



TANEY ENGINEERING

**UPDATE #2 TO THE
TECHNICAL DRAINAGE STUDY
FOR
*THE ORCHARDS AT GRAND TETON & TENAYA
Units 2 and 3***

**CITY OF LAS VEGAS
NEVADA**

August 2012

Prepared by:

Taney Engineering
6030 S. Jones, Suite #100
Las Vegas, Nevada 89118
Telephone: (702) 362-8844
Fax: (702) 362-5233

Prepared for:

D.R. Horton
330 Carousel Parkway
Henderson, NV 89014
Telephone: (702) 635-3600

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: The Orchards at Grand Teton & Tenaya Units 2 and 3 Date: August 23, 2012

Location of Development: a) Descriptive (Cross Streets) North/South: Tenaya
East/West: Grand Teton

b) Section: 15 Township: 19S Range: 60E

c) APN : 125-15-101-003

Name of Owner: D.R. Horton

Telephone No.: (702) 635-3600 Fax No.: (702) 909-4601 E-Mail Address: _____

Address: 330 Carousel Parkway Henderson, NV 89014

Contact Person-Name: David W. Trushaw, P.E. Telephone No.: (702) 362-8844

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

Firm: Taney Engineering

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

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 36.4+/- acres Being Developed/Disturbed: 26+/- acres

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

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

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

5. Approximate upstream land area which drains to the subject site: >1 square mile

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

Technical Drainage Study for Spinnaker Homes at The Orchard, DS4274 and TDS Update for Orchards, DS4558

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

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



Engineer's Seal

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

***New Required Field**

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

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

**UPDATE TO THE
TECHNICAL DRAINAGE STUDY
FOR
The Orchards at Grand Teton
& Tenaya Units 2 and 3
Residential Development**

August 2012

Prepared by:



Taney Engineering
6030 S. Jones, Suite #100
Las Vegas, NV 89118

Prepared for:

D R HORTON
330 Carousel Pkwy.
Henderson, Nevada 89014
Phone: (702) 632-3600 Fax: (800) 909-4601

APN: 125-15-101-003



TANEY ENGINEERING

6030 SOUTH JONES BLVD, SUITE 100

LAS VEGAS, NV 89118

TELEPHONE: 702-362-8844

Fax: 702-362-5233

August 23, 2012
Job No. DRH-12-033

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

Subject: Update #2 to the Technical Drainage Study for The Orchards at Grand Teton & Tenaya Units 2 and 3 (DS# 4274)

Mr. Sung:

Taney Engineering is pleased to provide one (1) hard copy and one (1) digital copy of the Update #2 to the Technical Drainage Study for *The Orchards at Grand Teton & Tenaya Units 2 and 3*. The original report that was prepared by Thomason Consulting Engineers, DS-4274, and was approved by the City of Las Vegas on September 12, 2008. This study was also reviewed by this office and found to be reasonable. An update for Unit 1 has recently been conditionally approved (DS4558); the approval letter has been provided in Appendix E.

The conditions of the previous Tentative Map, TMP-27023 and Site Development Review, SDR-27226, were followed. The conditions of the Extension of Time, EOT-45057 for the Site Development Review and the Tentative Map are included in Appendix A.

This update is for Unit 2 and 3. These two units will be rough graded at the same time but constructed separately. Grading, Plan and Profiles, and Details plans are included in Appendix F.

The drainage pattern for the onsite basins remains the same from the previously approved study with minor grading revisions. See the Future Onsite Basins figure in the reference material, Appendix E. A 37' wide drainage easement is provided in Unit 2 at the end of Fresh Harvest Avenue see cross section B. Cross section A shows a typical 37' wide street, conservatively assuming all 30cfs from basin DEON1 (DS4274) is present.

The finished floor elevations have been set at a vertical distance above the gutter flow line of at least twice the depth of flow in the gutter flow line up to a maximum of 18 inches above the water surface elevation in the street.

The offsite flows and drainage pattern have changed slightly from the previously approved study. A summary of the changes is provided below:

- The regional flood control facility, BRDB 0032, Brent 400 ac-ft South Environmental Enhancement Area Detention basin has been constructed, cutting of the large flow (874cfs) in Tenaya Way north of Grand Teton.
- There is an existing high point in Tenaya Way south of Grand Teton Drive. The previous study significantly reduced the high point and had a flow split at the intersection. Clark County would not approve this flow split. In order to obtain approval for the remaining units from Clark County and to maintain the existing condition, the high point will remain. This is considered reasonable with the proposed regional flood control facility in Grand Teton Drive (LVMD 2661) to be constructed very soon according to the most recent CCRFCD Ten-Year Construction Plan.

In the interim condition there is 2534cfs in Grand Teton Drive. Similar to the referenced drainage study a 15' wide concrete channel with CMU walls is proposed along Grand Teton Drive south of the proposed trail corridor. This intent of this channel is to reduce impacts to the water surface elevation in Grand Teton Drive due to the construction of the street improvements. Similar to the referenced drainage study a 40' long depressed curb near the west side of the project has been provided to allow storm runoff to enter the channel. Due to the proposed high point in Tenaya Avenue the channel will outlet to Grand Teton Drive instead of Tenaya Avenue as shown in the referenced study.

A proposed condition HEC-RAS analysis has been completed along Grand Teton Drive to address the water surface elevation in the interim condition. Please see Appendix D for calculations. Refer to Figure 5 in Appendix B for cross section locations. It is noted the water surface elevation (WSE) has been increased at a few cross sections. This is considered acceptable for multiple reasons which include:

- The existing finished floor elevations along Grand Teton Avenue are above the WSE.
- The increase in water surface elevation has been minimized by the addition of the concrete channel. The flow rate in Grand Teton Avenue has been significantly increased in the interim condition in the areas of WSE increase. In the existing condition large amounts of runoff were conveyed though the site and is now directed down Grand Teton Drive.
- The proposed regional flood control facility in Grand Teton Drive (LVMD 2661) is currently under design and the Construction funding is programmed in fiscal year 12/13 according to the to the most recent CCRFCD Ten-Year Construction Plan. See reference material Appendix E.

Based on the above reasons the WSE increase along Grand Teton Avenue is considered acceptable. It should also be noted that due to the large amount of runoff in Grand Teton Drive CCRFCD street criteria is not met in the interim condition. However this project is not adding additional flow to Grand Teton and is trying to mitigate the impact as much as possible.

A lateral weir has been added to the HEC-RAS analysis at Tenaya Way and shows that approximately 9cfs overtops the high point in Tenaya Way (between sections Sta 24+82 to Sta 25+78) in the 100-year interim condition. Offsite hydraulic cross section C has been provided for Tenaya Way demonstrating that CCRFCD criteria has been met for the 10-year and 100-year storm events.

The 18" nuisance storm drain system in Grand Teton Drive has been extended. Drop inlets have been provided similar to the previous study complete by TCE. A 12" bleeder line has been provided to drain the system.

I trust this will satisfy any concerns you have. If there are any question or you need any additional information, please do not hesitate to call our office.

Sincerely,

TANEY ENGINEERING



Rob Hansen, P.E.
Hydrologist

APPENDICES

APPENDIX A	Conditions of Approval
APPENDIX B	Figures
APPENDIX C	FlowMaster Sections
APPENDIX D	HEC-RAS Analyses
APPENDIX E	References
APPENDIX F	Improvement Plans

APPENDIX A

Conditions of Approval



LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
RICKI Y. BARLOW
BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

June 13, 2012

Mr. Stephen Aizenberg
Spinnaker Homes IX, LLC
4362 West Cheyenne Avenue
North Las Vegas, Nevada 89032

**RE: EOT-45057 - EXTENSION OF TIME - SITE DEVELOPMENT PLAN
REVIEW
PLANNING COMMISSION MEETING OF JUNE 12, 2012**

Dear Mr. Aizenberg:

Your request for an Extension of Time of a previously approved Site Development Plan Review (SDR-27226) FOR A 100-LOT SINGLE FAMILY RESIDENTIAL DEVELOPMENT WITH ACCESS ON WHISPERING SANDS DRIVE on 40.16 acres on the southwest corner of Grand Teton Drive and Tenaya Way (APN 125-15-101-003), U (Undeveloped) Zone [DR (Desert Rural Density Residential) General Plan Designation] under Resolution of Intent to R-PD2 (Residential Planned Development - 2 Units Per Acre), Ward 6 (Ross), was considered by the Planning Commission on June 12, 2012.

The Planning Commission voted to **APPROVE** your request, subject to the following:

Planning

1. This Extension of Time expires 04/10/14, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
2. Conformance to the approved conditions for Site Development Plan Review (SDR-27226).
3. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
DEVELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301

FAX 702.474.0352

TTY 702.386.9108

www.lasvegasnevada.gov



Mr. Stephen Aizenberg
Spinnaker Homes IX, LLC
EOT-45057 - Page Two
June 13, 2012

This action by the Planning Commission on **June 12, 2012** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests please access <http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm>, or contact the Department of Planning and Development at 702.229.6301 after **June 25, 2012**. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



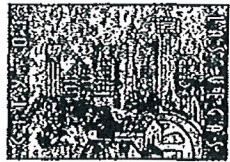
Steve Gebeke, AICP
Planning Supervisor
Case Planning Division

SG:clb

cc: Mr. Randy Dunlevie
2010-1 Cry Venture, LLC
2450 Broadway, 6th Floor
Santa Monica, California 90404

Mr. Bob Gronauer
Kaempfer Crowell
8345 West Sunset Road, Suite #250
Las Vegas, Nevada 89113

PLANNING & DEVELOPMENT



DEVELOPMENT SERVICES CENTER

731 S. Fourth Street
Las Vegas, NV 89101

Voice: 702-229-6301

For: 702-474-0352

TTY: 702-386-9108

www.lasvegasnevada.gov

April 11, 2008

Mr. Ben Young
Spinnaker Home IX LLC
4366 West Cheyenne Avenue
North Las Vegas, Nevada 89032

RE: SDR-27226- SITE DEVELOPMENT PLAN REVIEW

Dear Mr. Young:

Your request for a Site Development Plan Review for a 100-LOT SINGLE FAMILY RESIDENTIAL DEVELOPMENT WITH ACCESS ON WHISPERING SANDS DRIVE on 40.16 acres on the southwest corner of Grand Teton Drive and Tenaya Way (APN 125-15-101-003), U (Undeveloped) Zone [DR (Desert Rural Density Residential) General Plan Designation] under Resolution of Intent to R-PD2 (Residential Planned Development - 2 Units Per Acre), Ward 6 (Ross), was considered by the Planning Commission on April 10, 2008.

The Planning Commission voted to recommend **APPROVAL** of your request, subject to the following:

Planning and Development

1. Lots 95 and 96 on the Site Plan dated 3/11/08 shall be limited to one story or 20 feet, whichever is less.
2. Twenty (20) 24-inch box trees shall be added on the subject property exterior to the perimeter wall along Grand Teton as approved by the Department of Public Works.
3. This approval shall be void two years from the date of final approval, unless a building permit has been issued for the principal building on the site. An Extension of Time may be filed for consideration by the City of Las Vegas.
4. All development shall be in conformance with the site plan, landscape plan, and building elevations, date stamped 03/11/08 and 03/12/08, except as amended by conditions herein.

Mayor
Oscar B. Goodman

City Council
Gary Reese
(Mayor Pro Tem)
Larry Brown
Steve Wolfson
Lois Tarkenton
Steven D. Ross
Ricki Y. Barlow

City Manager
Douglas A. Selby



07101-001-06-07

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APR 14 2008

EOT-45057

5. The standards for this development shall include a Minimum lot size of 9,375 square feet and Building height shall not exceed two stories or 32 feet, whichever is less.
6. The setbacks for this development shall be a minimum of 10 feet to the front of the house, 18 feet to the front of the garage as measured from back of sidewalk or from back of curb if no sidewalk is provided, five feet on the side, 10 feet on the corner side, and 15 feet in the rear. The casita options shall be six foot from the main dwelling and five foot from the rear and side property lines.
7. A revised elevation of the proposed block wall, indicating 20% contrasting block, shall be submitted to and approved by the Planning and Development Department, prior to the time application is made for permits.
8. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time as Final Map submittal. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications.
9. No turf shall be permitted in the non-recreational common areas, such as medians and amenity zones in this development.
10. Pre-planting and post-planting landscape inspections are required to ensure the appropriate plant material, location, size of planters, and landscape plans are being utilized. The Planning and Development Department must be contacted to schedule an inspection prior to the start of the landscape installation and after the landscape installation is completed. A certificate of occupancy will not be issued or the final inspection will not be approved until the landscape inspections have been completed.
11. Revised elevations shall be submitted to and approved by the Planning and Development Department prior to the time application is made for a building permit to reflect a perimeter block wall with 20% contrasting block.
12. Air conditioning units shall not be mounted on rooftops.
13. All utility boxes exceeding 27 cubic feet in size shall meet the standards of LVMC Title 19.12.040.

Mr. Ben Young
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April 11, 2008

14. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.
15. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

16. Dedicate an additional 29 feet of right-of-way for a total radius of 54 feet on the southwest corner of Grand Teton Drive and Tenaya Way prior to the issuance of any permits.
17. Dedicate an additional 10 feet of right-of-way for a total half-street width of 60 feet on Grand Teton Drive adjacent to this site prior to the issuance of any permits.
18. Construct half-street improvements including appropriate over paving on Tenaya Way and all incomplete improvements on Grand Teton Drive and Whispering Sands Drive adjacent to this site concurrent with development of this site. Extend all required underground utilities, such as electrical, telephone, traffic signal system, etc., located within public rights-of-way, prior to construction of hard surfacing (asphalt or concrete). All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.
19. A minimum of two lanes of asphalt pavement on the major access street(s) adjacent to this site, and a working sanitary sewer connection shall be in place prior to final inspection of any units within this development. Full permanent improvements on all major access streets, including all required landscaped areas between the perimeter wall and adjacent public street, shall be constructed and accepted by the City prior to issuance of any building permits beyond 50% of all units within this development. All off-site improvements adjacent to this site, including all required landscaped areas between the perimeter walls and adjacent public streets, shall be constructed and accepted prior to issuance of building permits beyond 75%. The above thresholds notwithstanding, all required improvements shall be constructed within 24 months of approval of construction drawings. No partial bond releases will be allowed until all perimeter roadway improvements are in place.

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April 11, 2008

20. Gated access driveways shall be designed, located and constructed in accordance with Standard Drawing #222a. Emergency vehicle access/crash gated driveways shall be constructed in accordance with Standard Drawing #224.
21. The onsite streets shall be labeled as a private street, be designated as a common lot and shall be labeled as a private street, public utility easement (P.U.E.), public sewer easement and public drainage easement to be privately maintained by the Homeowners' Association on the Final Map for this site.
22. Provide public sewer easements for all public sewers not located within existing public street right-of-way prior to the issuance of any permits as required by the Department of Public Works. Improvement Drawings submitted to the City for review shall not be approved for construction until all required public sewer easements necessary to connect this site to the existing public sewer system have been granted to the City.
23. A Homeowners' Association shall be established to maintain all perimeter walls, private roadways, landscaping and common areas created with this development. All landscaping shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.
24. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits, submittal of any construction drawings or the submittal of a Map subdividing this site, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

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Mr. Ben Young
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April 11, 2008

25. The approval of all Public Works related improvements shown on this Site Development Plan Review is in concept only. Specific design and construction details relating to size, type and/or alignment of public improvements, including but not limited to street, sewer and drainage improvements, shall be resolved prior to submittal of a Tentative Map or construction drawings, whichever may occur first. No deviations from adopted City Standards shall be allowed unless specific written approval for such is received from the City Engineer prior to the submittal of a Tentative Map or construction drawings, whichever may occur first.

