIUS ANGLE
 .000 .000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
 ELEMENT NO 6 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2788.040 2511.310 73 .013 .000 .000 13.000 1
 ELEMENT NO 7 IS A TRANSITION
 U/S DATA STATION INVERT SECT N RADIUS ANGLE
 -2778.040 2511.470 60 .013 .000 .000
 ELEMENT NO 8 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2512.100 2516.940 60 .013 .000 .000 .000 0
 ELEMENT NO 9 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2437.350 2517.310 60 .013 .000 .000 .000 0
 ELEMENT NO 10 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2430.760 2517.343 60 .013 .000 .000 15.000 0
 ELEMENT NO 11 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2417.580 2517.409 60 .013 .000 .000 15.000 0
 W S P G W
 WATER SURFACE PROFILE - ELEMENT CARD LISTING

PAGE NO 3

ELEMENT NO 12 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2411.090 2517.440 60 .013 .000 .000 .000 0
 ELEMENT NO 13 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2403.740 2517.477 60 .013 .000 .000 -15.000 0
 ELEMENT NO 14 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2389.040 2517.551 60 .013 .000 .000 -15.000 0
 ELEMENT NO 15 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2381.810 2517.590 60 .013 .000 .000 .000 0
 ELEMENT NO 16 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2275.550 2518.120 60 .013 .000 .000 .000 0
 ELEMENT NO 17 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2266.890 2518.160 60 .013 .000 .000 -15.000 0
 ELEMENT NO 18 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2249.570 2518.250 60 .013 .000 .000 -15.000 0
 ELEMENT NO 19 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
 -2232.250 2518.330 60 .013 .000 .000 -15.000 0
 ELEMENT NO 20 IS A REACH
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

ELEMENT NO	IS A	REACH	STATION	INVERT	SECT		RADIUS	ANGLE	ANG PT	MAN H
21	IS A	REACH	-2214.930	2518.420	60	.013	.000	.000	-15.000	0
	U/S DATA					N				
22	IS A	REACH	-2206.660	2518.460	60	.013	.000	.000	.000	1
	U/S DATA					N				
23	IS A	REACH	-2198.000	2518.512	60	.013	.000	.000	15.000	0
	U/S DATA					N				
24	IS A	REACH	-2180.680	2518.616	60	.013	.000	.000	15.000	0
	U/S DATA					N				
			-2163.360	2518.720	60	.013	.000	.000	15.000	0
W S P G W										
WATER SURFACE PROFILE - ELEMENT CARD LISTING										
25	IS A	REACH	-2146.040	2518.824	60	.013	.000	.000	15.000	0
	U/S DATA					N				
26	IS A	REACH	-2137.760	2518.880	60	.013	.000	.000	.000	0
	U/S DATA					N				
27	IS A	REACH	-1913.380	2520.220	60	.013	.000	.000	.000	1
	U/S DATA					N				
28	IS A	REACH	-1632.840	2527.480	60	.013	.000	.000	.000	1
	U/S DATA					N				
29	IS A	REACH	-1368.000	2533.440	60	.013	.000	.000	.000	0
	U/S DATA					N				
30	IS A	REACH	-1360.010	2533.620	60	.013	.000	.000	2.000	0
	U/S DATA					N				
31	IS A	REACH	-1352.020	2533.824	60	.013	.000	.000	15.000	0
	U/S DATA					N				
32	IS A	REACH	-1333.040	2534.183	60	.013	.000	.000	15.000	0
	U/S DATA					N				
33	IS A	REACH	-1320.060	2534.543	60	.013	.000	.000	15.000	0
	U/S DATA					N				
34	IS A	REACH	-1304.080	2534.902	60	.013	.000	.000	15.000	0
	U/S DATA					N				
35	IS A	REACH	-1296.480	2535.050	60	.013	.000	.000	.000	0
	U/S DATA					N				
36	IS A	REACH	-1252.800	2536.030	60	.013	.000	.000	-15.000	1
	U/S DATA					N				
37	IS A	REACH	-1252.799	2536.031	60	.013	.000	.000	-12.000	0
W S P G W										
WATER SURFACE PROFILE - ELEMENT CARD LISTING										
38	IS A	REACH	-1225.811	2536.819	60	.013	.000	.000	-15.000	1
	U/S DATA					N				
39	IS A	REACH	-1225.809	2536.820	60	.013	.000	.000	-15.000	0
	U/S DATA					N				
40	IS A	REACH	-1225.808	2536.821	60	.013	.000	.000	-15.000	0
	U/S DATA					N				
41	IS A	REACH	-1140.000	2539.320	60	.013	.000	.000	.000	1
	U/S DATA					N				
42	IS A	TRANSITION	-1130.000	2539.610	85	.013	.000	.000		
	U/S DATA					N				
43	IS A	REACH	-1129.999	2539.611	85	.013	.000	.000	15.000	0
	U/S DATA					N				
44	IS A	REACH	-1129.998	2539.612	85	.013	.000	.000	1.200	0
	U/S DATA					N				
45	IS A	REACH	-1005.030	2543.720	85	.013	.000	.000	.000	0
	U/S DATA					N				
46	IS A	SYSTEM HEADWORKS	-1005.030	2543.720	85					
	U/S DATA									

SDN

W S ELEV
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Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
-2918.370	2501.500	1.579	2503.080	264.00	27.86	12.05	2515.13	.00	3.00	6.00	3.000	6.000	.00	0 .0
1.091	.2134				.0562	.06	1.58	3.91	1.01	.013	.00	.00	BOX	
-2917.280	2501.733	1.591	2503.324	264.00	27.66	11.88	2515.20	.00	3.00	6.00	3.000	6.000	.00	0 .0
6.210	.2134				.0520	.32	1.59	3.86	1.01	.013	.00	.00	BOX	
-2911.069	2503.058	1.669	2504.727	264.00	26.37	10.80	2515.52	.00	3.00	6.00	3.000	6.000	.00	0 .0
5.358	.2134				.0454	.24	1.67	3.60	1.01	.013	.00	.00	BOX	
-2905.711	2504.202	1.750	2505.952	264.00	25.14	9.82	2515.77	.00	3.00	6.00	3.000	6.000	.00	0 .0
4.645	.2134				.0397	.18	1.75	3.35	1.01	.013	.00	.00	BOX	
-2901.066	2505.193	1.835	2507.029	264.00	23.97	8.92	2515.95	.00	3.00	6.00	3.000	6.000	.00	0 .0
4.037	.2134				.0347	.14	1.84	3.12	1.01	.013	.00	.00	BOX	
-2897.029	2506.055	1.925	2507.980	264.00	22.86	8.11	2516.09	.00	3.00	6.00	3.000	6.000	.00	0 .0
3.515	.2134				.0303	.11	1.93	2.90	1.01	.013	.00	.00	BOX	
-2893.514	2506.805	2.019	2508.824	264.00	21.79	7.37	2516.20	.00	3.00	6.00	3.000	6.000	.00	0 .0
3.060	.2134				.0265	.08	2.02	2.70	1.01	.013	.00	.00	BOX	
-2890.454	2507.458	2.118	2509.575	264.00	20.78	6.70	2516.28	.00	3.00	6.00	3.000	6.000	.00	0 .0
2.662	.2134				.0232	.06	2.12	2.52	1.01	.013	.00	.00	BOX	
-2887.792	2508.026	2.221	2510.247	264.00	19.81	6.09	2516.34	.00	3.00	6.00	3.000	6.000	.00	0 .0
2.309	.2134				.0204	.05	2.22	2.34	1.01	.013	.00	.00	BOX	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
-2885.483	2508.518	2.329	2510.848	264.00	18.89	5.54	2516.39	.00	3.00	6.00	3.000	6.000	.00	0 .0
1.995	.2134				.0179	.04	2.33	2.18	1.01	.013	.00	.00	BOX	
-2883.489	2508.944	2.443	2511.387	264.00	18.01	5.04	2516.42	.00	3.00	6.00	3.000	6.000	.00	0 .0
1.713	.2134				.0157	.03	2.44	2.03	1.01	.013	.00	.00	BOX	
-2881.776	2509.309	2.562	2511.872	264.00	17.17	4.58	2516.45	.00	3.00	6.00	3.000	6.000	.00	0 .0
1.459	.2134				.0138	.02	2.56	1.89	1.01	.013	.00	.00	BOX	
-2880.317	2509.621	2.687	2512.308	264.00	16.37	4.16	2516.47	.00	3.00	6.00	3.000	6.000	.00	0 .0
1.229	.2134				.0121	.01	2.69	1.76	1.01	.013	.00	.00	BOX	
-2879.088	2509.883	2.818	2512.701	264.00	15.61	3.78	2516.49	.00	3.00	6.00	3.000	6.000	.00	0 .0
1.018	.2134				.0107	.01	2.82	1.64	1.01	.013	.00	.00	BOX	
WARNING - Flow depth near top of box conduit														
-2878.070	2510.100	2.956	2513.056	264.00	14.88	3.44	2516.50	.00	3.00	6.00	3.000	6.000	.00	0 .0
TRANS STR	.0140				.0118	.12	2.96	1.53		.013	.00	.00	BOX	
WARNING - Flow depth near top of box conduit														
-2868.070	2510.240	2.276	2512.516	264.00	16.57	4.26	2516.78	.00	3.00	7.00	3.000	7.000	.00	0 .0

Referenced Starting Hgt for lateral FDS-N

48.060 .0133
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SDN
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2.28 1.94 2.30 .013 .00 .00 BOX
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WATER SURFACE PROFILE LISTING
KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update
SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2820.010	2510.880	2.268	2513.148	264.00	16.63	4.29	2517.44	.00	3.00	7.00	3.000	7.000	.00	0 .0
JUNCT STR	.0000					.0201	.00	2.27	1.95		.013	.00	.00	BOX
-2820.010	2510.880	1.627	2512.507	227.00	19.93	6.17	2518.68	.00	3.00	7.00	3.000	7.000	.00	0 .0
						.0282	.90	1.63	2.75	2.06	.013	.00	.00	BOX
31.970	.0135													
-2788.040	2511.310	1.560	2512.870	227.00	20.79	6.71	2519.58	.00	3.00	7.00	3.000	7.000	.00	0 .0
TRANS STR	.0160					.0238	.24	1.56	2.93		.013	.00	.00	BOX
-2778.040	2511.470	2.946	2514.416	227.00	18.86	5.52	2519.94	.00	4.26	4.92	5.000	.000	.00	1 .0
						.0175	.58	2.95	2.12	2.81	.013	.00	.00	PIPE
32.825	.0206													
-2745.215	2512.145	2.975	2515.120	227.00	18.64	5.39	2520.51	.00	4.26	4.91	5.000	.000	.00	1 .0
						.0163	1.40	2.98	2.09	2.81	.013	.00	.00	PIPE
85.930	.0206													
-2659.286	2513.912	3.097	2517.009	227.00	17.77	4.90	2521.91	.00	4.26	4.86	5.000	.000	.00	1 .0
						.0144	.74	3.10	1.93	2.81	.013	.00	.00	PIPE
51.520	.0206													
-2607.765	2514.972	3.226	2518.198	227.00	16.94	4.46	2522.66	.00	4.26	4.78	5.000	.000	.00	1 .0
						.0128	.44	3.23	1.78	2.81	.013	.00	.00	PIPE
34.439	.0206													
-2573.327	2515.680	3.364	2519.044	227.00	16.16	4.05	2523.10	.00	4.26	4.69	5.000	.000	.00	1 .0
						.0114	.27	3.36	1.65	2.81	.013	.00	.00	PIPE
24.036	.0206													
-2549.290	2516.175	3.512	2519.687	227.00	15.40	3.68	2523.37	.00	4.26	4.57	5.000	.000	.00	1 .0
						.0102	.17	3.51	1.51	2.81	.013	.00	.00	PIPE
16.838	.0206													

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WATER SURFACE PROFILE LISTING
KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update
SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2532.452	2516.521	3.672	2520.193	227.00	14.69	3.35	2523.54	.00	4.26	4.42	5.000	.000	.00	1 .0
						.0091	.10	3.67	1.38	2.81	.013	.00	.00	PIPE
11.333	.0206													
-2521.119	2516.754	3.847	2520.601	227.00	14.00	3.05	2523.65	.00	4.26	4.21	5.000	.000	.00	1 .0
						.0082	.06	3.85	1.26	2.81	.013	.00	.00	PIPE
6.703	.0206													
-2514.417	2516.892	4.041	2520.933	227.00	13.35	2.77	2523.70	.00	4.26	3.94	5.000	.000	.00	1 .0
						.0075	.02	4.04	1.13	2.81	.013	.00	.00	PIPE
2.317	.0206													
-2512.100	2516.940	4.263	2521.203	227.00	12.73	2.52	2523.72	.00	4.26	3.55	5.000	.000	.00	1 .0
						.0069	.14	4.26	1.00	5.00	.013	.00	.00	PIPE
20.301	.0050													
-2491.799	2517.041	4.531	2521.572	227.00	12.14	2.29	2523.86	.00	4.26	2.92	5.000	.000	.00	1 .0
						.0066	.36	4.53	.84	5.00	.013	.00	.00	PIPE
54.449	.0050													
-2437.350	2517.310	4.757	2522.067	227.00	11.77	2.15	2524.22	.00	4.26	2.15	5.000	.000	.00	1 .0
						.0066	.04	4.76	.69	5.00	.013	.00	.00	PIPE
6.590	.0050													
-2430.760	2517.343	4.777	2522.120	227.00	11.75	2.14	2524.26	.00	4.26	2.06	5.000	.000	.00	1 .0
						.0066	.09	4.78	.68	5.00	.013	.00	.00	PIPE
13.180	.0050													

SDN													
-2417.580	2517.409	4.815	2522.224	227.00	11.70	2.13	2524.35	.00	4.26	1.89	5.000	.000	.00 1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.490	.0048					.0066	.04	4.81	.64	5.00	.013	.00	PIPE
-2411.090	2517.440	4.835	2522.275	227.00	11.68	2.12	2524.39	.00	4.26	1.79	5.000	.000	.00 1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.350	.0050					.0067	.05	4.84	.62	5.00	.013	.00	PIPE

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KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2403.740	2517.477	4.855	2522.332	227.00	11.66	2.11	2524.44	.00	4.26	1.68	5.000	.000	.00	1 .0
14.700	.0050					.0067	.10	4.85	.60	5.00	.013	.00	.00	PIPE
-2389.040	2517.551	4.892	2522.444	227.00	11.62	2.10	2524.54	.00	4.26	1.45	5.000	.000	.00	1 .0
7.230	.0054					.0068	.05	4.89	.56	5.00	.013	.00	.00	PIPE
-2381.810	2517.590	4.907	2522.497	227.00	11.61	2.09	2524.59	.00	4.26	1.35	5.000	.000	.00	1 .0
36.123	.0050					.0071	.26	4.91	.54	5.00	.013	.00	.00	PIPE
-2345.687	2517.770	5.000	2522.770	227.00	11.56	2.08	2524.85	.00	4.26	.00	5.000	.000	.00	1 .0
70.137	.0050					.0075	.52	5.00	.00	5.00	.013	.00	.00	PIPE
-2275.550	2518.120	5.183	2523.303	227.00	11.56	2.08	2525.38	.00	4.26	.00	5.000	.000	.00	1 .0
8.660	.0046					.0076	.07	5.18	.00	5.00	.013	.00	.00	PIPE
-2266.890	2518.160	5.312	2523.471	227.00	11.56	2.08	2525.55	.00	4.26	.00	5.000	.000	.00	1 .0
17.320	.0052					.0076	.13	5.31	.00	5.00	.013	.00	.00	PIPE
-2249.570	2518.250	5.456	2523.706	227.00	11.56	2.08	2525.78	.00	4.26	.00	5.000	.000	.00	1 .0
17.320	.0046					.0076	.13	5.46	.00	5.00	.013	.00	.00	PIPE
-2232.250	2518.330	5.610	2523.940	227.00	11.56	2.08	2526.02	.00	4.26	.00	5.000	.000	.00	1 .0
17.320	.0052					.0076	.13	5.61	.00	5.00	.013	.00	.00	PIPE
-2214.930	2518.420	5.755	2524.175	227.00	11.56	2.08	2526.25	.00	4.26	.00	5.000	.000	.00	1 .0
8.270	.0048					.0076	.06	5.75	.00	5.00	.013	.00	.00	PIPE