This action by the Planning Commission on **April 10, 2008** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision or there is a review action filed by the City Council within the same time period. The Notice of Final Action was filed with the Las Vegas City Clerk on **April 11, 2008**.

Sincerely,



Douglas J. Rankin, AICP
Planning Manager
Case Planning Division

DR:nl:clb

cc: Mr. Ben Young
Royal Construcion
4366 West Cheyenne Avenue
North Las Vegas, Nevada 89032

Ms. Sonia Macias
TCE
3277 East Warm Springs Road
Las Vegas, Nevada 89120

EOT-45057

APPENDIX B

Figures

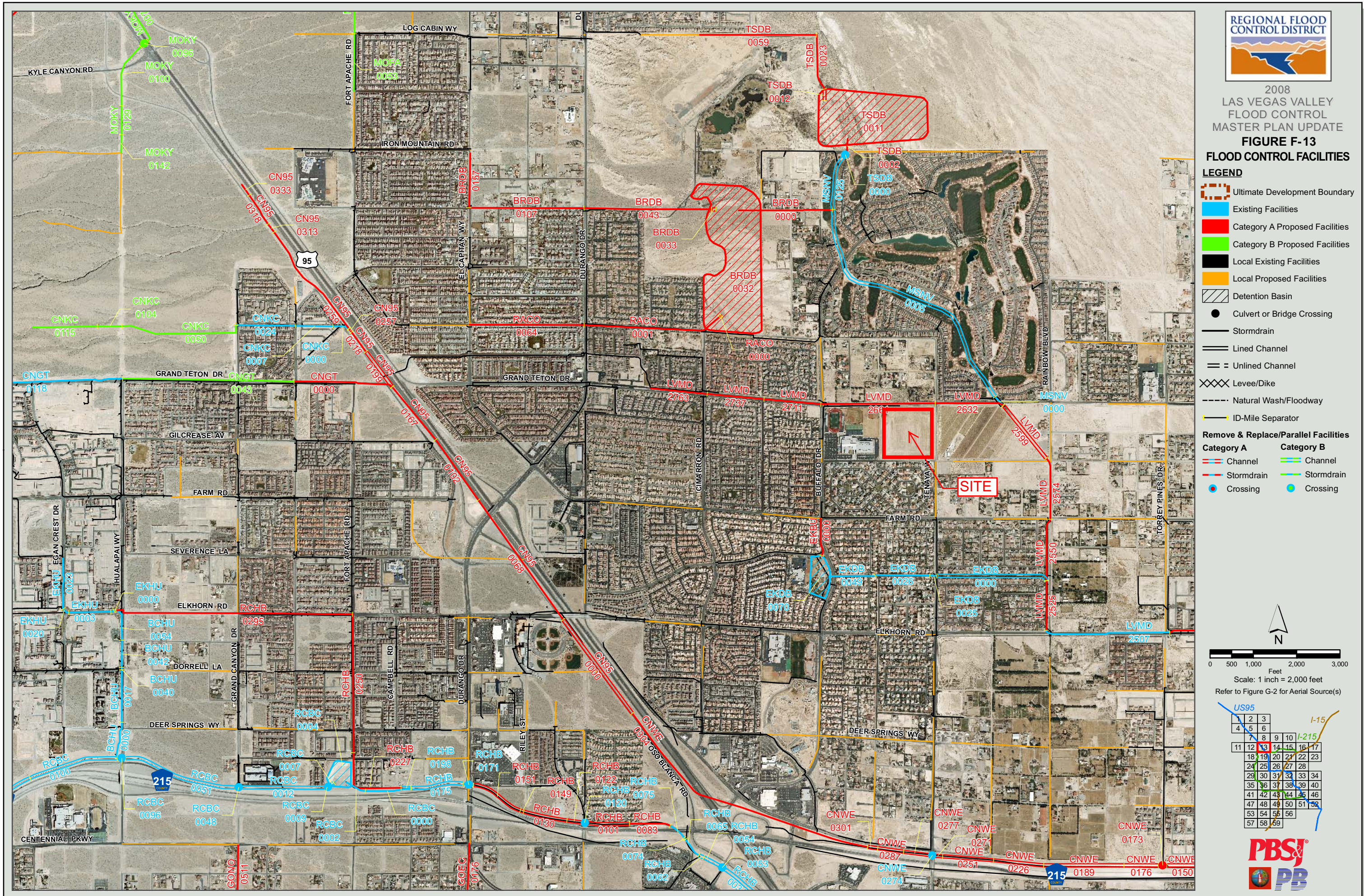


FIGURE 1

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BCHU		BELTWAY CHANNEL - HUALAPAI						
0000	E	12' X 5' RCAP	853	501	CBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1216	501	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	60	222	DNW26-C	WEST3	0.51	1.04
0042	E	60" RCP	615	222	DNW26-C	WEST3	0.51	1.42
0054	E	54" RCP	770	222	DNW26-C	WEST3	0.51	1.23
BRDB		BRENT DRAINAGE SYSTEM						
0000	P3	36" RCP with 18" Orifice Plate	2170	37	BRDB	WEST3	2.48	0.40
0031	P3	45,080 cfs PMF Spillway		45080	CBRDB	WEST3	2.48	
0032	P3	450 ac-ft South Environmental Enhancement Area		1902	CBRDB	WEST3	2.48	
0033	P3	Energy Dissipator	100	957	CNW113-C	WEST3	1.58	
0043	P1	8' X 6' RCB	2920	957	CNW113-C	WEST3	1.58	2.10
0107	P1	8' X 6' RCB	2660	957	CNW113-C	WEST3	1.58	2.40
0157	P1	12' X 6' RCB	1260	741	CNW96-C	WEST3	0.95	0.25
CN95		CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH						
0000	P2	Conc Chnl 22"W 10"D 0:1 SS	2690	3340	CNWBB3-C	WEST3	3.36	2.17
0068	P1	3: 8' X 7" RCB	3380	3216	CNW103-C	WEST3	3.05	2.12
0102	P1	3: 8' X 6' RCB	1710	2888	2CNW89-C	WEST3	2.66	2.09
0167	P1	2: 10' X 6' RCB	1580	2160	2CNW71-E	WEST3	1.64	1.50
0199	P3	Conc Chnl 15"W 11"D 0:1 SS	1015	1609	2CNW72-C	WEST3	1.17	0.82
0218	P3	16' X 8' RCB	556	1609	2CNW72-C	WEST3	1.17	0.77
0257	P3	Transition Structure	100	1609	2CNW72-C	WEST3	1.17	0.77
0259	P3	16' X 8' RCB	2848	674	CNW74-C	WEST3	0.45	2.06
0313	P3	Transition Structure	240	674	CNW74-C	WEST3	0.45	1.50
0318	P3	14' X 6' RCB	797	333	NW62-S	WEST3	0.21	1.47
0333	P3	12' X 6' RCB	300	333	NW62-S	WEST3	0.21	5.50
CNGT		CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH						
0000	P3	10' X 5' RCB	2290	600	CNW71-E	WEST3	0.47	2.63
0043	P0	6' X 6' RCB	3980	600	CNW71-E	WEST3	0.47	3.00
0118	E	6' X 5' RCAP	5472	363	KYLEDET*	KYLEDB	57.73	3.72
CNKC		CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH						
0000	E	12' X 4' RCB	377	999	CNW72-C	WEST3	0.71	4.58
0007	E	10' X 5' RCB	874	999	CNW72-C	WEST3	0.71	3.28
0024	E	8' X 5' RCB	1385	999	CNW72-C	WEST3	0.71	2.40
0050	P0	6' X 6' RCB	2830	999	CNW72-C	WEST3	0.71	3.00
0104	P0	6' X 5' RCB	565	452	NW45-S	WEST3	0.27	3.00
0115	P0	72" RCP	1513	452	NW45-S	WEST3	0.27	3.00
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0150	P2	Conc Chnl 42"W 10"D 0:1 SS	720	4233	CNW3B3-C	WEST3	5.64	0.40
0173	P2	42' X 10' RCBC @ Torrey Pines	190	4233	CNW3B3-C	WEST3	5.64	0.40
0176	P2	Conc Chnl 32"W 12"D 0:1 SS	795	4233	CNW3B3-C	WEST3	5.64	0.40
0189	P2	Conc Chnl 32"W 10"D 0:1 SS	1845	4067	CNW2D4-C	WEST3	5.15	0.54
0226	P2	Conc Chnl 12"W 12"D 2:1 SS	1165	4067	CNW2D4-C	WEST3	5.15	1.00
0251	P2	Conc Chnl 12"W 12"D 2:1 SS	1135	3951	CNW2D3-C	WEST3	4.65	0.59
0271	P2	Conc Chnl 32"W 10"D 0:1 SS	185	3951	CNW2D3-C	WEST3	4.65	0.59
0274	E	32' X 10' RCBC @ Tenaya	130	3951	CNW2D3-C	WEST3	4.65	0.45
0277	P2	Conc Chnl 13"W 10"D 2:1 SS	590	3951	CNW2D3-C	WEST3	4.65	0.45
0287	P2	Conc Chnl 13"W 10"D 2:1 SS	605	3593	CNW2B2-C	WEST3	3.84	1.19
0301	P2	Conc Chnl 32"W 10"D 0:1 SS	235	3593	CNW2B2-C	WEST3	3.84	1.19
0304	P2	32' X 10' RCB	6510	3593	CNW2B2-C	WEST3	3.84	1.75
EKBU		ELKHORN SPRINGS AND BUFFALO						
0000	P1	78" RCP	860	375	NW134-C	WEST3	0.46	1.00
EKDB		ELKHORN SPRINGS DETENTION BASIN						
0000	E	Grass Chnl 15"W 5.8"D 3.5:1 SS	2575	238	CNW150-C	WEST3	1.41	0.39
0025	E	4' X 3' RCB	160	120	ELKBASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	120	ELKBASIN	WEST3	0.84	1.23
0049	E	60" RCP	1095	120	ELKBASIN	WEST3	0.84	0.13
0070	E	48 ac-ft Elkhorn Springs Detention Basin		629	CNW133-C	WEST3	0.84	
EKHU		ELKHORN AND HUALAPAI						
0000	E	6' X 5' RCB Overflow Structure	48	638	CNW26-C	WEST3	0.51	0.91
0001	E	6' X 5' RCAP	72	638	CNW26-C	WEST3	0.51	0.91
ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
EKHU		ELKHORN AND HUALAPAI						
0003	E	6' X 4' RCAP	980	638	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	638	CNW26-C	WEST3	0.51	3.61
0023	E	8' X 5' RCAP	1200	638	CNW26-C	WEST3	0.51	0.90
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GONO		GOWAN NORTH SYSTEM						
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14
LVMD		LAS VEGAS WASH - MIDDLE						
2490	P2	2: 13' X 7' RCB	2555	2278	CNW168-C	CWEST3	4.69	0.40
2507	E	2: 13' X 9' RCB	2831	2278	CNW168-C	CWEST3	4.69	0.36
2525	P1	21' X 6' RCB	1140	1913	CNW159-C	CWEST3	3.91	0.40
2550	P1	21' X 6' RCB	1445	1664	CD161-C	CWEST3	3.41	0.40
2574	P1	21' X 6' RCB	1430	1664	CD161-C	CWEST3	3.41	0.60
2599	P1	Conc Chnl 30"W 5"D 2:1 SS	1577	1585	CNW162-C	CWEST3	3.08	0.40
2632	P1	13' X 5' RCB	1580	968	CNW138-C	WEST3	1.16	0.59
2661	P1	11' X 5' RCB	2640	968	CNW138-C	WEST3	1.16	1.00
2711	P1	8' X 5' RCB	1320	968	CNW138-C	WEST3	1.16	1.80
2737	P1	8' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	1.81
2763	P1	78" RCP	1320	818	CNW139-C	WEST3	0.93	2.40
MOFA		MOCCASIN - FORT APACHE						
0024	P0	12' X 6' RCB	1520	394	DNW100-W	LOWER3	0.46	0.25
0053	P0	10' X 6' RCB	1345	258	DNW78-C	LOWER3	0.24	0.25
MOKY		MOCCASIN - KYLE CANYON BRANCH						
0078	P0	2: 13' X 7" RCB	965	1205	CNW50-E	LOWER3	1.06	0.40
0096	P0	2: 13' X 7" RCBC @ US 95	210	1066	CNW35-C	LOWER3	0.89	1.70
0100	P0	2: 13' X 7" RCB	1515	1066	CNW35-C	LOWER3	0.89	0.40
0129	P0	2: 11' X 7" RCB	675	779	CNW33-C	LOWER3	0.64	0.40
0142	P0	2: 9' X 7" RCB	430	779	CNW33-C	LOWER3	0.64	0.40
MSNV		MOUNTAIN SPA/VISTA RANCH						
0000	E	6: 12' X 5' RCBC @ Grand Teton	273	679	CNW163-C	CWEST3	1.67	0.40
0005	E	Grass Chnl 100"W 4.5"D 10:1 SS	6325	679	CNW163-C	CWEST3	1.67	0.40
0125	E	Grass Chnl 100"W 4.5"D 10:1 SS	1300	116	CNW147E	WEST3	1.54	0.40
RACO		RACEL STREET COLLECTOR						
0000	P3	96" RCP Baffled Energy Dissipator	54	497	CNW111S	WEST3	0.55	4.20
0001	P3	78" RCP	3245	497	CNW111S	WEST3	0.55	2.46
0064	P3	78" RCP	2650	423	DNW111S	WEST3	0.44	2.09
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0000	E	6' X 5' RCB	1062	222	FADB	WEST3	1.60	1.04
0002	E	54" RCP Outlet with 41" Orifice	503	222	FADB	WEST3	1.60	2.38
0003	E	2,341 cfs PMF Spillway		2341	FADBIN	WEST3	1.60	
0004	E	76 ac-ft Fort Apache Detention Basin		1255	FADBIN	WEST3	1.60	
0007	E	Energy Dissipator	100	1255	FADBIN	WEST3	1.60	
0009	E	12' X 6' RCBC @ Fort Apache Detention Basin	133	1255	FADBIN	WEST3	1.60	1.79
0012	E	Conc Chnl 12"W 6'-7"D 0:1 SS	1937	1255	FADBIN	WEST3	1.60	3.15
0048	E	12' X 6' RCBC @ Grand Canyon	140	1040	CMNA1	WEST3	1.32	3.15
0051	E	Conc Chnl 12"W 6'-8"D 0:1 SS	2660	1040	CMNA1	WEST3	1.32	3.44
0096	E	1: 10' X 6' and 1: 6' X 6' RCBC @ Hualapai Way	190	1040	CMNA1	WEST3	1.32	1.93
0100	E	Conc Chnl 12"W 5.5"D 0:1 SS	2085	598	CDMNA1	WEST3	0.48	2.88
0140	E	Conc Chnl 10"W 5"D 0:1 SS	2155	598	CDMNA1	WEST3	0.48	1.65
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0034	E	Conc Chnl 21"W 8"D 0:1 SS	1000	2631	CNW1C-W	WEST3	4.68	1.19
0053	E	2: 12' X 8' RCBC @ South Ramp Connector	85	2304	CDW1C1	WEST3	4.31	1.40
0054	E	Conc Chnl 21"W 8"D 0:1 SS	432	2304	CDW1C1	WEST3	4.31	1.51
0062	E	Transition Structure	130	2304	CDW1C1	WEST3	4.31	1.51
0065	E	24' X 7" RCB	480	2304	CDW1C1	WEST3	4.31	0.30
0074	E	24' X 6' RCB	50	2226	CNWBC6-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC6-C	WEST3	4.17	2.81
0083	P2	20' X 6' RCB	950	2226	CNWBC6-C	WEST3	4.17	2.49
0101	P2	Conc Chnl 20"W 7"D 0:1 SS	980	2226	CNWBC6-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC6-C	WEST3	4.17	1.00
ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0122	P2	Conc Chnl 16'-20"W 6"D 0:1 SS	350	2226	CNWBC6-C	WEST3	4.17	1.84
0130	P2	Conc Chnl 16"W 6"D 0:1 SS	1012	2226	CNWBC6-C	WEST3	4.17	2.67
0149	P2	Conc Chnl 16"W 6'-7"D 0:1 SS	87	1888	CNWBC3	WEST3	3.75	2.27
0151	P2	Conc Chnl 16"W 7"D 0:1 SS	1255	1888	CNWBC3	WEST3	3.75	2.65
0171	E	16' X 6' RCBC @ El Capitan Way	234	1888	CNWBC3	WEST3	3.75	1.75
0175	E	Conc Chnl 14"W 7"D 0:1 SS	1220	1888	CNWBC3	WEST3	3.75	2.93
0198	E	Conc Chnl 14"W 7"D 0:1 SS	225	1402	CNWBA6-C	WEST3	3.61	2.93
0227	P1	11' X 8' RCB	1885	1402	CNWBA6-C	WEST3	3.61	2.17
0250	P1	11' X 8' RCB	3200	1402	CNWBA6-C	WEST3	3.61	1.06
0295	P1	7' X 6' RCB	5525	973	CNW66-C	WEST3	1.75	3.30
TSDB		TULE SPRINGS DRAINAGE SYSTEM						
0000	E	2: 10' X 4' RCBC @ Echo Grande	100	26	TULEDB	WEST3	1.35	1.04
0002	P3	36" RCP with 22" Orifice Plate	320	26	TULEDB	WEST3	1.35	0.33
0010	P3	14,013 cfs PMF Spillway		14013	CTULEDB	WEST3	1.35	
0011	P3	117 ac-ft North Environmental Enhancement Area		804	CTULEDB	WEST3	1.35	
0012	P3	Energy Dissipator	260	376	CNW148-C	WEST3	0.52	
0023	P1	84" RCP	1320	376	CNW148-C	WEST3	0.52	0.80
0059	P1	78" RCP	2640	376	CNW148-C	WEST3	0.52	1.03

* The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.

** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.

^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e., HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).



2008 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 13

LEGEND

ID (Facility Identifier)

Parent Stream Name

Stream Name

River Mile

Distance Above Confluence
with Parent Stream (Miles)

Miles in Hundredths

AABB

0000

Existing Facility..... E

Proposed or Modified Facility..... P

Contingency Level

Category B..... P0

Master Plan..... P1

Preliminary Design..... P2

Design..... P3

Bottom Width..... W

Depth..... D

Side Slope, H:V..... SS

Construction Features

Cast in Place Concrete Pipe..... CIPCP

Corrugated Metal Arch Pipe Culvert..... CMAP

Corrugated Metal Pipe Culvert..... CMPC

High Density Polyethylene..... HDPE

Horizontal Elliptical Reinforced Concrete Pipe..... HERCP

Reinforced Concrete Arch Pipe..... RCAP

Reinforced Concrete Arch Culvert..... RCAC

Reinforced Concrete Box..... RCB

Reinforced Concrete Box Culvert..... RCBC

Reinforced Concrete Pipe..... RCP

Reinforced Concrete Pipe Culvert..... RCPCL

Storm Sewer Pipe..... SSP



FIGURE 1A



NORTHWEST
NEIGHBORHOOD
STUDY
PHASE 2

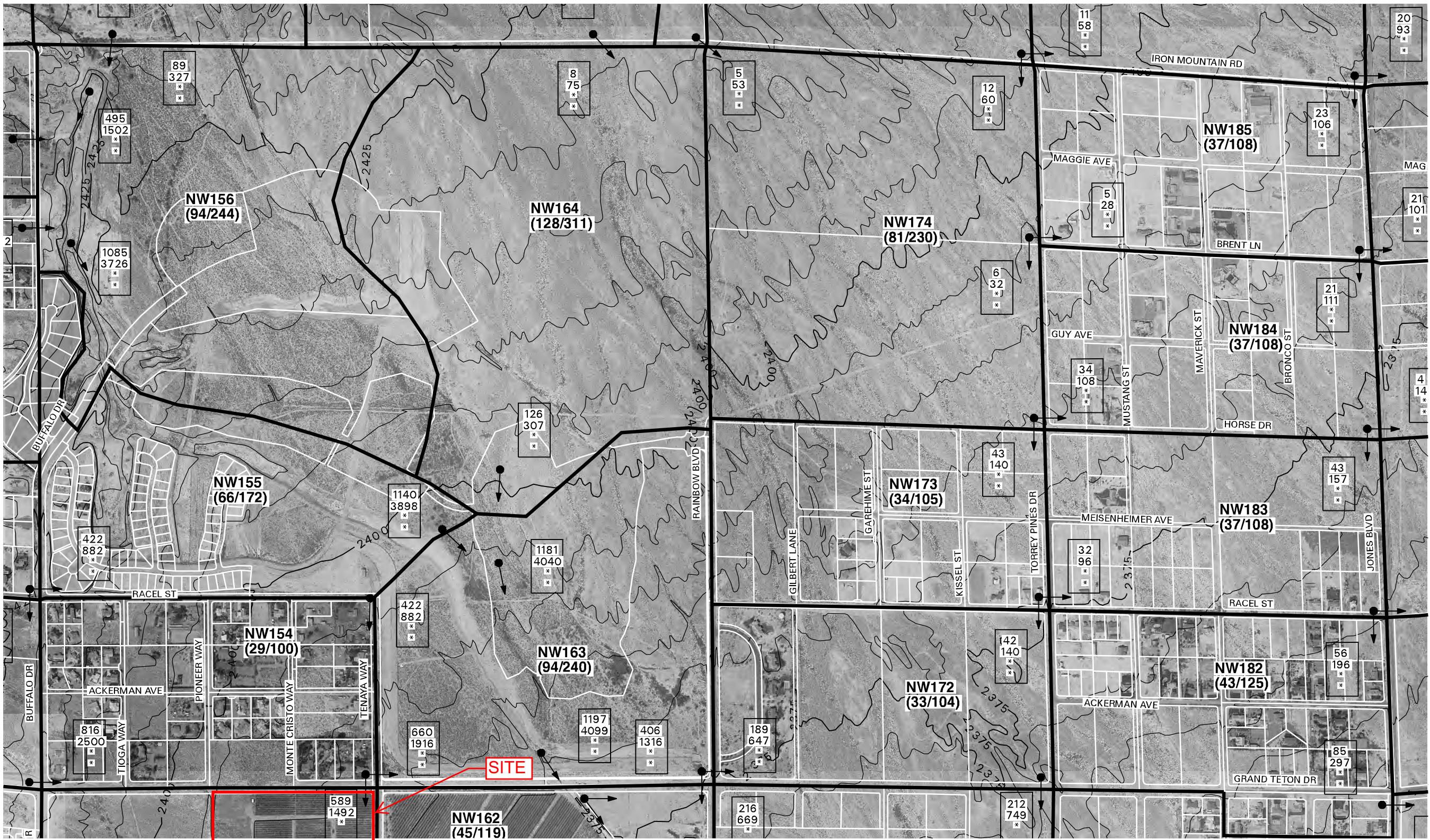
LEGEND

- SUB-BASIN BOUNDARY
- FLOW ARROW
- 250 10-YEAR STREET FLOW
- 500 100-YEAR STREET FLOW
- 300 10-YEAR FACILITY FLOW
- 800 100-YEAR FACILITY FLOW
- (FLOWS IN CFS)

BWJS	Basin-ID
(13 / 59)	Contributing flow (10-Year / 100-Year from the basin (cfs)

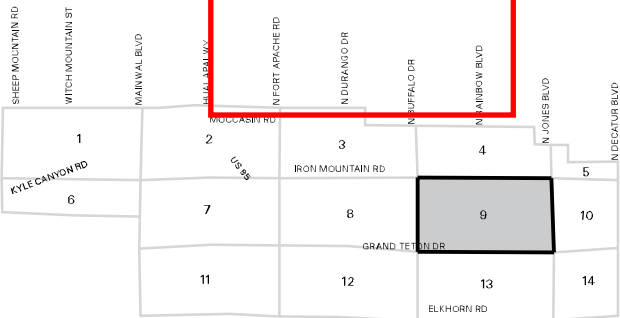
PHOTO DATE: SEPTEMBER 1998

FIGURE E-9



EXISTING DRAINAGE CONDITIONS

PBSI
ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES
901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7200



NOTE:
Existing conditions are based on future
CN values with only existing local and
CCRFCD facilities in place

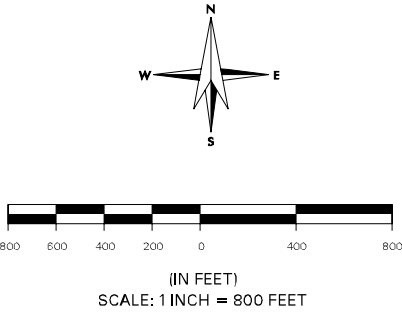
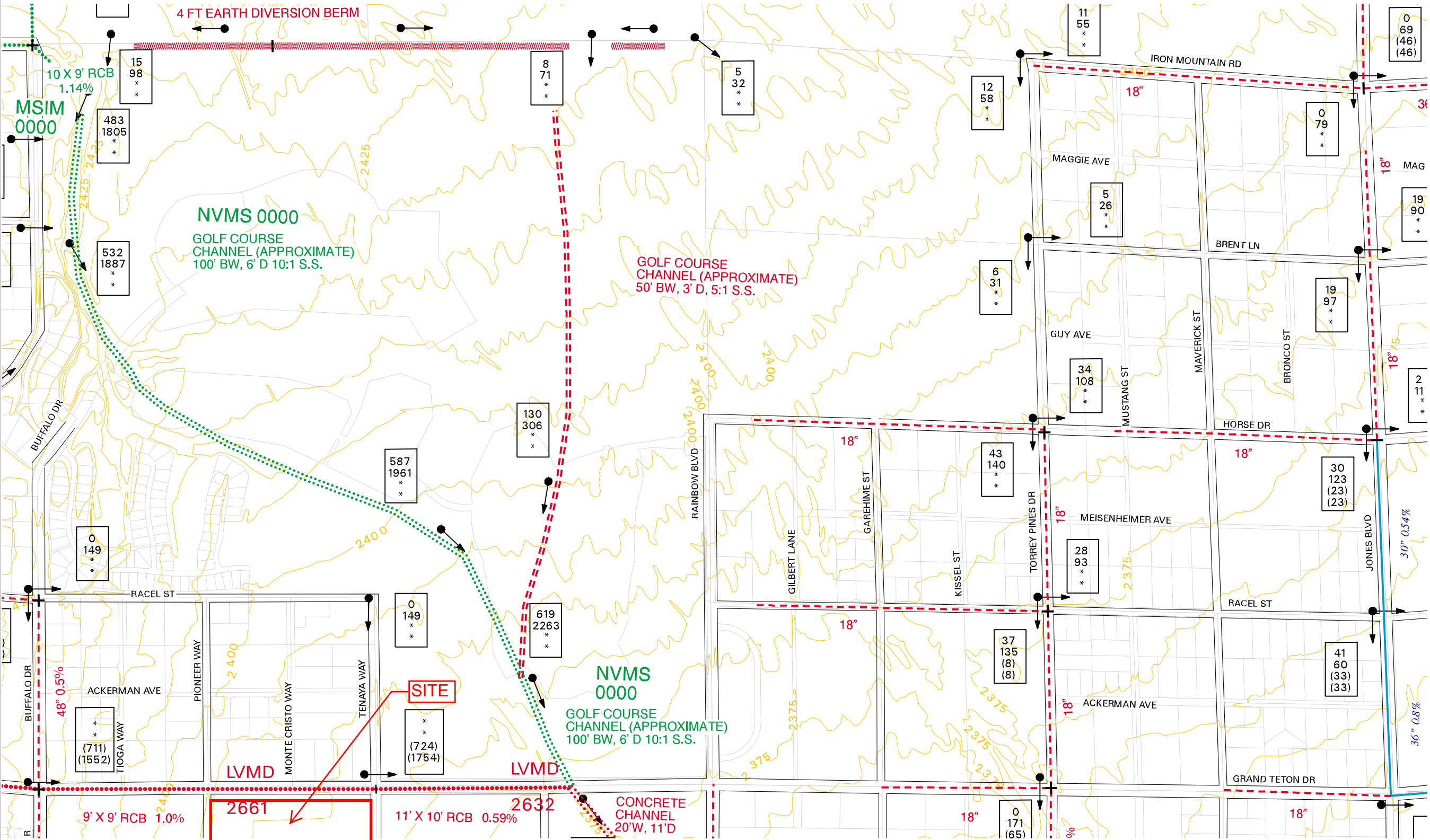


FIGURE 2



**NORTHWEST
NEIGHBORHOOD
STUDY
PHASE 2
LEGEND**

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS (Not Included in 1996 MPU)
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES (Not Included in 1996 MPU)
- EXISTING LOCAL BRIDGES
- PROPOSED REGIONAL CULVERT
- EXISTING REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE (Not Included in 1996 MPU)
- EXISTING LOCAL PIPELINE
- PROPOSED LOCAL PIPELINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- PROPOSED LOCAL CHANNEL
- PROPOSED REGIONAL CHANNEL (Not Included in 1996 MPU)
- EXISTING REGIONAL DIKE/LEEVE
- PROPOSED REGIONAL DIKE/LEEVE
- PROPOSED REGIONAL DIKE/LEEVE (Not Included in 1996 MPU)
- PROPOSED LOCAL DIKE/LEEVE