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KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-2206.660	2518.460	5.881	2524.341	227.00	11.56	2.08	2526.42	.00	4.26	.00	5.000	.000	.00	1 .0
8.660	.0060					.0076	.07	5.88	.00	5.00	.013	.00	.00	PIPE
-2198.000	2518.512	5.998	2524.510	227.00	11.56	2.08	2526.58	.00	4.26	.00	5.000	.000	.00	1 .0
17.320	.0060					.0076	.13	6.00	.00	5.00	.013	.00	.00	PIPE
-2180.680	2518.616	6.128	2524.744	227.00	11.56	2.08	2526.82	.00	4.26	.00	5.000	.000	.00	1 .0
17.320	.0060					.0076	.13	6.13	.00	5.00	.013	.00	.00	PIPE
-2163.360	2518.720	6.258	2524.978	227.00	11.56	2.08	2527.05	.00	4.26	.00	5.000	.000	.00	1 .0
17.320	.0060					.0076	.13	6.26	.00	5.00	.013	.00	.00	PIPE
-2146.040	2518.824	6.389	2525.213	227.00	11.56	2.08	2527.29	.00	4.26	.00	5.000	.000	.00	1 .0
8.280	.0068					.0076	.06	6.39	.00	4.45	.013	.00	.00	PIPE

SDN

-2137.760	2518.880	6.396	2525.276	227.00	11.56	2.08	2527.35	.00	4.26	.00	5.000	.000	.00	1	.0
224.380	.0060					.0076	1.70	6.40	.00	5.00	.013	.00	.00	PIPE	
-1913.380	2520.220	6.864	2527.084	227.00	11.56	2.08	2529.16	.00	4.26	.00	5.000	.000	.00	1	.0
9.923	.0259					.0076	.08	6.86	.00	2.62	.013	.00	.00	PIPE	
-1903.457	2520.477	6.685	2527.162	227.00	11.56	2.08	2529.24	.00	4.26	.00	5.000	.000	.00	1	.0
HYDRAULIC JUMP															
-1903.457	2520.477	2.645	2523.122	227.00	21.53	7.20	2530.32	.00	4.26	4.99	5.000	.000	.00	1	.0
36.684	.0259					.0251	.92	2.64	2.61	2.62	.013	.00	.00	PIPE	

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WATER SURFACE PROFILE LISTING Date: 6-27-2019 Time:12:10:57
 KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update
 SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
 STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1866.773	2521.426	2.650	2524.076	227.00	21.49	7.17	2531.24	.00	4.26	4.99	5.000	.000	.00	1 .0
233.933	.0259					.0235	5.51	2.65	2.60	2.62	.013	.00	.00	PIPE
-1632.840	2527.480	2.753	2530.233	227.00	20.49	6.52	2536.75	.00	4.26	4.97	5.000	.000	.00	1 .0
264.840	.0225					.0211	5.58	2.75	2.42	2.74	.013	.00	.00	PIPE
-1368.000	2533.440	2.835	2536.275	227.00	19.76	6.06	2542.34	.00	4.26	4.95	5.000	.000	.00	1 .0
7.990	.0226					.0200	.16	2.83	2.29	2.73	.013	.00	.00	PIPE
-1360.010	2533.620	2.840	2536.460	227.00	19.72	6.04	2542.50	.00	4.26	4.95	5.000	.000	.00	1 .0
7.990	.0255					.0199	.16	2.84	2.28	2.63	.013	.00	.00	PIPE
-1352.020	2533.824	2.851	2536.675	227.00	19.63	5.98	2542.66	.00	4.26	4.95	5.000	.000	.00	1 .0
18.980	.0189					.0198	.38	2.85	2.26	2.89	.013	.00	.00	PIPE
-1333.040	2534.183	2.846	2537.029	227.00	19.67	6.01	2543.03	.00	4.26	4.95	5.000	.000	.00	1 .0
12.980	.0277					.0195	.25	2.85	2.27	2.57	.013	.00	.00	PIPE
-1320.060	2534.543	2.872	2537.415	227.00	19.45	5.87	2543.29	.00	4.26	4.94	5.000	.000	.00	1 .0
15.980	.0225					.0191	.31	2.87	2.23	2.74	.013	.00	.00	PIPE
-1304.080	2534.902	2.886	2537.788	227.00	19.34	5.81	2543.59	.00	4.26	4.94	5.000	.000	.00	1 .0
7.600	.0195					.0190	.14	2.89	2.21	2.86	.013	.00	.00	PIPE
-1296.480	2535.050	2.887	2537.937	227.00	19.33	5.80	2543.74	.00	4.26	4.94	5.000	.000	.00	1 .0
43.680	.0224					.0185	.81	2.89	2.21	2.74	.013	.00	.00	PIPE

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WATER SURFACE PROFILE LISTING Date: 6-27-2019 Time:12:10:57
 KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update
 SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
 STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1252.799	2536.031	2.933	2538.964	227.00	18.96	5.58	2544.55	.00	4.26	4.92	5.000	.000	.00	1 .0
26.988	.0292					.0172	.46	2.93	2.14	2.53	.013	.00	.00	PIPE
-1225.808	2536.821	3.031	2539.852	227.00	18.23	5.16	2545.01	.00	4.26	4.89	5.000	.000	.00	1 .0
14.367	.0291					.0158	.23	3.03	2.01	2.53	.013	.00	.00	PIPE
-1211.441	2537.240	3.097	2540.336	227.00	17.77	4.90	2545.24	.00	4.26	4.86	5.000	.000	.00	1 .0
21.535	.0291					.0144	.31	3.10	1.93	2.53	.013	.00	.00	PIPE
-1189.906	2537.867	3.226	2541.093	227.00	16.94	4.46	2545.55	.00	4.26	4.78	5.000	.000	.00	1 .0

SDN

16.382	.0291						.0128	.21	3.23	1.78	2.53	.013	.00	.00	PIPE	
-1173.524	2538.344	3.364	2541.708	227.00	16.16	4.05	2545.76	.00	4.26	4.69	5.000	.000	.00	.00	1	.0
12.437	.0291						.0114	.14	3.36	1.65	2.53	.013	.00	.00	PIPE	
-1161.087	2538.706	3.512	2542.218	227.00	15.40	3.68	2545.90	.00	4.26	4.57	5.000	.000	.00	.00	1	.0
9.237	.0291						.0102	.09	3.51	1.51	2.53	.013	.00	.00	PIPE	
-1151.850	2538.975	3.672	2542.647	227.00	14.69	3.35	2546.00	.00	4.26	4.42	5.000	.000	.00	.00	1	.0
6.488	.0291						.0091	.06	3.67	1.38	2.53	.013	.00	.00	PIPE	
-1145.362	2539.164	3.847	2543.011	227.00	14.00	3.05	2546.06	.00	4.26	4.21	5.000	.000	.00	.00	1	.0
3.961	.0291						.0082	.03	3.85	1.26	2.53	.013	.00	.00	PIPE	
-1141.402	2539.279	4.041	2543.320	227.00	13.35	2.77	2546.09	.00	4.26	3.94	5.000	.000	.00	.00	1	.0
1.402	.0291						.0075	.01	4.04	1.13	2.53	.013	.00	.00	PIPE	

* FILE: SDN.WSW

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WATER SURFACE PROFILE LISTING

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KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
-1140.000	2539.320	4.263	2543.583	227.00	12.73	2.52	2546.10	.00	4.26	3.55	5.000	.000	.00	1	.0
TRANS STR	.0290					.0014	.01	4.26	1.00		.013	.00	.00	PIPE	
-1130.000	2539.610	6.380	2545.990	227.00	5.68	.50	2546.49	.00	2.92	8.00	5.000	8.000	.00	0	.0
-1129.998	2539.612	6.404	2546.016	227.00	5.68	.50	2546.52	.00	2.92	8.00	5.000	8.000	.00	0	.0
44.605	.0329					.0014	.06	6.40	.45	1.36	.013	.00	.00	BOX	
-1085.393	2541.078	5.000	2546.078	227.00	5.68	.50	2546.58	.00	2.92	8.00	5.000	8.000	.00	0	.0
5.713	.0329					.0008	.00	5.00	.45	1.36	.013	.00	.00	BOX	
-1079.681	2541.266	4.766	2546.032	227.00	5.95	.55	2546.58	.00	2.92	8.00	5.000	8.000	.00	0	.0
4.266	.0329					.0010	.00	4.77	.48	1.36	.013	.00	.00	BOX	

WARNING - Flow depth near top of box conduit

-1075.414	2541.406	4.587	2545.993	227.00	6.19	.59	2546.59	.00	2.92	8.00	5.000	8.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	
HYDRAULIC JUMP															
----- WARNING - Flow depth near top of box conduit -----															
-1075.414	2541.406	1.723	2543.130	227.00	16.46	4.21	2547.34	.00	2.92	8.00	5.000	8.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	
1.009	.0329					.0161	.02	1.72	2.21	1.36	.013	.00	.00	BOX	
-1074.406	2541.439	1.731	2543.170	227.00	15.40	4.17	2547.34	.00	2.92	8.00	5.000	8.000	.00	0	.0
	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	-	
16.463	.0329					.0150	.25	1.73	2.20	1.36	.013	.00	.00	BOX	

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WATER SURFACE PROFILE LISTING

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KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1057.942	2541.980	1.815	2543.796	227.00	15.63	3.79	2547.59	.00	2.92	8.00	5.000	8.000	.00	0 .0
12.910	.0329					.0130	.17	1.82	2.04	1.36	.013	.00	.00	BOX
-1045.032	2542.405	1.904	2544.308	227.00	14.91	3.45	2547.76	.00	2.92	8.00	5.000	8.000	.00	0 .0
10.245	.0329					.0113	.12	1.90	1.90	1.36	.013	.00	.00	BOX
-1034.787	2542.741	1.997	2544.738	227.00	14.21	3.14	2547.87	.00	2.92	8.00	5.000	8.000	.00	0 .0

SDN														
8.159	.0329	-	-	-	-	-	.0099	.08	2.00	1.77	1.36	.013	.00	.00 BOX
-1026.628	2543.010	2.094	2545.104	227.00	13.55	2.85	2547.95	.00	2.92	8.00	5.000	8.000	.00	0 .0
6.470	.0329	-	-	-	-	.0086	.06	2.09	1.65	1.36	.013	.00	.00 BOX	
-1020.158	2543.222	2.196	2545.419	227.00	12.92	2.59	2548.01	.00	2.92	8.00	5.000	8.000	.00	0 .0
5.064	.0329	-	-	-	-	.0075	.04	2.20	1.54	1.36	.013	.00	.00 BOX	
-1015.094	2543.389	2.303	2545.692	227.00	12.32	2.36	2548.05	.00	2.92	8.00	5.000	8.000	.00	0 .0
3.868	.0329	-	-	-	-	.0066	.03	2.30	1.43	1.36	.013	.00	.00 BOX	
-1011.226	2543.516	2.416	2545.932	227.00	11.75	2.14	2548.07	.00	2.92	8.00	5.000	8.000	.00	0 .0
2.830	.0329	-	-	-	-	.0057	.02	2.42	1.33	1.36	.013	.00	.00 BOX	
-1008.395	2543.609	2.534	2546.143	227.00	11.20	1.95	2548.09	.00	2.92	8.00	5.000	8.000	.00	0 .0
1.915	.0329	-	-	-	-	.0050	.01	2.53	1.24	1.36	.013	.00	.00 BOX	
-1006.480	2543.672	2.657	2546.330	227.00	10.68	1.77	2548.10	.00	2.92	8.00	5.000	8.000	.00	0 .0
1.096	.0329	-	-	-	-	.0044	.00	2.66	1.15	1.36	.013	.00	.00 BOX	

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WATER SURFACE PROFILE LISTING
KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS Update
SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.	Base Wt./I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
-1005.384	2543.708	2.787	2546.495	227.00	10.18	1.61	2548.10	.00	2.92	8.00	5.000	8.000	.00	0 .0
.354	.0329	-	-	-	-	.0038	.00	2.79	1.07	1.36	.013	.00	.00 BOX	
-1005.030	2543.720	2.924	2546.644	227.00	9.70	1.46	2548.11	.00	2.92	8.00	5.000	8.000	.00	0 .0

APPENDIX F

CD of Electronic Files & Revised Improvement Plans

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

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 RIVER OR LAKE. THIS SHALL BE DONE IN ACCORDANCE WITH THE BEST MANAGEMENT PRACTICES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIAL SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION OR CONSTRUCTION ACTIVITIES THAT EXCEED THE REQUIREMENTS OF THE BEST MANAGEMENT STANDARDS SPECIFIED IN TITLE 24 AND 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 NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITIES HAVE COMPLETED. CONSTRUCTION ACTIVITIES SHALL BE PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NV000000, SECTION II.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO CONSTRUCTION, SINGLE AND TIE LOCATIONS, AND BUMPS AND RAMP, WITHIN 24 HOURS AFTER ANY 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 TO REFLECT THE CHANGING CONSTRUCTION ACTIVITY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NV000000, SECTION II.A.12.
5. ACCUMULATED SEDIMENT IN BUMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT. EXCESSIVE SEDIMENT SHALL BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

A PORTION OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) SECTION 21, TOGETHER WITH A PORTION OF THE NORTHWEST QUARTER (NW 1/4) AND SO HALF (S 1/2) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER
GILCREASE AVENUE AND OSO BLANCA ROAD
(W FRONTAGE ROAD)
ELEVATION = 2631.88 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE
SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION
20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK
COUNTY, NEVADA. AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY,
NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS.

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020
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 ELECTRICAL SHALL BE AT LEAST 12-INCHES OR GREATER AS DICTATED BY LOCAL CODES AND STANDARDS.
3. FOR VALVE ADJUSTMENT CONTACT 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION.
4. IN THE EVENT OF NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND STRUCTURES CONTACT 702-365-2099

CALL SOUTHWEST GAS AT 702-400-1789 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION

SOUTHWEST GAS CORPORATION DATE

4. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY. ANY CHANGES AS AMENDED IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS, ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
6. CHISEL "S" OR "O" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
7. POLY(VINYL) (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
8. ALL MANHOLES PAVED IN STREETS (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS, STREETS LESS THAN EIGHTEEN (18') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
9. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
10. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
11. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
12. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN TEN TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REDUCED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
13. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

LVVWD PROJECT # N/A (REVISED 08/01/2017)

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVMD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVMD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICES MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVMD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVVMD STANDARD PLANS, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY 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 LVVMD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVMD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES AND APPURTENANCES SHALL BE DISINFECTED, PRESSURE TESTED, AND HAVE AN ACCEPTABLE PASSING HEALTH WATER SAMPLE OBTAINED, PRIOR TO OPERATION AND USE.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVMD 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 LVVMD 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 LVVMD 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.

ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TRAVEL ELEMENT ADJACENT A PUBLIC STREET, IF DAMAGED OR IF THE LYVNDO DETERMINES THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LYVNDO WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LYVNDO WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION, OF ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LYVNDO WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

15. NO LEAD COMPLIANCE NOTE

TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKS BRASS PRODUCTS PROPOSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEAD FREE PRODUCT MAY NOT BE REUSED.

1. INDICATED GRADES OTHER THAN T.C., F.G. & GUTTER F.L. ARE ROUGH GRADES

2. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE ROUGH QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLANS WILL RESULT IN QUANTITY CHANGES.
3. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.
4. ROUGH PAD ELEVATIONS SHALL BE GRADDED TO WITHIN 0.1' OF THE PAD ELEVATIONS SHOWN ON THE PLANS. WHEN GRADING IS COMPLETE PER THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE LOTS CAN BE INSPECTED. AT THAT TIME THE ENGINEER SHALL ALSO DECIDE IF ANY ADDITIONAL DITCHES OR BERMS ARE REQUIRED. THE CONTRACTOR IS REQUESTED NOT TO REMOVE ANY OF HIS ROUGH GRADING EQUIPMENT UNTIL HE RECEIVES GRADING APPROVAL FROM THE ENGINEER.
5. SOILS REPORT PREPARED BY N/A, PROJECT NO. N/A, DATED N/A.
6. EARTHWORK QUANTITIES (RAW):
 - CUT = N/A CUBIC YARDS
 - FILL = N/A CUBIC YARDS
- A) THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SUBSIDENCE OR SHRINKAGE.
- B) THE ABOVE QUANTITIES DO REFLECT USING NATIVE MATERIAL IN LIEU OF TYPE I GRAVEL BASE MATERIAL FOR STREET SECTIONS.
- C) THE ABOVE QUANTITIES DO NOT REFLECT ANY EARTHWORK WHICH MAY BE REQUIRED BY THE ENGINEER TO CONSTRUCT ADDITIONAL PROTECTIVE DITCHES OR BERMS NOT SHOWN ON THESE DRAWINGS.

ALL FIRE HYDRANTS BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE DEPARTMENT'S APPROVED FIRE CODE.