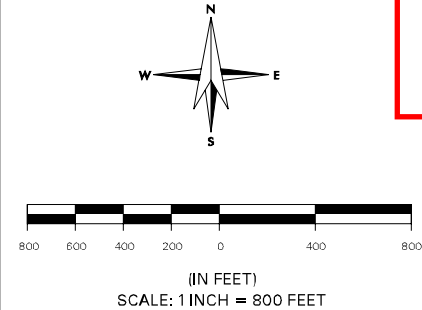
FIGURE F-9

FUTURE DRAINAGE CONDITIONS



901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7200

ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES



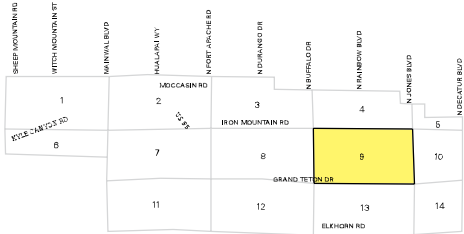
FLOW ARROW

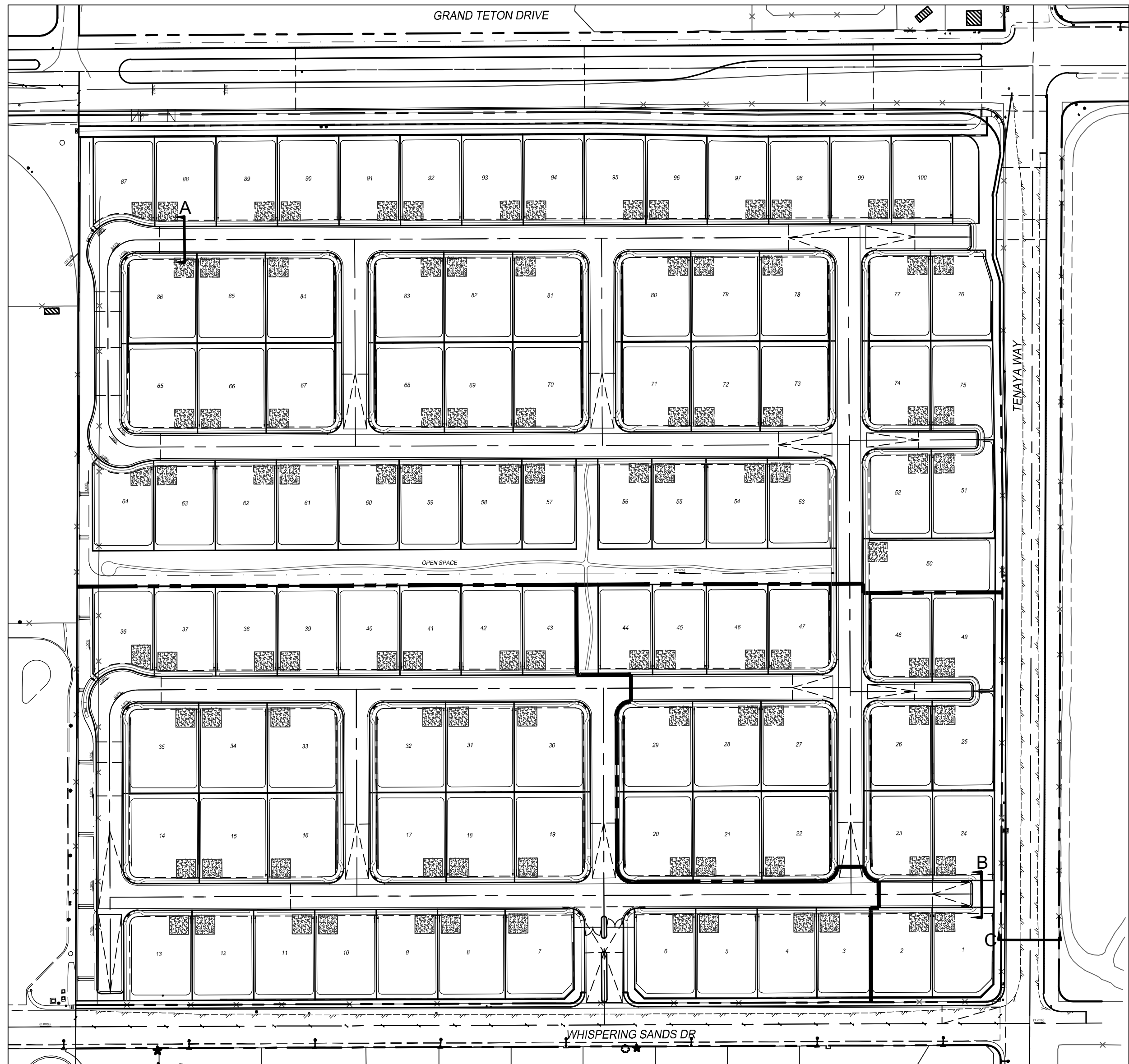
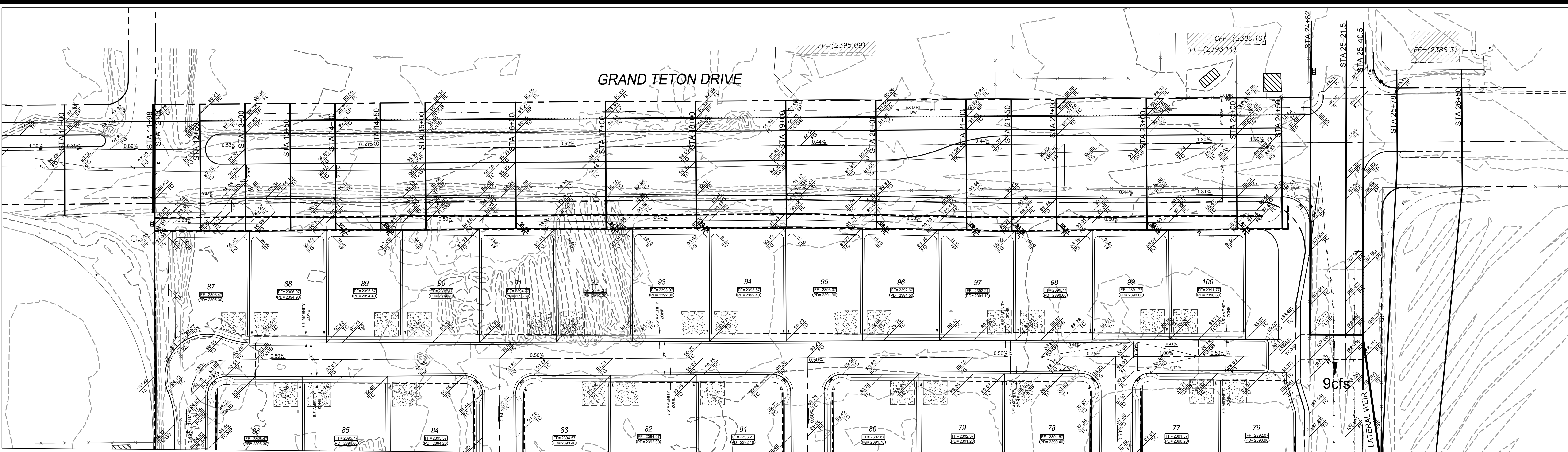
250
500
(300)
(800)

10-YEAR STREET FLOW
100-YEAR STREET FLOW
10-YEAR FACILITY FLOW
100-YEAR FACILITY FLOW
(FLOWS IN CFS)

NOTE:
Ultimate drainage conditions are based on future CN values with all flood control facilities in place.
Regional facility identifiers were established based on the methodology used in the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley."

NOTE:
All regional facilities proposed in the "1996 Clark County Regional Flood Control Master Plan Update for the Las Vegas Valley" have been resized based on the flows developed in this study. In addition, many of these facilities have been changed from channels to reinforced concrete box culverts.





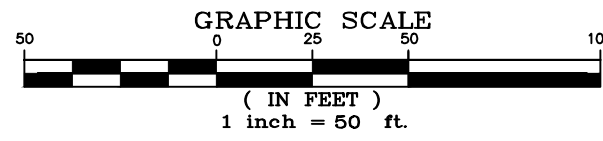
CROSS SECTION MAP

Cross Section	Description	Q (cfs)	Depth (ft)	Velocity (ft/s)	DxV
A - Typ 37' Street @ 0.41%	DEON1	30	0.56	2.71	1.52
B - 37' Drainage Easement	DEON1	30	0.38	4.14	1.57
C - Tenaya Interim - 100-yr	DEON1+DEV TEN+9cfs	43	0.69	2.79	1.93
C - Tenaya Interim - 10-yr	DEON1+DEV TEN	8	0.42	1.86	0.78
C - Tenaya Ultimate - 100yr	DEON1+DEV TEN+9cfs	34	0.61	2.78	1.70
C - Tenaya Ultimate - 10yr	DEON1+DEV TEN	8	0.41	2.09	0.86

All flows have been referenced from DS4274 by TCE

River Station	Q Total (cfs)	WSE (ft)	TCE Existing Condition Station	WSE	Difference (ft)
-1100	2538	99.64	15	99.91	-0.27
-1198	2538	98.78	14	100.02	-1.24
-1200	2538	98.22	14	100.02	-1.8
-1250	2538	97.9	13	99.58	-1.68
-1300	2538	98.11	13	99.58	-1.47
-1350	2538	97.65	12	98.01	-0.36
-1400	2538	97.52	12	98.01	-0.49
-1450	2538	97.2	12	98.01	-0.81
-1500	2538	97.11	11	97.01	0.1
-1600	2538	96.04	11	97.01	-0.97
-1700	2538	95.08	10	95.37	-0.29
-1800	2538	94.16	9	95.34	-1.18
-1900	2538	93.27	8	94.13	-0.86
-2000	2538	92.71	7	93.09	-0.38
-2100	2538	92.5	7	93.09	-0.59
-2150	2538	92.25	6	91.87	0.38
-2200	2538	92.02	6	91.87	0.15
-2300	2538	91.68	5	91.39	0.29
-2400	2538	90.03	4	89.74	0.29
-2450	2538	89.39	3	88.58	0.81
-2482	2538	88.25	btwn 2-3*	88.41	-0.16
-2483	Lat Struct				
-2521.5	2532.14	88.21	btwn 2-3*	88.20	0.01
-2540.5	2532.14	87.81	btwn 2-3*	88.10	-0.29
-2578	2529.36	88.02	2	87.9	0.12
-2650	2494.78	87.86	1	87.88	-0.02

*WSE was interpolated between sections 2 and 3 of TCE analysis



APPENDIX C

FlowMaster Sections

Project Description

Input Data

0+00.0	0.37
0+01.5	0.00
0+02.5	0.12
0+18.5	0.44
0+34.5	0.12
0+35.5	0.00
0+37.0	0.37

(0+00.0, 0.37)	(0+02.5, 0.12)	0.013
(0+02.5, 0.12)	(0+34.5, 0.12)	0.016
(0+34.5, 0.12)	(0+37.0, 0.37)	0.013

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

Normal Depth		0.56	ft
Elevation Range	0.00 to 0.44 ft		
Flow Area		11.08	ft²
Wetted Perimeter		37.49	ft

Worksheet for A -Typ 37' Street @ 0.41%

Results

Hydraulic Radius	0.30	ft
Top Width	37.00	ft
Normal Depth	0.56	ft
Critical Depth	0.53	ft
Critical Slope	0.00555	ft/ft
Velocity	2.71	ft/s
Velocity Head	0.11	ft
Specific Energy	0.67	ft
Froude Number	0.87	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.56	ft
Critical Depth	0.53	ft
Channel Slope	0.41000	%
Critical Slope	0.00555	ft/ft

Cross Section for A -Typ 37' Street @ 0.41%

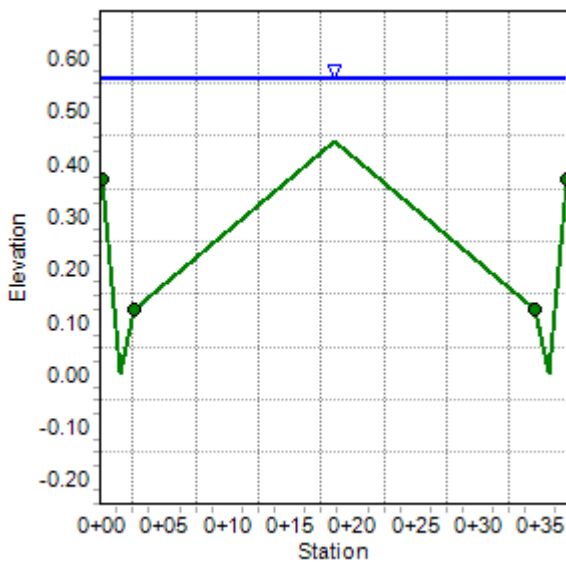
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.41000	%
Normal Depth	0.56	ft
Discharge	30.00	ft ³ /s

Cross Section Image



Project Description

Input Data

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

Roughness Segment Definitions

(0+00.0, 0.87)	(0+37.0, 0.87)	0.013
----------------	----------------	-------

Options

Results

8/23/2012 11:42:48 AM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for B - 37' Drainage Easement

Results

Critical Slope	0.00382	ft/ft
Velocity	4.14	ft/s
Velocity Head	0.27	ft
Specific Energy	0.65	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	0.38	ft
Critical Depth	0.46	ft
Channel Slope	1.15000	%
Critical Slope	0.00382	ft/ft

Cross Section for B - 37' Drainage Easement

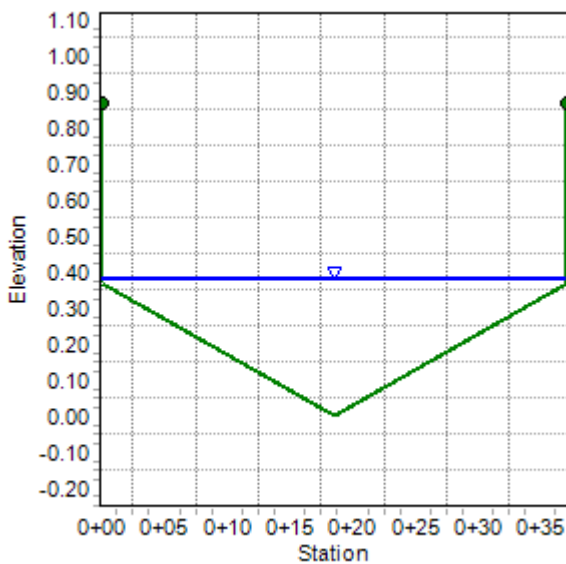
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.15000	%
Normal Depth	0.38	ft
Discharge	30.00	ft ³ /s

Cross Section Image



Worksheet for C - Tenaya Interim - 10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.68000 %
Discharge 8.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.17
0+40.0	0.83
0+59.0	0.45
0+69.0	0.00
0+80.0	2.75

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+59.0, 0.45)	0.016
(0+59.0, 0.45)	(0+80.0, 2.75)	0.025

Options

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

Results

Normal Depth 0.42 ft
Elevation Range 0.00 to 2.75 ft

Worksheet for C - Tenaya Interim - 10-yr

Results

Flow Area	4.30	ft ²
Wetted Perimeter	25.27	ft
Hydraulic Radius	0.17	ft
Top Width	24.78	ft
Normal Depth	0.42	ft
Critical Depth	0.38	ft
Critical Slope	0.01133	ft/ft
Velocity	1.86	ft/s
Velocity Head	0.05	ft
Specific Energy	0.47	ft
Froude Number	0.79	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.38	ft
Channel Slope	0.68000	%
Critical Slope	0.01133	ft/ft

Cross Section for C - Tenaya Interim - 10-yr

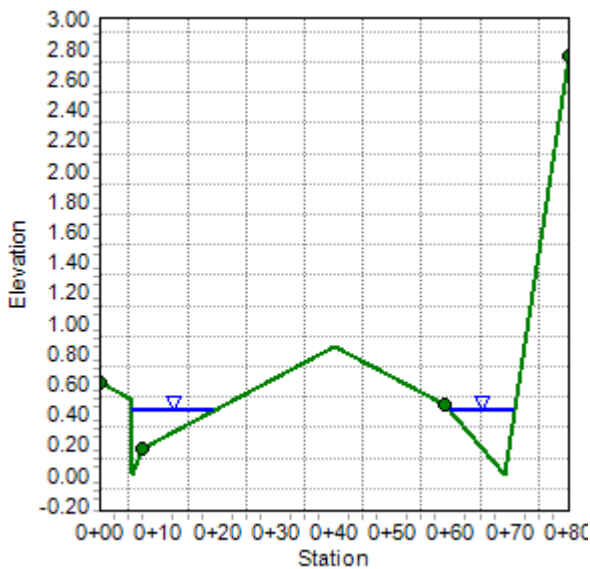
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.68000	%
Normal Depth	0.42	ft
Discharge	8.00	ft ³ /s

Cross Section Image



Project Description

Input Data

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

Roughness Segment Definitions

(0+00.0, 0.60)	(0+07.0, 0.17)	0.013
(0+07.0, 0.17)	(0+59.0, 0.45)	0.016
(0+59.0, 0.45)	(0+80.0, 2.75)	0.025

Options

Results

Bentley Systems, Inc. Bentley FlowMaster V8i (SELECTseries 1) [08.11.01.03]

Worksheet for C - Tenaya Interim - 100-yr

Results

Flow Area	15.39	ft ²
Wetted Perimeter	58.25	ft
Hydraulic Radius	0.26	ft
Top Width	57.55	ft
Normal Depth	0.69	ft
Critical Depth	0.68	ft
Critical Slope	0.00755	ft/ft
Velocity	2.79	ft/s
Velocity Head	0.12	ft
Specific Energy	0.81	ft
Froude Number	0.95	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.69	ft
Critical Depth	0.68	ft
Channel Slope	0.68000	%
Critical Slope	0.00755	ft/ft