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

2. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE, WATER MAINS ULT 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 § 106.6.15

3. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE PROVIDED FOR CONSUMERS OF CONSUMABLES CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW IFC § 3310, § 3312

4. 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 HYDRANT. IFC § 507.5.7.3

6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLOW VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE COMPLETED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE FIRE HYDRO TEST WITH PRIOR FIRE PREVENTION APPROVAL. IFC § 106.3

7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.I.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 § 507.5.1

9. PRIVATE HYDRANTS SHALL BE PAINTED RED. IFC § 507.5.1

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

11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC § C102

- RESIDENTIAL - 500 FT MAX UNSPRINKLERED; 600 FT SPINKLERED.
- COMMERCIAL - 300 FT UNSPRINKLERED, 400 FT SPINKLERED.

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 DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT. IF MORE THAN MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNTY OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATE BASIS. IFC § C102.8

13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CURB-RETURN, DRIVEWAY 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, SINK, POWER POLE, STRUCTURE OR ANY OTHER OBSTRUCTION. IFC § C102.10

15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. 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 FIRE HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. IF 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 STREET. FOR SYSTEMS REQUIRED TO HAVE TWO (2) SOURCES OF SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 7 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. FOR SYSTEMS PERMITTED TO HAVE ONE SOURCE OF SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 3 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD-INS CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. 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

20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% LENGTHS OF APPROACH AND GRADE. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 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 20 FT INSIDE TURNING RADIUS. IFC § 503.2.4

22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL BE NOT LESS THAN 13'6" INS. IFC § 503.2.1

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

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

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

27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LINES. 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. SIGNAGE SHALL BE PLACED ON THE PAVEMENT OR AGAIN IF CURBS ARE PROVIDED THE SIGN 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. IFC § 503.6

29. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS, OR HAVING FOUR OR MORE TRAVEL LANES AND A TRAFFIC COUNTY OF MORE THAN 30,000 VEHICLES PER DAY, ALL HYDRANTS BEING UTILIZED TO DELIVER FIRE FLOW TO THE DESIGNATED LOCATION SHALL BE LOCATED ON THE SAME SIDE OF THE STREET AS THE PROPOSED DEVELOPMENT. CLV REGULATION

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 LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, F GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED/ PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/ OR ADJACENT PROPERTIES.

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 PROPER LOCATIONS. CALL BEFORE YOU DIG: 1 (800) 227-2600; SOUTHWEST GAS CORPORATION: 702-400-1789 (STANDBY CONTACT NUMBER)

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS" CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST 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 UTILITIES AND ALL LOCAL CITY CODES AND ORDINANCES ARE OTHERWISE APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CITY PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY AND CONVEYED TO THE CITY BY THESE PLANS. 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 WORK AND DURING THE COURSE OF HIS WORK TAKE THE 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 THE LOCAL UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. EXACT MIX DESIGNS 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 EVERY 120' IN EXTENDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE UP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR MINIMUM VERTICAL CLEARANCE OVER NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOLS REPORT AS PREPARED BY N/A, REPORT #N/A, N/A APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWHUT 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 RELOCATION.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED AS AVAILABLE. THE CONTRACTOR SHALL COMPLY WITH N.R.S. STATUTE NO. 625.380 AND CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY PETER 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 RELATIONS; 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 RINGS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF DOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREIN.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING AND RECORDING AS REQUIRED BY THE CITY OF LAS VEGAS, 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 WIDE INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (OVERS) LOCATION OF THE PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND THE CONNECTION TO A DRIP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN, AND WHERE APPROPRIATE, STORM DRAIN LATERALS LEAVE THE PUBLIC RIGHT-OF-WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE LOCAL NORTH GRID AND THE CITY OF LAS VEGAS. FINAL LOCATION MAP(S) MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINITIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATION ELECTRONIC COMMA SEPARATOR FILE (SDF) MUST BE SUBMITTED TO THE CITY OF LAS VEGAS. THE CONTRACTOR SHALL ALSO COMPLY 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 ADDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

1. ALL CONSTRUCTION SIGNING, BARRICADES, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS. THE CONTRACTOR SHALL MAINTAIN TRAFFIC CONTROL DEVICES UNTIL THE WORK IS COMPLETED, AND SHALL MAINTAIN SADS SIGN UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCLOSED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFY A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE ROUTE THROUGH THAT 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 SIGNING, OR TEMPORARY TRAFFIC CONTROL DEVICES, THE CONTRACTOR SHALL BE REQUIRED TO 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 AND TRAFFIC CONTROL DEVICES. THE CONTRACTOR SHALL BE FABRICATED WITH DIAMOND GRADE VIB CLASS 5 REFLECTIVE SHEETING OR APPROVED EQUIV. ALL NEW TRAFFIC SIGNS, EXCEPT STREET NAME AND SCHOOL SPEED LIMIT UTM, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT. ALL PROTECTIVE AND ADVANCE WARNING SIGNS SHALL HAVE 3M SERIES 150. ALL ANTI-GRAFFITI PROTECTIVE OVERLAY FILM, STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDPOINT IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN, THE STANDPOINT SHALL BE MOUNTED ON A SIGNPOST. THE SIGNPOST SHALL BE MOUNTED ON THE SIDE OF THE STREET INDICATING THE DIRECTION OF TRAVEL.
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 UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS REQUIRED FOR THESE PLANS.
9. STREET SIGNS AND STOPS SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR THE CITY OF LAS VEGAS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR MSA WORK AREA CONTRACTOR SPECIALIST SUPERVISE ALL TRAFFIC CONTROL DEVICES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL 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 CITIZENS AREA TRAVEL (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY RELOCATION OF BUS STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) 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 TO THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DEPARTMENT.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DEPARTMENT (SECTION 100) PRIOR TO ANY CONSTRUCTION OF ANY TYPE THAT MAY REQUIRE ANY CHANGING OF STOPS FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE REQUIRED DRAWINGS REGARDING FINAL PAYMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL OBTAIN A DRAFT APPROVAL FROM THE TRAFFIC ENGINEERING DEPARTMENT DEPENDING ADEQUATE TRANSITIONS TO THE FINAL PAYMENT MARKINGS WHICH WILL BE OBTAINED FROM THE TRAFFIC ENGINEERING DEPARTMENT. THE CONTRACTOR SHALL CONTACT TRAFFIC ENGINEERING DEPARTMENT TO OBTAIN MODIFYING PAYMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE STANDARD DRAWINGS" AND THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CUMMACK COUNTY, ARIZONA," (USD), LATEST REVISION.
2. DESIGN PROFESSIONAL AND CONTRACTOR SHALL VERIFY CITY'S LATEST LED FIXTURE SPECIFICATION AND APPROVED FIXTURES PER CLV WEBSITE, UNDER BUILDING AND SAFETY FORMS, PRIOR TO ORDERING MATERIALS AND/OR EQUIPMENT.
3. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.
4. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623.02.01 OF THE USS.
5. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. 10 BUNG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
6. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE MINIMUM 12" CLEARANCE IN ACCORDANCE WITH THE USS NO. 302A. WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
7. AS-BUILT DRAWINGS SHALL BE SUBMITTED TO THE TRAFFIC ENGINEERING DIVISION, PRIOR TO ANY PRE-FINAL INSPECTION. THE ASBUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARED.
8. SERVICE POINT SHALL BE COORDINATED WITH MV ENERGY, AND WHEREVER POSSIBLE, BE LOCATED NEAR CENTER OF THE GROUND. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING ORDNIS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED. AT NO EXPENSE TO THE CITY OF TUCUMAN.
10. THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