Cross Section for C - Tenaya Interim - 100-yr

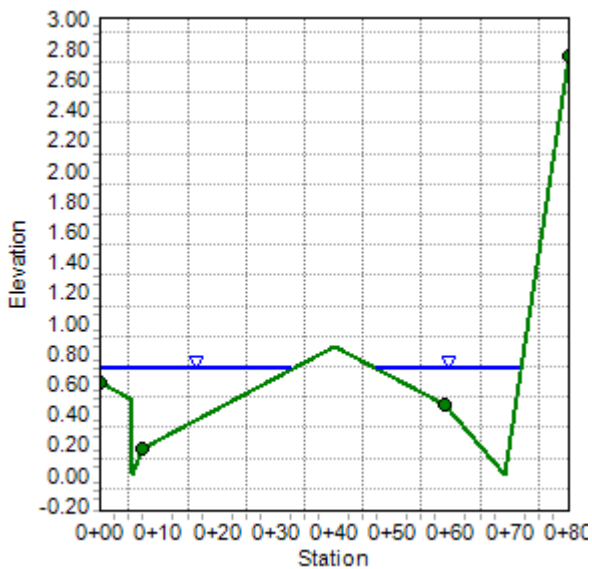
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.68000	%
Normal Depth	0.69	ft
Discharge	43.00	ft ³ /s

Cross Section Image



Project Description

Input Data

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

Roughness Segment Definitions

Options

8/23/2012 11:44:17 AM 27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666 Page 1 of 2

Worksheet for C - Tenaya Ultimate - 10yr

Results

Normal Depth		0.41	ft
Elevation Range	0.00 to 0.83 ft		
Flow Area		3.83	ft ²
Wetted Perimeter		27.74	ft
Hydraulic Radius		0.14	ft
Top Width		26.90	ft
Normal Depth		0.41	ft
Critical Depth		0.41	ft
Critical Slope		0.00712	ft/ft
Velocity		2.09	ft/s
Velocity Head		0.07	ft
Specific Energy		0.48	ft
Froude Number		0.98	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.41	ft
Channel Slope	0.68000	%
Critical Slope	0.00712	ft/ft

Cross Section for C - Tenaya Ultimate - 10yr

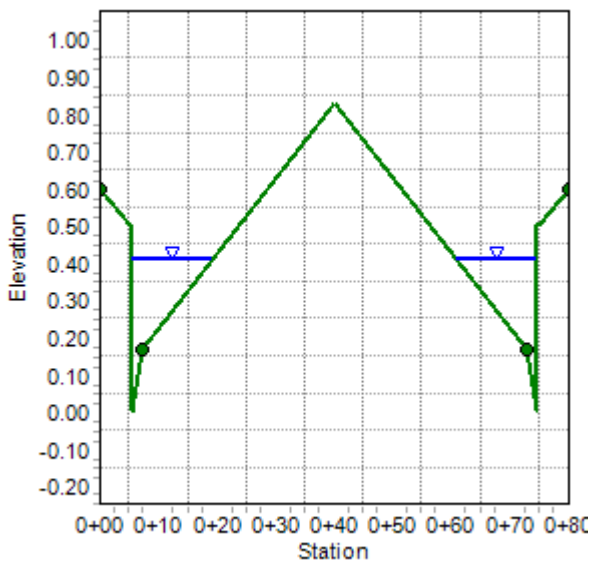
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.68000	%
Normal Depth	0.41	ft
Discharge	8.00	ft ³ /s

Cross Section Image



Worksheet for C - Tenaya Ultimate - 100yr

Results

Normal Depth		0.61	ft
Elevation Range	0.00 to 0.83 ft		
Flow Area		12.21	ft ²
Wetted Perimeter		59.48	ft
Hydraulic Radius		0.21	ft
Top Width		58.42	ft
Normal Depth		0.61	ft
Critical Depth		0.63	ft
Critical Slope		0.00582	ft/ft
Velocity		2.78	ft/s
Velocity Head		0.12	ft
Specific Energy		0.73	ft
Froude Number		1.07	
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	0.61	ft
Critical Depth	0.63	ft
Channel Slope	0.68000	%
Critical Slope	0.00582	ft/ft

Cross Section for C - Tenaya Ultimate - 100yr

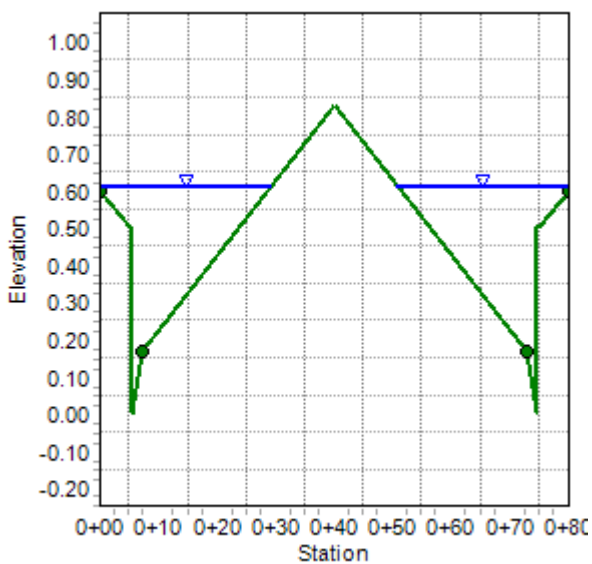
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.68000	%
Normal Depth	0.61	ft
Discharge	34.00	ft ³ /s

Cross Section Image

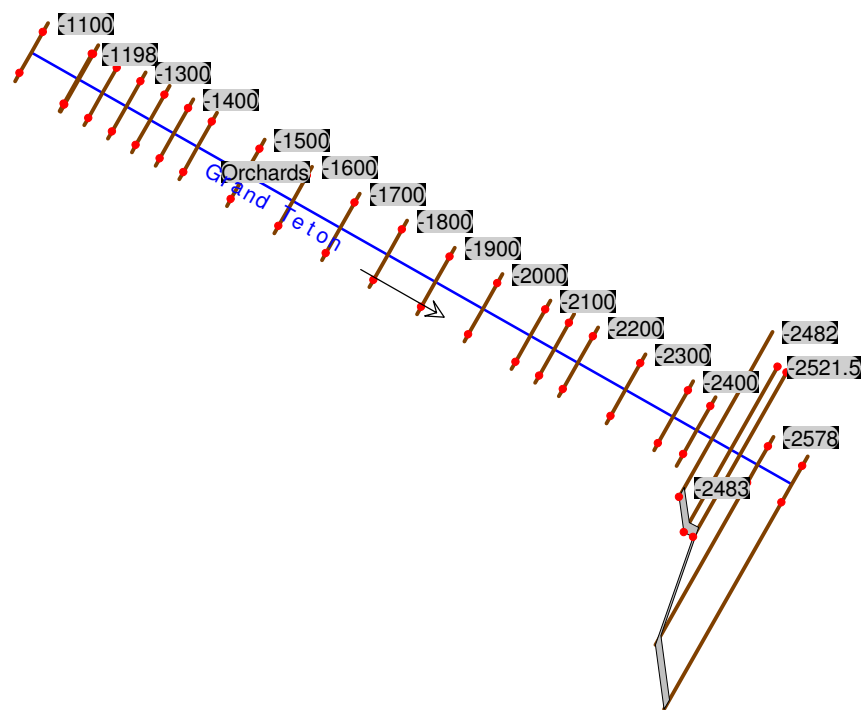


APPENDIX D

HEC-RAS Analyses

WSE Comparison

River Station	Q Total (cfs)	WSE (ft)	TCE Existing Condition		Difference (ft)
			Station	WSE	
-1100	2538	99.64	15	99.91	-0.27
-1198	2538	98.78	14	100.02	-1.24
-1200	2538	98.22	14	100.02	-1.8
-1250	2538	97.9	13	99.58	-1.68
-1300	2538	98.11	13	99.58	-1.47
-1350	2538	97.65	12	98.01	-0.36
-1400	2538	97.52	12	98.01	-0.49
-1450	2538	97.2	12	98.01	-0.81
-1500	2538	97.11	11	97.01	0.1
-1600	2538	96.04	11	97.01	-0.97
-1700	2538	95.08	10	95.37	-0.29
-1800	2538	94.16	9	95.34	-1.18
-1900	2538	93.27	8	94.13	-0.86
-2000	2538	92.71	7	93.09	-0.38
-2100	2538	92.5	7	93.09	-0.59
-2150	2538	92.25	6	91.87	0.38
-2200	2538	92.02	6	91.87	0.15
-2300	2538	91.68	5	91.39	0.29
-2400	2538	90.03	4	89.74	0.29
-2450	2538	89.39	3	88.58	0.81
-2482	2538	88.25	btwn 2-3*	88.41	-0.16
-2483	Lat Struct				
-2521.5	2532.14	88.21	btwn 2-3*	88.20	0.01
-2540.5	2532.14	87.81	btwn 2-3*	88.10	-0.29
-2578	2529.36	88.02	2	87.9	0.12
-2650	2494.78	87.86	1	87.88	-0.02
*WSE was interpolated between sections 2 and 3 of TCE analysis					



None of the XS's are Geo-Referenced [Geo-Ref user entered XS] [Geo-Ref interpolated XS] [Non Geo-Ref user entered XS] [Non Geo-Ref interpolated XS]

HEC-RAS Plan: Plan 09 River: Grand Teton Reach: Orchards Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Orchards	-1100	PF 1	2538.00	97.31	99.64	100.36	102.11	0.014414	12.28	205.68	122.50	1.69
Orchards	-1198	PF 1	2538.00	95.96	98.78	99.43	101.07	0.007380	11.32	213.21	120.00	1.52
Orchards	-1200	PF 1	2538.00	95.93	98.22	99.02	101.01	0.005765	8.83	233.58	140.00	1.31
Orchards	-1250	PF 1	2538.00	95.69	97.90	98.70	100.72	0.005933	8.68	235.03	140.00	1.32
Orchards	-1300	PF 1	2538.00	95.45	98.11	98.75	100.27	0.004236	6.62	285.45	140.00	0.92
Orchards	-1350	PF 1	2538.00	94.96	97.65	98.37	100.03	0.004588	6.79	276.40	140.00	0.95
Orchards	-1400	PF 1	2538.00	94.97	97.52	98.21	99.77	0.004352	6.53	282.38	140.00	0.92
Orchards	-1450	PF 1	2538.00	94.64	97.20	97.91	99.54	0.004503	6.54	278.44	140.00	0.93
Orchards	-1500	PF 1	2538.00	94.49	97.11	97.66	99.01	0.003576	6.17	302.69	140.00	0.84
Orchards	-1600	PF 1	2538.00	93.60	96.04	96.79	98.52	0.005183	6.93	268.25	140.00	1.00
Orchards	-1700	PF 1	2538.00	92.70	95.08	95.91	97.90	0.006592	7.64	249.86	140.00	1.12
Orchards	-1800	PF 1	2538.00	91.81	94.16	95.01	97.15	0.007951	8.34	237.82	140.00	1.23
Orchards	-1900	PF 1	2538.00	90.92	93.27	94.14	96.30	0.009233	9.05	229.42	140.00	1.33
Orchards	-2000	PF 1	2538.00	89.60	92.71	93.47	95.29	0.008198	8.87	241.76	142.00	1.26
Orchards	-2100	PF 1	2538.00	89.94	92.50	93.02	94.41	0.005617	7.85	275.27	144.00	1.06
Orchards	-2150	PF 1	2538.00	89.71	92.25	92.76	94.13	0.005549	7.81	277.07	145.00	1.06
Orchards	-2200	PF 1	2538.00	89.49	92.02	92.52	93.85	0.005351	7.69	280.66	145.00	1.04
Orchards	-2300	PF 1	2538.00	89.05	91.68	92.09	93.30	0.004542	7.32	295.78	145.00	0.96
Orchards	-2400	PF 1	2538.00	87.74	90.03	90.77	92.55	0.010746	9.73	230.25	145.00	1.43
Orchards	-2450	PF 1	2538.00	87.08	89.39	90.15	91.99	0.010960	9.87	223.83	145.00	1.44
Orchards	-2482	PF 1	2538.00	87.28	88.25	88.92	91.33	0.042554	14.53	194.50	347.30	3.15
Orchards	-2483		Lat Struct									
Orchards	-2521.5	PF 1	2532.14	86.54	88.21	88.71	89.90	0.017197	10.45	242.37	304.74	2.06
Orchards	-2540.5	PF 1	2532.14	86.30	87.81	88.32	89.56	0.017943	10.62	238.43	301.71	2.11
Orchards	-2578	PF 1	2529.36	85.93	88.02	88.26	88.90	0.007051	10.01	420.02	428.70	1.45
Orchards	-2650	PF 1	2494.78	85.65	87.86	87.93	88.42	0.004200	8.29	532.08	530.48	1.14

Orchards_Dev.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

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

```

PROJECT DATA

Project Title: Orchards_Dev
Project File : Orchards_Dev.prj
Run Date and Time: 8/23/2012 11:50:08 AM

Project in English units

PLAN DATA

Plan Title: Plan 09
Plan File : s:\Active\D R Horton\DRH-12-033 - The Orchards Grand Teton & Tenaya\Hydrology\Update #2\HEC-RAS\Orchards_Dev.p09

Geometry Title: Orchards_Int
Geometry File : s:\Active\D R Horton\DRH-12-033 - The Orchards Grand Teton & Tenaya\Hydrology\Update #2\HEC-RAS\Orchards_Dev.g01

Flow Title : Flow 01
Flow File : s:\Active\D R Horton\DRH-12-033 - The Orchards Grand Teton & Tenaya\Hydrology\Update #2\HEC-RAS\Orchards_Dev.f01

Plan Summary Information:

Number of:	Cross Sections = 25	Multiple Openings = 0
	Culverts = 0	Inline Structures = 0
	Bridges = 0	Lateral Structures = 1

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Flow 01
Flow File : s:\Active\D R Horton\DRH-12-033 - The Orchards Grand Teton & Tenaya\Hydrology\Update #2\HEC-RAS\Orchards_Dev.f01

Flow Data (cfs)

River	Reach	RS	PF 1
Grand Teton	Orchards	-1100	2538

Boundary Conditions

River Downstream	Reach	Profile	Upstream
Grand Teton 0.005	Orchards	PF 1	Normal S = 0.0144 Normal S =

Orchards_Dev.rep

GEOMETRY DATA

Geometry Title: Orchards_Int

Geometry File : s:\Active\DR Horton\DRH-12-033 - The Orchards Grand Teton & Tenaya\Hydrology\Update #2\HEC-RAS\Orchards_Dev.g01

CROSS SECTION

RIVER: Grand Teton

REACH: Orchards RS: -1100

INPUT

Description: Sta 11+00

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	98.07	19	97.69	33	97.96	33	98.46	47	98.73
47	98.23	50	98.29	103	97.48	104.5	97.31	104.5	97.81
105	97.81	122.5	97.95						

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	105	.016

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	105		98	98	98		.1	.3

CROSS SECTION

RIVER: Grand Teton

REACH: Orchards RS: -1198

INPUT

Description: Sta 11+98

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	97.44	50	97.39	103	96.13	104.5	95.96	104.5	96.46
105	96.46	120	96.76	120	100.76				

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	0	.016	105	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	0	105		2	2	2		.1	.3

CROSS SECTION

RIVER: Grand Teton

REACH: Orchards RS: -1200

INPUT

Description: Sta 12+00

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	97.45	19	96.78	50	97.4	103	96.1	104.5	95.93
104.5	96.43	105	96.43	110	96.53	120	96.73	124.99	96.63
125	94.08	132.5	93.93	140	94.08	140	99.58		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.016	124.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	124.99		50	50	50		.1	.3

CROSS SECTION

RIVER: Grand Teton

REACH: Orchards RS: -1250

INPUT

Description: Sta 12+50

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	96.43	11	96.21	19	96.51	50	97.13	103	95.86

Orchards_Dev.rep

104.5	95.69	104.5	96.19	105	96.19	110	96.29	120	96.49
124.99	96.39	125	93.76	132.5	93.62	140	93.76	140	99.26

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.016	124.99	.013

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

19	124.99	50	50	50	.1	.3
----	--------	----	----	----	----	----

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards RS: -1300

INPUT
Description: Sta 13+00
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	95.68	11	95.84	19	96.26	33	96.53	33	97.03
50	97.37	67	97.04	67	96.54	103	95.62	104.5	95.45
104.5	95.95	105	95.95	110	96.05	120	96.25	124.99	96.15
125	93.45	132.5	93.3	140	93.45	140	98.95		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

19	124.99	50	50	50	.1	.3
----	--------	----	----	----	----	----

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards RS: -1350

INPUT
Description: Sta 13+50
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	95.27	11	95.47	19	95.99	33	96.26	33	96.76
50	97.1	67	96.77	67	96.27	103	95.38	104.5	95.21
105	95.21	110	95.16	120	95.06	124.99	94.96	125	93.18
132.5	93.03	140	93.18	140	98.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

19	124.99	50	50	50	.1	.3
----	--------	----	----	----	----	----

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards RS: -1400

INPUT
Description: Sta 14+00
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	94.79	11	95.09	19	95.72	33	96	33	96.5
50	96.83	67	96.5	67	96	103	95.11	104.5	94.97
104.5	95.47	105	95.47	110	95.57	120	95.77	124.99	95.67
125	92.82	132.5	92.67	140	92.82	140	97.82		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

19	124.99	50	50	50	.1	.3
----	--------	----	----	----	----	----

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards RS: -1450

INPUT
Description: Sta 14+50

Orchards_Dev.rep

Station Elevation Data			num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	94.52	11	94.72	19	95.46	33	95.72	33	96.22	
50	96.56	67	96.22	67	95.72	103	94.81	104.5	94.64	
104.5	95.14	105	95.14	110	95.24	120	95.44	124.99	95.34	
125	92.5	132.5	92.35	140	92.5	140	97.5			

Manning's n Values			num=	3					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013				

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	124.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton
 REACH: Orchards RS: -1500

INPUT
 Description: Sta 15+00

Station Elevation Data			num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	93.92	11	94.34	19	95.19	33	95.46	33	95.96	
50	96.3	67	95.96	67	95.46	103	94.66	104.5	94.49	
104.5	94.99	105	94.99	110	95.09	120	95.29	124.99	95.19	
125	92.19	132.5	92.04	140	92.19	140	97.19			

Manning's n Values			num=	3					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013				

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	124.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton
 REACH: Orchards RS: -1600

INPUT
 Description: Sta 16+00

Station Elevation Data			num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	93.68	11	93.59	19	94.27	33	94.55	33	95.05	
50	95.38	67	95.05	67	94.55	103	93.77	104.5	93.6	
104.5	94.1	105	94.1	110	94.2	120	94.4	124.99	94.3	
125	91.69	132.5	91.54	140	91.69	140	96.69			

Manning's n Values			num=	3					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013				

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	124.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton
 REACH: Orchards RS: -1700

INPUT
 Description: Sta 17+00

Station Elevation Data			num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	93.46	11	92.84	19	93.36	33	93.63	33	94.13	
50	94.47	67	94.13	67	93.63	103	92.87	104.5	92.7	
104.5	93.2	105	93.2	110	93.3	120	93.5	124.99	93.4	
125	91.19	132.5	91.04	140	91.19	140	96.19			

Manning's n Values			num=	3					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013				