NONE



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ABBREVIATIONS			
AC	ASPHALTIC CONCRETE OR ACRE	FL	FLOWLINE
AGG	AGGREGATE BASE	FT	FEET OR FOOT
APN	ASSESSORS PARCEL NUMBER	FUT	FUTURE
APPROX OR ~	APPROXIMATE	GRD	GRADE OR GROUND
AVE	AVENUE	GB	GRADE BREAK OR GRADE CHANGE
AT	AT	GV	GATE VALVE
BC	BEGIN CURVE OR BACK OF CURB	HDPE	HIGH DENSITY POLYETHYLENE
BCR	BEGINNING OF CURB RETURN	HOA	HOME OWNERS ASSOCIATION
BHW	BOTTOM OF HEADWALL	HORZ	HORIZONTAL
BDD	BUILDING	HP	HIGH POINT
BLVD	BOULEVARD	HWL	HIGH WATER LEVEL
BM	BENCHMARK	HDWL OR HW	HEADWALL
BVC	BEGIN VERTICAL CURVE	HYD	HYDRAULIC OR HYDRANT
BWV	BACK WATER VALVE	ID	INSIDE DIAMETER
CC	CLARK COUNTY	IN	INCH
CCAUD	CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS	INT	INTERSECTION
CCPW	CLARK COUNTY PUBLIC WORKS	INV	INVERT ELEVATION
CCRFCD	CLARK COUNTY REGIONAL FLOOD DISTRICT	IP	IRON PIPE
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	IRRG	IRRIGATION
CE	COMMON ELEMENT	LF	LINEAR FEET
CLC/LC	CENTERLINE	LMC	LANDSCAPE MAINTENANCE CORPORATION
CLR	CLEAR OR CLEARANCE	LP	LOW POINT
CLSM	CONTROLLED LOW STRENGTH MATERIAL	LT OR L	LEFT
CLV	CITY OF LAS VEGAS	LVWD	LAS VEGAS VALLEY WATER DISTRICT
CM&C	CEMENT MORTAR LINED AND COATED	LWL	LOW WATER LEVEL
CMU	CONCRETE MASONRY UNIT	MAX	MAXIMUM
CONV	CITY OF NORTH LAS VEGAS	MECH	MECHANICAL
COH	CITY OF HENDERSON	MH	MANHOLE
CONC	CONCRETE	MIN	MINIMUM
CT	COURT	MISC	MISCELLANEOUS
CY OR CU YD	CUBIC YARD	MUE	MUNICIPAL UTILITY EASEMENT
DCWCS	DESIGN AND CONSTRUCTION FOR WASTEWATER COLLECTION SYSTEMS	NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
DET	DETAIL	NTS	NOT TO SCALE
DI	DUCTILE IRON OR DRAIN INLET	NUE	NONEXCLUSIVE UTILITY EASEMENT
DIA, Ø	DIAMETER	NVE	NV ENERGY
DIP	DUCTILE IRON PIPE	OC	ON CENTER
DR	DRIVE	OD	OUTSIDE DIAMETER OR OVERALL DIMENSION
DWG(S)	DRAWING	OFF	OFFSET
DWY	DRIVEWAY	ORIG	ORIGINAL
EA	EACH	P4E	PUBLIC OR PEDESTRIAN ACCESS EASEMENT
ECR	END CURB RETURN	PB	PULL BOX
EC	EXISTING GROUND	PC	POINT OF CURVE
ELEV	ELEVATION	PCC	POINT OF COMPOUND CURVE
ESMT	EASEMENT	PDE	PUBLIC DRAINAGE EASEMENT
EP	EDGE OF PAVEMENT	P OR PL	PROPERTY LINE
ERU	EQUIVALENT RESIDENTIAL UNIT	POB	POINT OF BEGINNING
EVC	END VERTICAL CURVE	POC	POINT OF CURVATURE
EX OR EXIST	EXISTING	POE	POINT OF ENDING
FC	FACE OF CURB	PRC	POINT OF REVERSE CURVATURE
FF	FINISHED FLOOR	PRELIM	PRELIMINARY
FG	FINISHED GRADE	PROP	PROPOSED
FGH	FINISHED GRADE, HIGH SIDE	PRV	PRESSURE REDUCING VALVE
FGL	FINISHED GRADE, LOW SIDE	PUE	PUBLIC UTILITY EASEMENT
FI	FIRE HYDRANT	PT	POINT OF TANGENT OR POINT
		PVC	POLYVINYL CHLORIDE
		PVI	POINT OF VERTICAL INTERSECTION
		QTY	QUANTITY
		R	RADIUS
		RCA	REINFORCED CONCRETE ARCH
		RCB	REINFORCED CONCRETE BOX
		RCP	REINFORCED CONCRETE PIPE
		RD	ROAD
		ROWY ESMT	ROADWAY EASEMENT
		REQD	REQUIRED
		REV	REVISION
		RG	ROUGH GRADE
		RT OR R	RIGHT
		R/W, ROW	RIGHT OF WAY
		S	SLOPE
		SCH	SCHEDULE
		SD	STORM DRAIN
		SDO	STORM DRAIN DROP INLET
		SDMH	STORM DRAIN MANHOLE
		SEC	SECTION
		SF	SQUARE FEET
		SHT	SHEET
		SLTC	STREET LIGHT & TRAFFIC CONTROL ESMT
		SNWA	SOUTHERN NEVADA WATER AUTHORITY
		SPECS	SPECIFICATIONS
		ST	STREET
		SSMH	SANITARY SEWER MANHOLE
		STA	STATION
		STD	STANDARD
		STL	STEEL
		STLT	STREET LIGHT
		SW	SIDEWALK
		SWG	SOUTHWEST GAS
		SWR OR SS	SANITARY SEWER
		SY	SQUARE YARD
		TAN	TANGENT
		TC	TOP OF CURB
		TF	TOP OF FLOOR OR TOP OF FOOTING
		TG	TOP OF GRATE
		THRU	THROUGH
		THW	TOP OF HEADWALL
		TP	TOP OF PIPE
		TPW	TOP OF WALL
		TRW	TOP OF RETAINING WALL
		TSW	TOP OF SCREEN WALL
		TYP	TYPICAL
		UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
		VC	VERTICAL CURVE
		VERT	VERTICAL
		VG	VALLEY GUTTER
		WI	WROUGHT IRON
		WL	WATER LINE
		WP2	WATER PRESSURE ZONE
		WT	WEIGHT
		WTR	WATER LINE

SPECIAL NOTE

IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED WHICH 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 OF LAS VEGAS DEPT. OF PUBLIC WORKS. TEMPORARY CONSTRUCTION ITEMS INCLUDE: PAVEMENT TRANSITIONS, PROTECTIVE DITCHES AND BERMS, ROAD SIGNS AND BARRICADES, ETC.

NOTICE TO CONTRACTOR

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

-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 PROPER LOCATIONS. CALL BEFORE YOU DIG. (800) 227-2600

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		5' CONTOUR
		1' CONTOUR
		STRIPING
		SEWER MANHOLE
		CURB AND GUTTER
		SANITARY SEWER PIPE AND FLOW ARROW
		WATER PIPE
		WATER GATE VALVE
		FIRE HYDRANT
		WATER BLOW-OFF
		WATER LATERAL W/ METER
		SANITARY SEWER LATERAL
		STREETLIGHT
		EDGE OF PAVEMENT
		PAD ELEVATION
		FINISHED FLOOR ELEVATION
		ELEVATION
		RETAINING WALL
		STORM DRAIN W/ MANHOLE
		EXISTING GAS GATE VALVE
		EXISTING UNKNOWN MANHOLE
		EXISTING GAS, SIZE PER PLAN
		EXISTING POWER POLE
		EXISTING TRAFFIC SIGNAL
		EXISTING WALL
		WATER PIPE FITTING
		WATER POINT OF CONNECTION
		SEWER POINT OF CONNECTION
		DAYLIGHT LINE
		STREET CENTERLINE
		RIGHT-OF-WAY
		MATCHLINE
		BOUNDARY LINE
		PHASE LINE
		PROPERTY LINE
		FLOWLINE
		SAWCUT
		CUT/FILL TRANSITION LINE
		SIDEWALK
		EX STRIPING TO BE OBLITERATED
		GRADE BREAK LINE
		REFLECTIVE RAISED PAVEMENT MARKERS
		BACK WATER VALVE
		WROUGHT IRON FENCE
		PONY WALL
		DECORATIVE PERIMETER WALL
		DECORATIVE PERIMETER RETAINING WALL
		PROPOSED CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
		EXISTING CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB
		FUTURE CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB

QUANTITIES

		PRIVATE	PUBLIC
DRAINAGE			
1.	48" TYPE II STORM DRAIN MANHOLE	EA	-
2.	5.0' TYPE "CM2" DROP INLET	EA	-
3.	7.5' TYPE "CM2" DROP INLET	EA	-
4.	10.0' TYPE "CM2" DROP INLET	EA	-
5.	12.5' TYPE "CM2" DROP INLET	EA	-
6.	18" RCP CLASS II STORM DRAIN	LF	-
7.	24" RCP CLASS IV STORM DRAIN	LF	-
8.	30" RCP CLASS IV STORM DRAIN	LF	-
9.	36" RCP CLASS IV STORM DRAIN	LF	-
10.	RIPRAP 050=8", THK=16"	SF	-
11.	8" WIDE CONCRETE VALLEY GUTTER W/10" TYPE I AGGREGATE BASE	SF	-
12.	SIDEWALK UNDER DRAIN	SF	-
13.			

SLATER
HANIFAN
GROUP

a Westwood team

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

CITY OF LAS VEGAS, NV

KBHOME

MONTECITO - OFFSITE OSO BLANCA ROAD

LEGEND, ABBREVIATIONS, AND QUANTITIES

DATE: 7/10/19

DRAFTER: BCS

DESIGNER: BCS

CHECKED: MAK

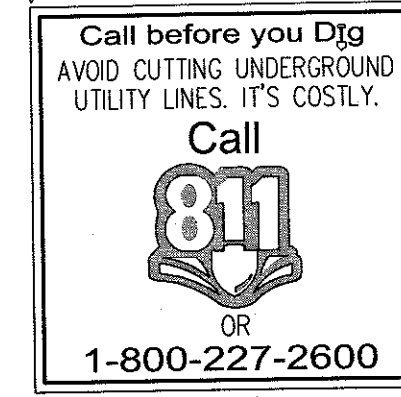
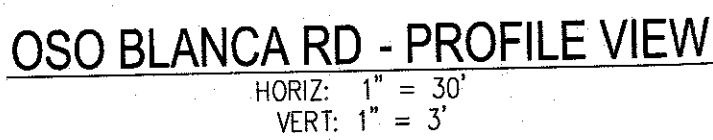
PROJECT NO.
KBH1805-006

PROFESSIONAL ENGINEER
TIMOTHY M. MULROONEY
Exp. 12/31/2019
CIVIL
No. 22938

7/10/19

C-3

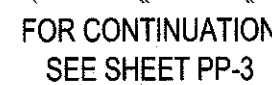
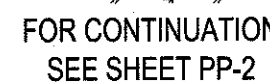
SHEET 3 OF 12





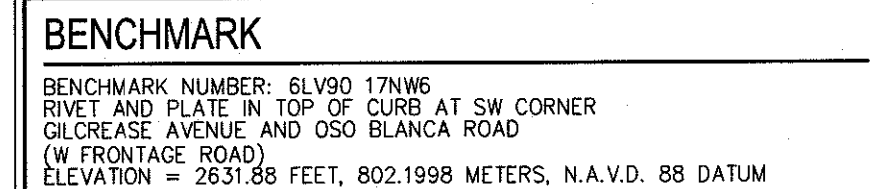
STORM DRAIN LATERAL II - PLAN VIEW





HORIZ: $1'' = 30'$
VERT: $1'' = 3'$

HORIZ: 1" = 30'
VERT: 1" = 3'



NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, W.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS.

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS SHOWN AND TO
REPLACE ALL SURVEY MONUMENTATION DAMAGED, DISTURBED, DESTROYED, OR
OBSCURED DURING CONSTRUCTION.

NO WORK WITHIN NDOT RIGHT OF WAY WITHOUT AN NDOT PERMIT.

CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN
EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

QUANTITIES		PRIVATE	PUBLIC	
DRAINAGE				
1.	48" TYPE II STORM DRAIN MANHOLE	EA	-	1
2.	8' WIDE CONCRETE VALLEY GUTTER	SF	-	681
3.	18" RCP CLASS III STORM DRAIN	LF	-	273
4.	5.0' DROP INLET TYPE "CM2"	EA	-	3
5.	7.5' DROP INLET TYPE "CM2"	EA	-	2
6.	10.0' DROP INLET TYPE "CM2"	EA	-	1
7.	12.5' DROP INLET TYPE "CM2"	EA	-	2
8.				
9.				
10.				

- 1 EXISTING IMPROVEMENTS TO BE RELOCATED
- 2 INSTALL "A" TYPE ISLAND CURB PER CAUSAUD NO. 219
- 3
- 4 INSTALL "L" TYPE CURB & GUTTER PER CAUSAUD NO. 216
- 5 INSTALL 1" OPEN GRADE OVER 6" DENSE GRADE OVER 13" TYPE I
- 6 AGGREGATE BASE
- 7 INSTALL 4" WIDE CONCRETE SHARED USE PATH W/ "A" TYPE II
- 8 AGGREGATE BASE
- 9
- 10 INSTALL SIDEWALK RAMP PER CAUSAUD NO. 235, CASE I AND CAUSAUD NO. 235,
- 11
- 12 REMOVE EXISTING RIRRAP
- 13
- 14 INSTALL "L" TYPE ISLAND CURB & GUTTER PER CAUSAUD NO. 219
- 15
- 16 INSTALL 8' VALLEY GUTTER PER CAUSAUD NO. 228
- 17
- 18 INSTALL 48" TYPE II STORM DRAIN MANHOLE PER CAUSAUD NO. 405
- 19
- 20 CONSTRUCT PENETRATION INTO EFCB SD PER DETAIL ON SHEET D-1
- 21
- 22 REMOVE EX NDOT INLET AND CONCRETE APRON PER DSS108
- 23
- 24 INSTALL 5.0" DROP INLET TYPE "CM2" PER CAUSAUD NO. 412.1 AND 421
- 25
- 26 INSTALL 7.5" DROP INLET TYPE "CM2" PER CAUSAUD NO. 412.1 AND 421
- 27
- 28 INSTALL 10.0" DROP INLET TYPE "CM2" PER CAUSAUD NO. 412.1 AND 421
- 29
- 30 INSTALL 12.5" DROP INLET TYPE "CM2" PER CAUSAUD NO. 412.1 AND 421
- 31
- 32 INSTALL MODIFIED RESIDENTIAL DRIVEWAY PER NDOT STD DWG R-5.3.2

1. EXISTING UTILITY LOCATIONS SHOWN HEREON 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 IN THEIR PROPER LOCATION.

1. SEE DRAWING C-2 & C-3 FOR GENERAL NOTES.
2. REFER TO CAAUSD DWG NO. 501 FOR GENERAL UNDERGROUND UTILITY LOCATIONS. THE WATER SERVICE LATERALS ARE GENERALLY LOCATED PERPENDICULAR TO THE MAIN. THE MAIN AND WATER METER STOP SHALL BE THE WATER CONTRACTOR TO REPLACE WATER SERVICE LATERAL FROM THE MAIN TO THE ANGLE METER STOP PER UDACFS IF DAMAGED DURING CONSTRUCTION.
3. REPLACE ALL TRAFFIC CONTROL DEVICES (SIGNS OR PAVEMENT MARKINGS) THAT ARE DISTURBED, DESTROYED, MOVED OR MODIFIED BY TRENCHING ACTIVITY TO MEET CLARK COUNTY REQUIREMENTS. ALL MATERIAL USED SHALL BEET CLARK COUNTY SPECIFICATIONS, OR WILL BE APPROVED EQUIVALENT.
4. PIPE LENGTH IS MEASURED FROM CENTER OF MANHOLE TO CENTER OF MANHOLE.

- 1) THE AGGREGATE BASE SHALL BE 10-INCHES OF TYPE 1 CLASS B CONFORMING TO THE REQUIREMENTS SET FORTH IN SUBSECTION 704.03.03 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 2) THE DENSE-GRADED PLANTING BITUMINOUS SURFACE, EXCLUDING THE OPEN GRADE LAYER, SHALL BE 6-INCHES OF TYPE 2C CONFORMING TO THE REQUIREMENTS AS SET FORTH IN SUBSECTION 705.03.01 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. BITUMINOUS SURFACE, EXCLUDING THE OPEN GRADE LAYER, SHALL BE 6-INCHES OF TYPE 2C CONFORMING TO THE REQUIREMENTS.
- 3) THE GRADE OF ASPHALT FOR BOTH OPEN AND DENSE GRADE MIXTURES SHALL BE PG76-22W OR PG76-22NVR, CONFORMING TO SUBSECTION 703.03.02 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 4) APPLY FULL-WIDTH OPEN GRADE.
- 5) SUBGRADE PREPARATION SHALL CONFORM TO SUBSECTION 302.03.01OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 6) TACK COAT SHALL BE EMULSIFIED ASPHALT, TYPE SS-1H (DILUTED) AT THE FOLLOWING APPLICATIONS RATES:

i. TACK BETWEEN DENSE GRADE LIFTS	0.06 GAL/YD ²
ii. TACK OPEN GRADE TO DENSE GRADE	0.07 GAL/YD ²
iii. TACK COLD MILLED SURFACE	0.10 GAL/YD ²
- 7) PRIME COAT SHALL BE CUTBACK ASPHALT, TYPE MC-70NW, WITH AN APPLICATION RATE OF 0.28 GAL/YD², OR THE PRIME COAT MAY BE AN APPROVED EQUAL FROM THE NDOT OPL.