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	124.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton

Orchards_Dev.rep

REACH: Orchards

RS: -1800

INPUT

Description: Sta 18+00

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	93.04	11	92.09	19	92.44	33	92.72	33	93.22
50	93.55	67	93.22	67	92.72	103	91.98	104.5	91.81
104.5	92.31	105	92.31	110	92.41	120	92.61	124.99	92.51
125	90.69	132.5	90.54	140	90.69	140	95.69		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	124.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton

REACH: Orchards

RS: -1900

INPUT

Description: Sta 19+00

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	92.67	11	91.34	19	91.53	33	91.8	33	92.3
50	92.64	67	92.3	67	91.8	103	91.09	104.5	90.92
104.5	91.42	105	91.42	110	91.52	120	91.72	124.99	91.62
125	90.19	132.5	90.04	140	90.19	140	95.19		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	124.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	124.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton

REACH: Orchards

RS: -2000

INPUT

Description: Sta 20+00

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	92.28	11	90.59	19	91.09	33	91.36	33	91.86
50	92.2	67	91.86	67	91.36	105	89.6	106.5	90.43
106.5	90.93	107	90.93	112	91.03	122	91.23	126.99	91.13
127	89.69	134.5	89.54	142	89.69	142	94.69		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	126.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	126.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton

REACH: Orchards

RS: -2100

INPUT

Description: Sta 21+00

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	91.55	11	89.84	19	90.66	33	90.93	33	91.43
46.5	91.69	46.5	91.19	50	91.26	107	90.11	108.5	89.94
108.5	90.44	109	90.44	114	90.54	124	90.74	128.99	90.64
129	89.19	136.5	89.04	144	89.19	144	94.19		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	128.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	128.99		50	50	50		.1	.3

CROSS SECTION

RIVER: Grand Teton
 REACH: Orchards

RS: -2150

INPUT

Description: Sta 21+50

Station Elevation Data		num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	91.5	11	89.47	19	90.44	33	90.7	33	91.2
41	91.36	41	90.86	50	91.04	108	89.88	109.5	89.71
109.5	90.21	110	90.21	115	90.31	125	90.51	129.99	90.41
130	88.94	137.5	88.79	145	88.94	145	93.94		

Manning's n Values

Sta	n Val	Sta	n Val	num=	3
0	.025	19	.02	129.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	129.99		50	50	50		.1	.3

CROSS SECTION

RIVER: Grand Teton
 REACH: Orchards

RS: -2200

INPUT

Description: Sta 22+00

Station Elevation Data		num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	91.28	11	89.09	19	90	33	90.5	33	91
41	91.14	41	90.64	50	90.82	108	89.66	109.5	89.49
109.5	89.99	110	89.99	115	90.09	125	90.29	129.99	90.19
130	88.69	137.5	88.54	145	88.69	145	93.69		

Manning's n Values

Sta	n Val	Sta	n Val	num=	3
0	.025	19	.02	129.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	129.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton
 REACH: Orchards

RS: -2300

INPUT

Description: Sta 23+00

Station Elevation Data		num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	90.93	11	88.34	19	89.77	33	90.05	33	90.55
41	90.7	41	90.2	50	90.38	108	89.22	109.5	89.05
109.5	89.55	110	89.55	115	89.65	125	89.85	129.99	89.75
130	88.19	137.5	88.04	145	88.19	145	93.19		

Manning's n Values

Sta	n Val	Sta	n Val	num=	3
0	.025	19	.02	129.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	129.99		100	100	100		.1	.3

CROSS SECTION

RIVER: Grand Teton
 REACH: Orchards

RS: -2400

INPUT

Description: Sta 24+00

Station Elevation Data		num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	89.15	11	87.59	19	88.48	33	88.76	33	89.26
41	89.4	41	88.9	50	89.08	108	87.91	109.5	87.74
109.5	88.24	110	88.24	115	88.34	125	88.54	129.99	88.44
130	87.69	137.5	87.54	145	87.69	145	92.69		

Manning's n Values

Sta	n Val	Sta	n Val	num=	3
0	.025	19	.02	129.99	.013

Orchards_Dev.rep

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	129.99		50	50	50		.1	.3

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards

RS: -2450

INPUT

Description: Sta 24+50
Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	89.12	11	87.22	19	87.83	33	88.09	33	88.59
41	88.75	41	88.25	50	88.43	108	87.25	109.5	87.08
109.5	87.58	110	87.58	119.99	87.78	120	87.18	145	87.68
145	92.68								

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	19	.02	119.99	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19	119.99		32	32	32		.1	.3

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards

RS: -2482

INPUT

Description: Sta 24+82
Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	88.22	88.1	87.86	95.1	86.99	102.6	87.38	134.6	88.01
224.9	87.28	254.8	87.4	314.9	87.64	347.3	87.77		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	102.6	.016	347.3	.013

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	102.6	347.3		39.5	39.5	39.5		.1	.3

LATERAL STRUCTURE

RIVER: Grand Teton
REACH: Orchards

RS: -2483

INPUT

Description:

Lateral structure position = Right overbank

Distance from Upstream XS =

Deck/Roadway width = 20

Weir Coefficient = 2

Weir Flow Reference = Water Surface

Weir Embankment Coordinates

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
2482	87.77	2521.5	88.59	2540.5	88.21	2578	87.68	2650	87.43

Weir crest shape

= Broad Crested

LATERAL STRUCTURE OUTPUT Profile #PF 1 Lat Struct

E.G. US. (ft)	91.33	Weir Sta US (ft)	2482.00
W.S. US. (ft)	88.25	Weir Sta DS (ft)	2650.00
E.G. DS (ft)	88.42	Min El Weir Flow (ft)	87.43
W.S. DS (ft)	87.86	Wr Top Wdth (ft)	111.41
Q US (cfs)	2538.00	Weir Max Depth (ft)	0.48
Q Leaving Total (cfs)	43.66	Weir Avg Depth (ft)	0.33
Q DS (cfs)	2494.78	Weir Flow Area (sq ft)	36.29
Perc Q Leaving	1.70	Weir Coef (ft ^{1/2})	2.000
Q Weir (cfs)	43.66	Weir Submerg	0.00
Q Gates (cfs)		Q Gate Group (cfs)	
Q Culv (cfs)	0.00	Gate Open Ht (ft)	
Q Lat RC (cfs)		Gate #Open	
		Gate Area (sq ft)	
		Gate Submerg	
Q Breach (cfs)		Gate Invert (ft)	
Breach Avg Velocity (ft/s)		Gate Weir Coef	
Breach Flow Area (sq ft)			

Orchards_Dev.rep

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards

RS: -2521.5

INPUT

Description: Sta 25+21.5

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	87.92	48.9	87.21	77.7	86.54	134.4	87.5	175	87.3
196.8	87.24	275	87.94	347.5	88.59				

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	0	.016	347.5	.016

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	0	347.5		19	19		.1	.3

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards

RS: -2540.5

INPUT

Description: Sta 25+40.5

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	87.28	76	86.3	132.9	87.28	173.7	86.92	195.5	86.8