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED
TECHNICAL DRAINAGE STUDY DS5145 ON FILE AT CITY OF LAS VEGAS FOR THE
SUBJECT PROJECT.

TIMOTHY M. MULROONEY, P.E. 22938 DATE _____

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KV HOME

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60E

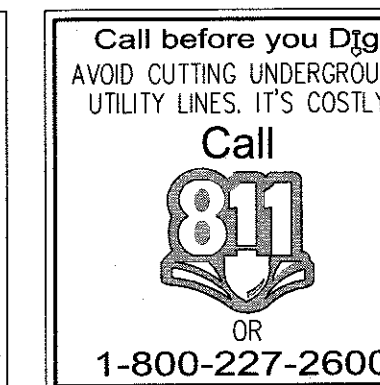
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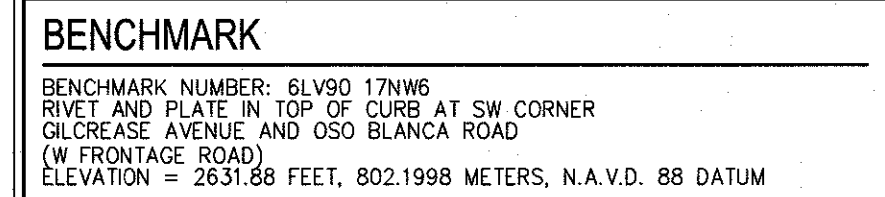
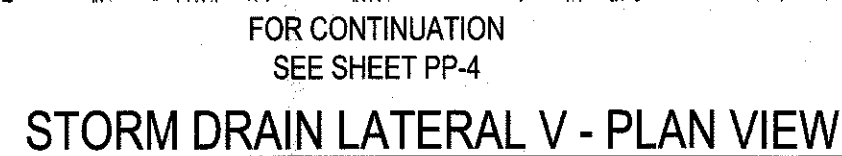
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SHEET 10 OF 12





NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS.

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NO WORK WITHIN NDOT RIGHT OF WAY WITHOUT AN NDOT PERMIT.

QUANTITIES		PRIVATE	PUBLIC
DRAINAGE			
1.	48" TYPE II STORM DRAIN MANHOLE	EA	-
2.	8' WIDE CONCRETE VALLEY GUTTER	SF	-
3.	18" RCP CLASS III STORM DRAIN	LF	-
4.	5.0' DROP INLET TYPE "CM2"	EA	-
5.	7.5' DROP INLET TYPE "CM2"	EA	-
6.	10.0' DROP INLET TYPE "CM2"	EA	-
7.	12.5' DROP INLET TYPE "CM2"	EA	-
8.			
9.			
10.			

1	EXISTING IMPROVEMENTS TO BE RELOCATED
2	INSTALL "A" TYPE ISLAND CURB PER CCAUSD NO. 219
3	INSTALL "L" TYPE CURB & GUTTER PER CCAUSD NO. 216
4	INSTALL 1" OPEN GRADE OVER 6" DENSE GRADE OVER 13" TYPE I AGGREGATE BASE
5	INSTALL 1" MED. CONCRETE SHARED USE PATH W/ 4" TYPE II AGGREGATE BASE
6	INSTALL SIDEWALK RAMP PER CCAUSD NO. 235, CASE I AND CCAUSD NO. 235.1
7	REMOVE EXISTING RIPRAP
8	INSTALL "L" TYPE ISLAND CURB & GUTTER PER CCAUSD NO. 219
9	INSTALL 8" VALLEY GUTTER PER CCAUSD NO. 228
10	INSTALL 48" TYPE B STORM DRAIN MANHOLE PER CCAUSD NO. 405
11	CONSTRUCT PENETRATION INTO EX RCB SLIP PER DETAIL ON SHEET D-1
12	REMOVE EX NDOT INLET AND CONCRETE APRON PER DSS108
13	INSTALL 5.0" DROP INLET TYPE "CM2" PER CCAUSD NO. 412.1 AND 421
14	INSTALL 7.5" DROP INLET TYPE "CM2" PER CCAUSD NO. 412.1 AND 421
15	INSTALL 10.0" DROP INLET TYPE "CM2" PER CCAUSD NO. 412.1 AND 421
16	INSTALL 12.5" DROP INLET TYPE "CM2" PER CCAUSD NO. 412.1 AND 421
17	INSTALL MODIFIED RESIDENTIAL DRIVEWAY PER NDOT STD DWG R-5.3.2

1. EXISTING UTILITY LOCATIONS SHOWN HEREON 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 IN THEIR PROPER LOCATION.

1. SEE DRAWING C-2 & C-3 FOR GENERAL NOTES.
2. REFER TO CAAUSD DWG NO. 501 FOR TYPICAL UNDERGROUND UTILITY LOCATIONS.
3. THE WATER SERVICE LATERAL IS LOCATED PERPENDICULAR TO THE MAIN TO THE WATER MAIN AT THE MAINLINE WITH THE WATER METER. CONTRACTOR TO REPLACE WATER SERVICE LATERAL FROM THE MAIN TO THE ANGLE METER STOP PER UDACFS IF DAMAGED DURING CONSTRUCTION.
4. REPLACE ALL TRAFFIC CONTROL DEVICES (SIGNS OR PAVEMENT MARKINGS) THAT ARE DISTURBED, DESTROYED, MOVED OR MODIFIED BY TRENCHING ACTIVITY TO CLARK COUNTY SATISFACTION. ALL MATERIAL USED SHALL MEET CLARK COUNTY SPECIFICATIONS, OR WILL BE APPROVED EQUIVALENT.
5. PIPE LENGTH IS MEASURED FROM CENTER OF MANHOLE TO CENTER OF MANHOLE.

- 1) THE AGGREGATE BASE SHALL BE 10-INCHES OF TYPE 1 CLASS B CONFORMING TO THE REQUIREMENTS OF SET FORTH IN SUBSECTION 703.03.03 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 2) THE DENSE-GRADE PLANTING BITUMINOUS SURFACE, EXCLUDING THE OPEN GRADE LAYER, SHALL BE 6-INCHES OF TYPE 2C CONFORMING TO THE REQUIREMENTS AS SET FORTH IN SUBSECTION 705.03.01 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION BITUMINOUS SURFACE, EXCLUDING THE OPEN GRADE LAYER, SHALL BE 6-INCHES OF TYPE 2C CONFORMING TO THE REQUIREMENTS
- 3) THE GRADE OF ASPHALT FOR BOTH OPEN AND DENSE GRADE MIXTURES SHALL BE PG76-22NVR OR PG76-22NVR, CONFORMING TO SUBSECTION 703.03.02 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 4) APPLY FULL-WIDTH OPEN GRADE.
- 5) SUBGRADE PREPARATION SHALL CONFORM TO SUBSECTION 302.03.01 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 6) TACK COAT SHALL BE EMULSIFIED ASPHALT, TYPE SS-1H (DILUTED) AT THE FOLLOWING APPLICATION RATES:

i.	TACK BETWEEN DENSE GRADE LIFTS	0.06 GAL/10 ²
ii.	TACK OPEN GRADE TO DENSE GRADE	0.07 GAL/10 ²
iii.	TACK COAL MILLED SURFACE	0.01 GAL/10 ²
- 7) PRIME COAT SHALL BE CUTBACK ASPHALT, TYPE MC-70N, WITH AN APPLICATION RATE OF 0.28 GAL/10², OR THE PRIME COAT MAY BE AN APPROVED EQUAL FROM THE NDOT OPI.

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS5145 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.



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DAD

SI

CITY OF LAS VEGAS, NV

KB HOME

**MONTECITO - OFFSITE OSO BLANCA ROAD
STREET SECTIONS & GRADING DETAILS I**

S21
19S
60E

DATE: 7/10/19

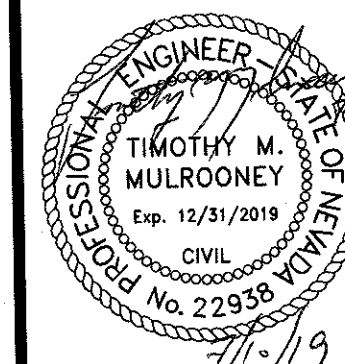
DRAFTER: BCS

DESIGNER: BCS

CHECKED: MAK

PROJECT NO.

KBH1805-006



D-1

SHEET 12 OF 12