273.7	87.56	346.1	88.21						

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.016	0	.016	346.1	.016

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	0	346.1		37.5	37.5		.1	.3

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards

RS: -2578

INPUT

Description: Sta 25+78

Sta 25+78

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	89.22	20	86.53	25	86.43	25.5	86.43	25.5	85.93
27	86.1	80	86.8	90.5	86.75	90.5	87.24	97	87.16
97	86.5	101.06	86.29	102.08	86.22	102.31	86.21	102.45	86.2
102.56	86.19	102.63	86.18	102.89	86.19	108.07	86.32	110.13	86.35
114.78	86.45	121.85	86.74	125.7	86.9	126.13	86.94	126.52	86.98
128.79	87.35	130.24	87.58	131.9	87.4	136.3	87.61	136.48	87.61
146.78	87.38	146.84	87.37	146.87	87.37	157.22	87.24	158.78	87.27
170.26	87.37	172.14	87.34	173.36	87.32	184.22	87.16	189.26	87.13
195.45	87.08	200.1	87.12	208.09	87.08	215.9	87.03	233.61	86.92
254.06	87.02	271.82	87.08	311.52	87.27	323.92	87.32	371.13	87.11
373.14	87.11	382.97	87.15	415.95	87.4	437.59	87.68		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.025	20	.016	97	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	20	97		72	72		.1	.3

CROSS SECTION

RIVER: Grand Teton
REACH: Orchards

RS: -2650

INPUT

Description: Sta 26+50

Station Elevation Data

num= 70

Orchards_Dev.rep									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	88	20	86.25	25	86.15	25.5	86.15	25.5	85.65
27	85.82	80	86.44	90.5	86.39	90.5	86.88	97	86.8
97	86.14	100	85.96	104.03	86	112.49	86.17	115.08	86.27
127.11	86.57	128.75	86.86	130.01	87.11	130.1	87.11	132.97	86.99
134.54	86.98	139.04	87.01	146.44	87.05	148.47	86.92	149.29	86.84
151.75	86.79	156.42	86.95	162.54	86.88	167.53	86.82	179.54	87.14
184.87	87.24	192.64	87.09	203.87	86.64	210.97	86.86	225.21	87.3
241.2	86.93	243.25	86.87	263.36	87.21	274.47	87.06	280.53	86.86
304.23	87.38	304.71	87.4	304.97	87.41	308.44	87.32	322.15	86.96
323.2	86.99	339.22	87.32	346	87.2	353.75	86.76	355.55	86.65
371.89	87.12	378.37	87.25	391.25	86.91	394.24	86.78	418.26	87.29
437.62	86.83	437.83	86.83	438.65	86.83	455.98	87.08	472.57	86.85
476.18	86.83	478.13	86.8	494.96	87.02	497.56	87.09	511.75	86.7
513.77	86.66	514.1	86.67	517.72	86.83	530.52	87.39	532.05	87.43

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.025	20	.016
		97	.025

Bank Sta:	Left	Right	Coeff Contr.	Expan.
	20	97	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Grand Teton

Reach	River Sta.	n1	n2	n3
Orchards	-1100	.025	.02	.016
Orchards	-1198	.025	.016	.013
Orchards	-1200	.025	.016	.013
Orchards	-1250	.025	.016	.013
Orchards	-1300	.025	.02	.013
Orchards	-1350	.025	.02	.013
Orchards	-1400	.025	.02	.013
Orchards	-1450	.025	.02	.013
Orchards	-1500	.025	.02	.013
Orchards	-1600	.025	.02	.013
Orchards	-1700	.025	.02	.013
Orchards	-1800	.025	.02	.013
Orchards	-1900	.025	.02	.013
Orchards	-2000	.025	.02	.013
Orchards	-2100	.025	.02	.013
Orchards	-2150	.025	.02	.013
Orchards	-2200	.025	.02	.013
Orchards	-2300	.025	.02	.013
Orchards	-2400	.025	.02	.013
Orchards	-2450	.025	.02	.013
Orchards	-2482	.025	.016	.013
Orchards	-2483	Lat Struct		
Orchards	-2521.5	.025	.016	.016
Orchards	-2540.5	.016	.016	.016
Orchards	-2578	.025	.016	.025
Orchards	-2650	.025	.016	.025

SUMMARY OF REACH LENGTHS

River: Grand Teton

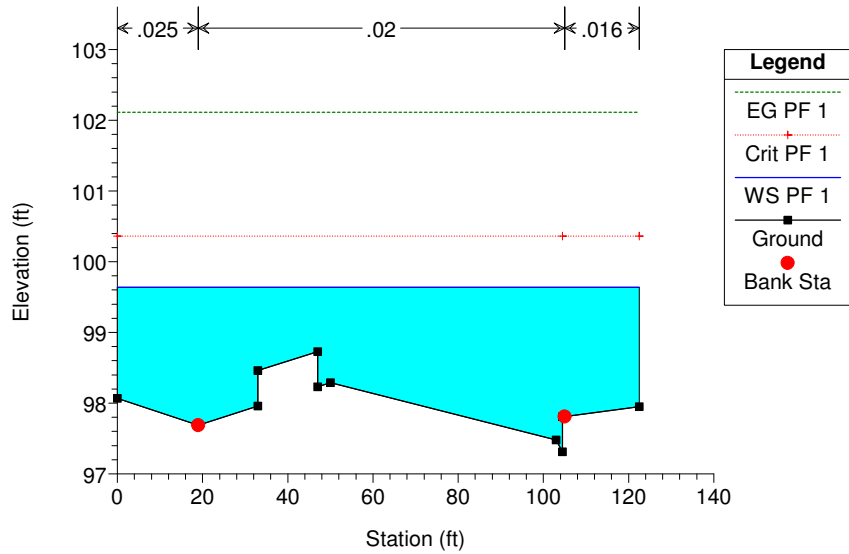
Reach	River Sta.	Left	Channel	Right
Orchards	-1100	98	98	98
Orchards	-1198	2	2	2
Orchards	-1200	50	50	50
Orchards	-1250	50	50	50
Orchards	-1300	50	50	50
Orchards	-1350	50	50	50
Orchards	-1400	50	50	50
Orchards	-1450	100	100	100
Orchards	-1500	100	100	100
Orchards	-1600	100	100	100
Orchards	-1700	100	100	100
Orchards	-1800	100	100	100
Orchards	-1900	100	100	100
Orchards	-2000	100	100	100
Orchards	-2100	50	50	50
Orchards	-2150	50	50	50
Orchards	-2200	100	100	100

		Orchards_Dev.rep		
Orchards	-2300	100	100	100
Orchards	-2400	50	50	50
Orchards	-2450	32	32	32
Orchards	-2482	39.5	39.5	39.5
Orchards	-2483	Lat Struct		
Orchards	-2521.5	19	19	19
Orchards	-2540.5	37.5	37.5	37.5
Orchards	-2578	72	72	72
Orchards	-2650			

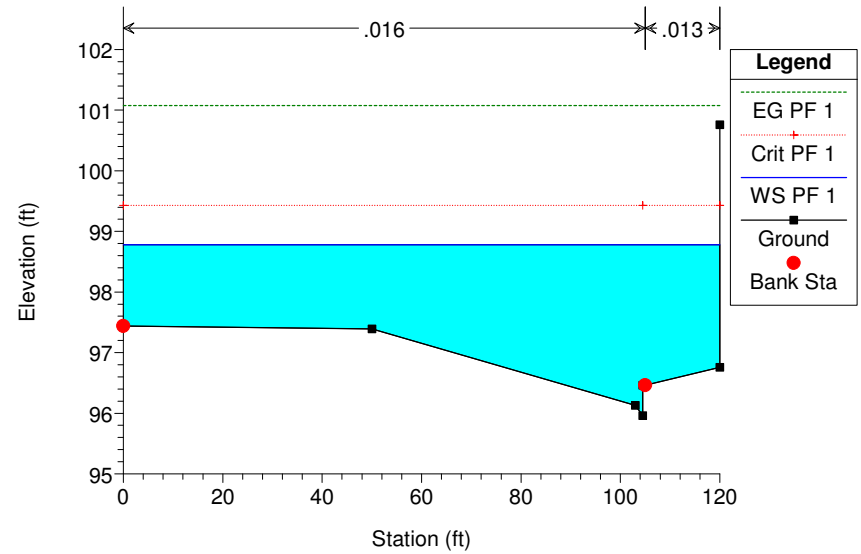
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Grand Teton

Reach	River Sta.	Contr.	Expan.
Orchards	-1100	.1	.3
Orchards	-1198	.1	.3
Orchards	-1200	.1	.3
Orchards	-1250	.1	.3
Orchards	-1300	.1	.3
Orchards	-1350	.1	.3
Orchards	-1400	.1	.3
Orchards	-1450	.1	.3
Orchards	-1500	.1	.3
Orchards	-1600	.1	.3
Orchards	-1700	.1	.3
Orchards	-1800	.1	.3
Orchards	-1900	.1	.3
Orchards	-2000	.1	.3
Orchards	-2100	.1	.3
Orchards	-2150	.1	.3
Orchards	-2200	.1	.3
Orchards	-2300	.1	.3
Orchards	-2400	.1	.3
Orchards	-2450	.1	.3
Orchards	-2482	.1	.3
Orchards	-2483	Lat Struct	
Orchards	-2521.5	.1	.3
Orchards	-2540.5	.1	.3
Orchards	-2578	.1	.3
Orchards	-2650	.1	.3

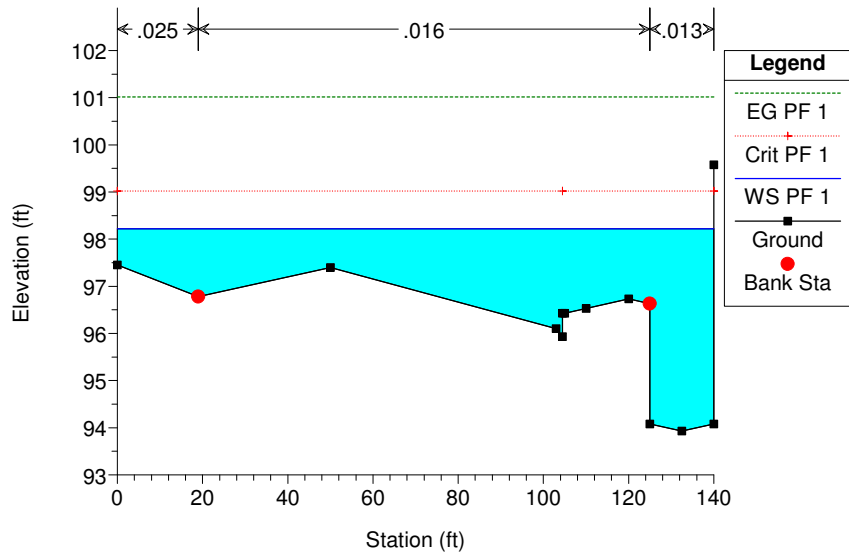
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 11+00



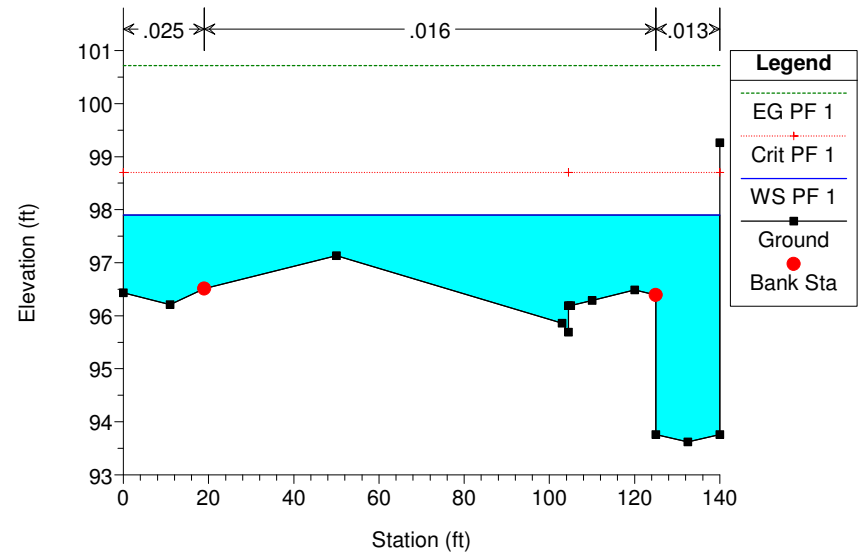
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 11+98



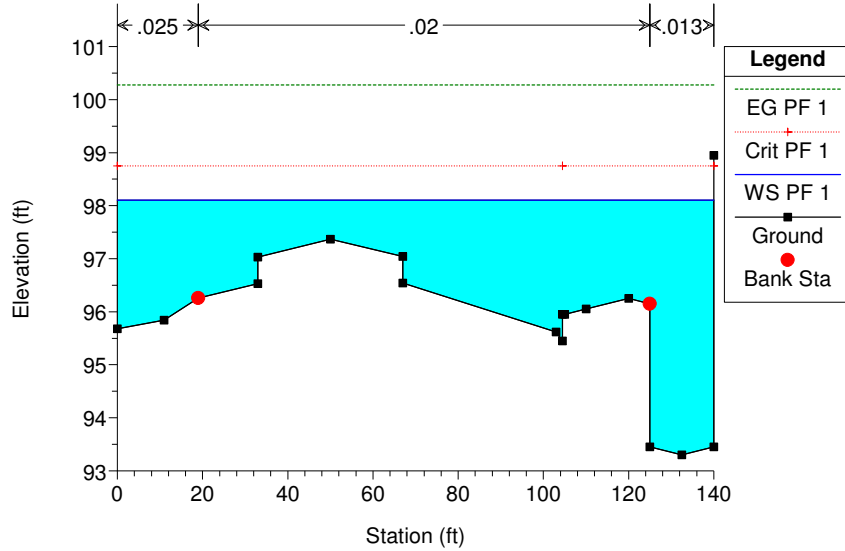
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Sta 12+00



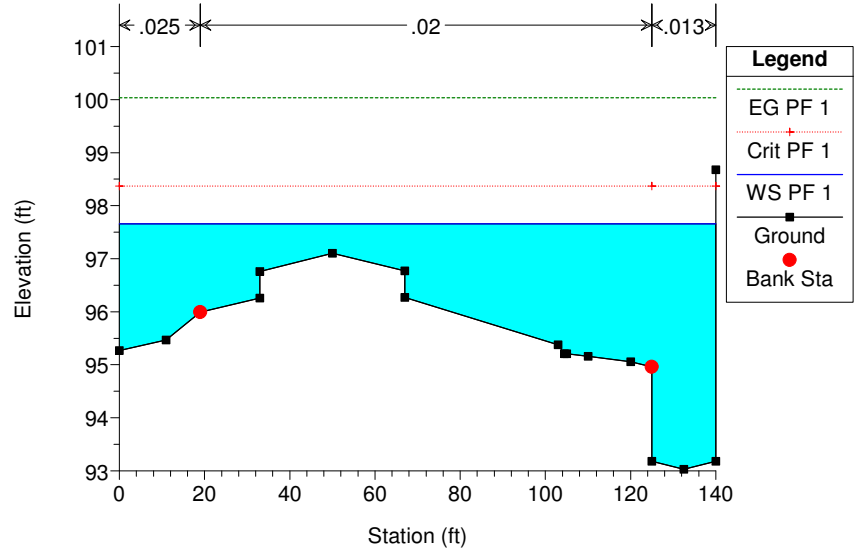
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Sta 12+50



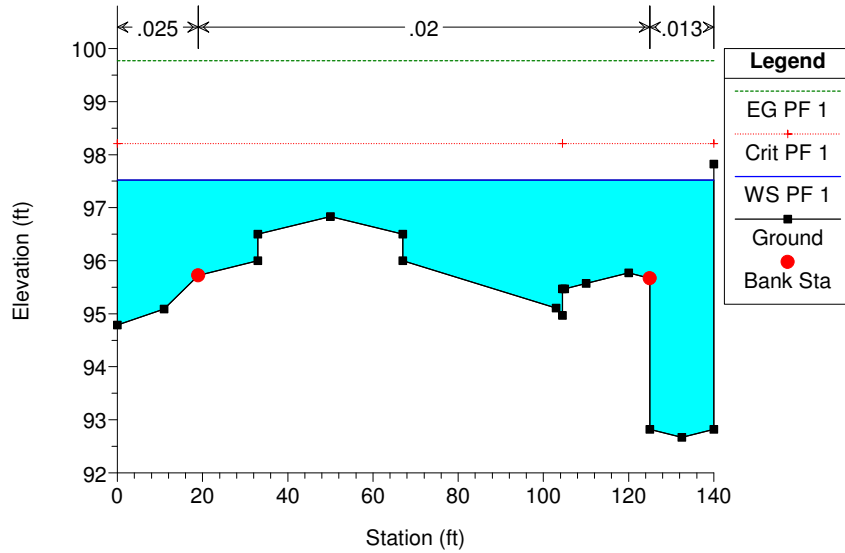
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 13+00



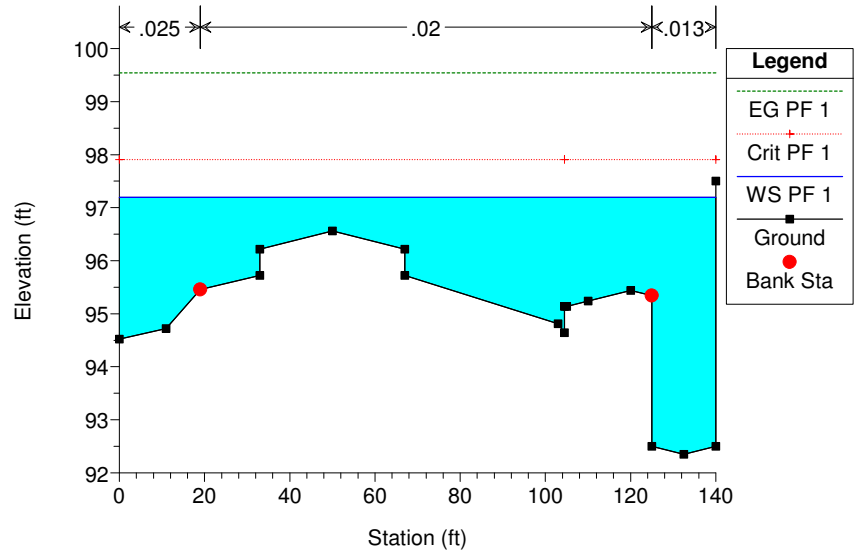
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 13+50



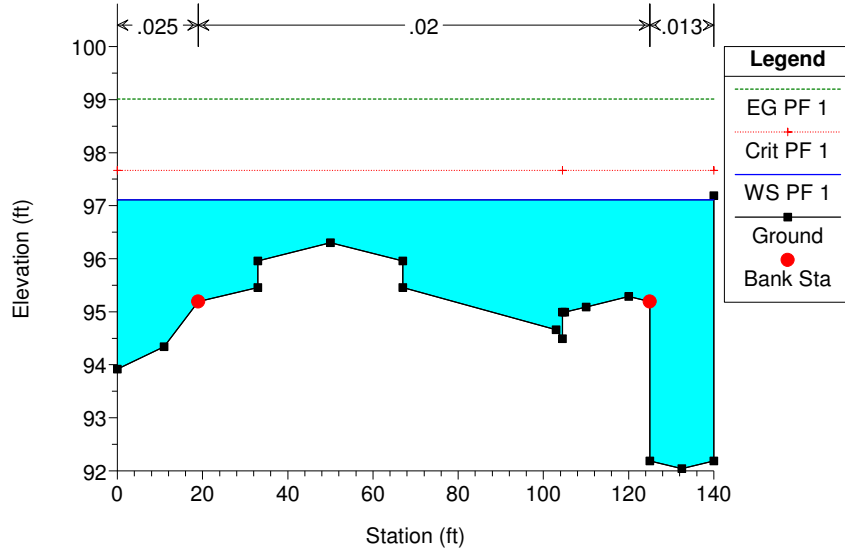
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 14+00



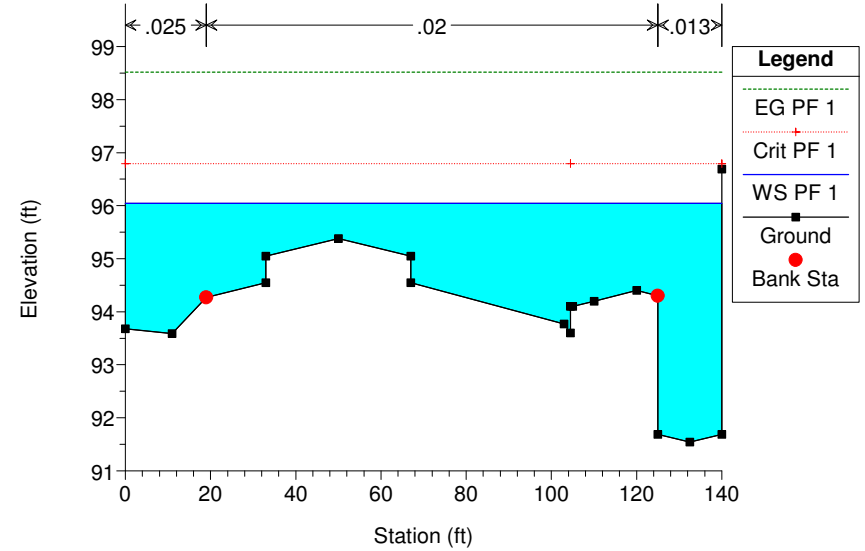
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 14+50



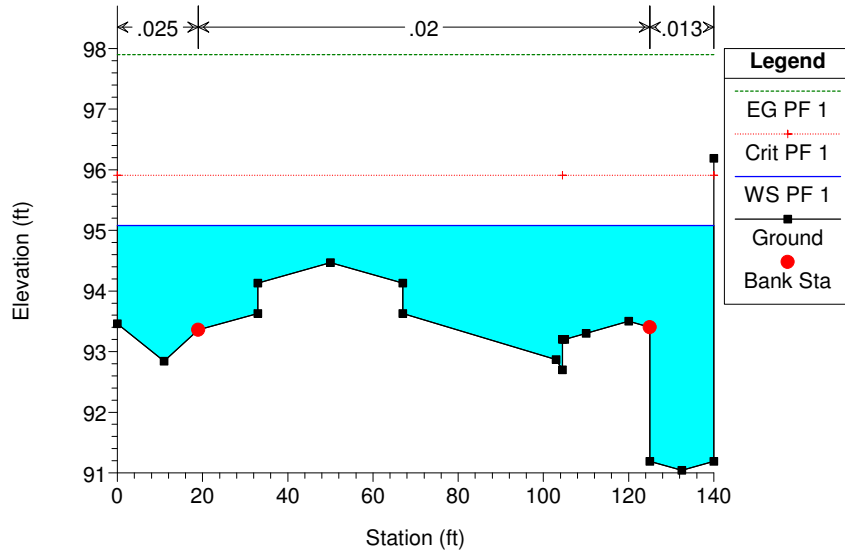
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 15+00



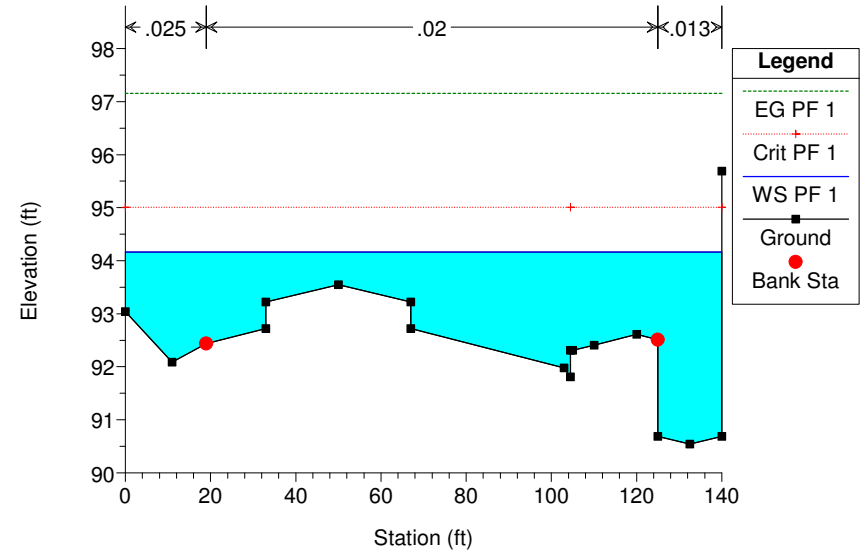
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 16+00



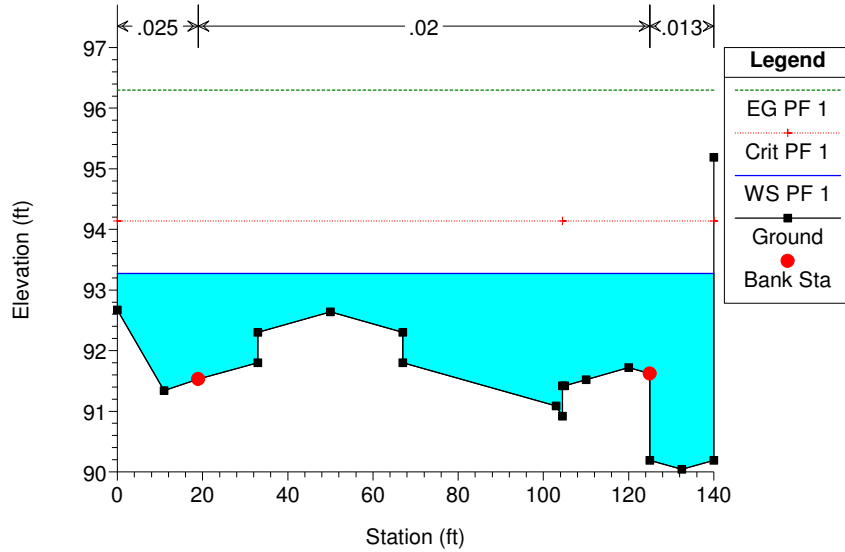
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 17+00



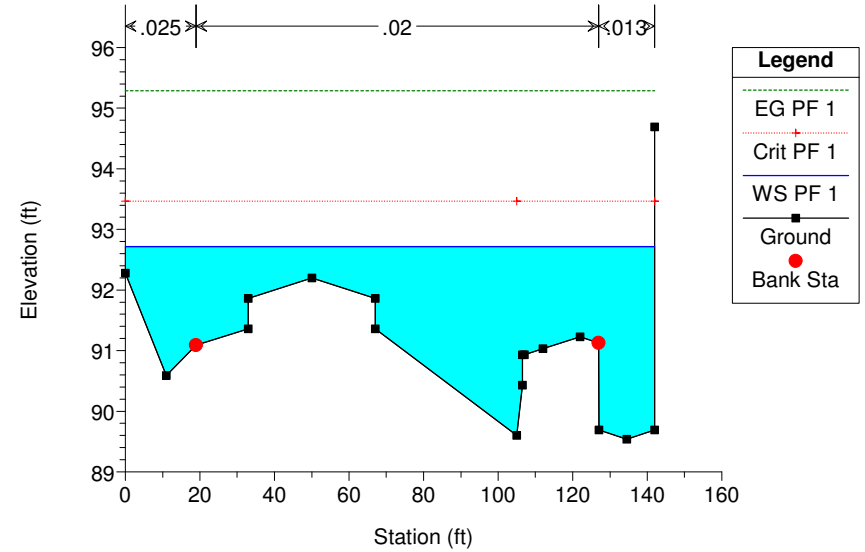
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 18+00



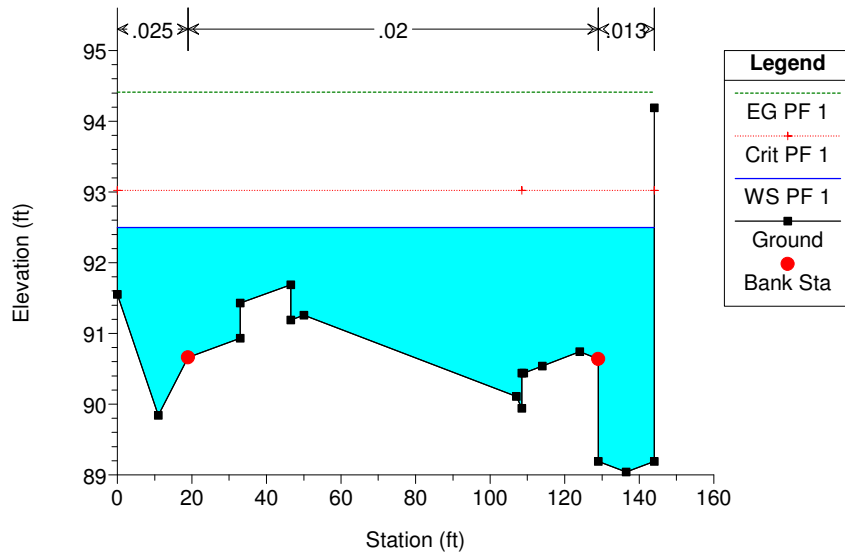
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Sta 19+00



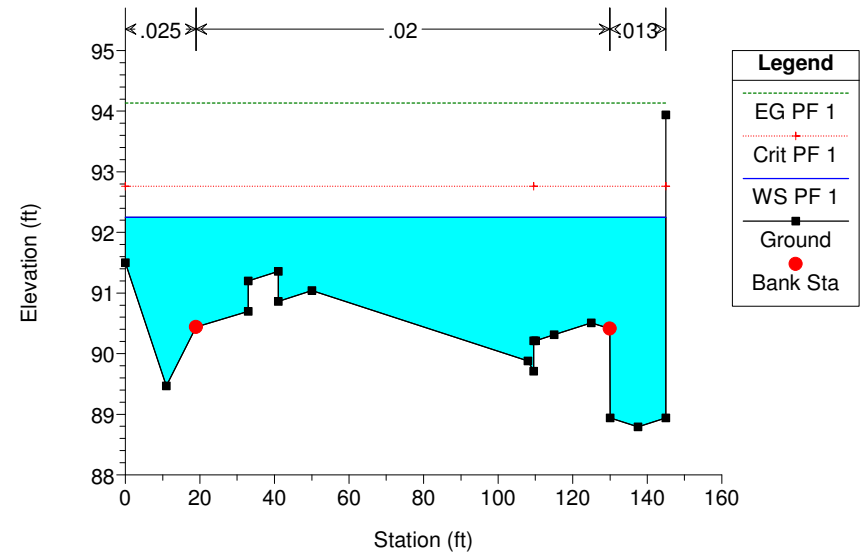
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Sta 20+00



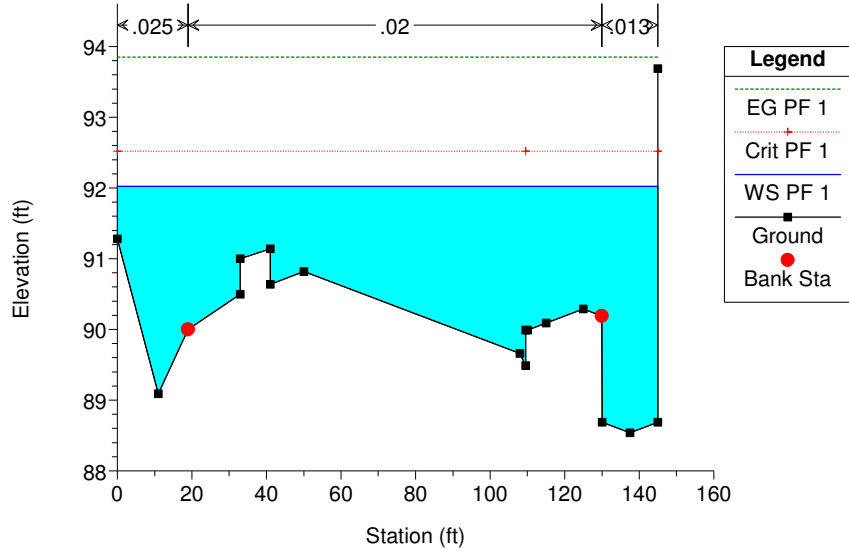
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 21+00



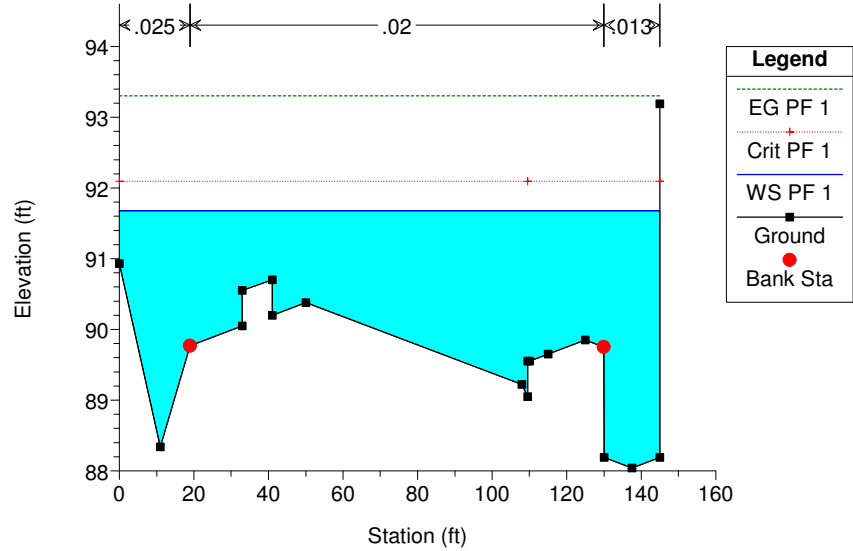
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 21+50



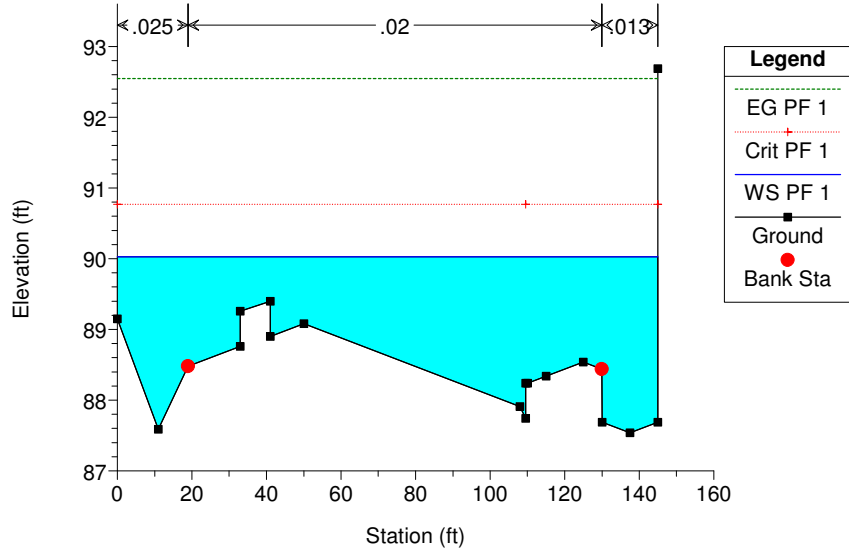
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 22+00



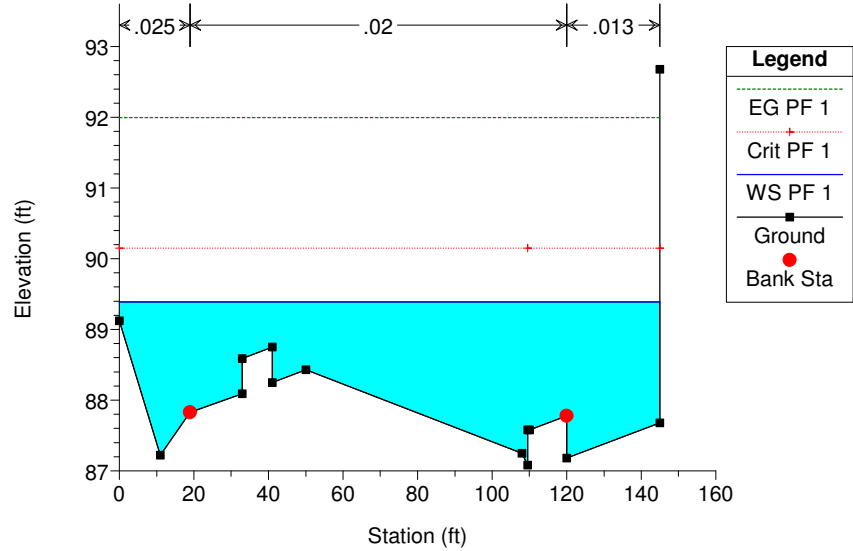
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 23+00

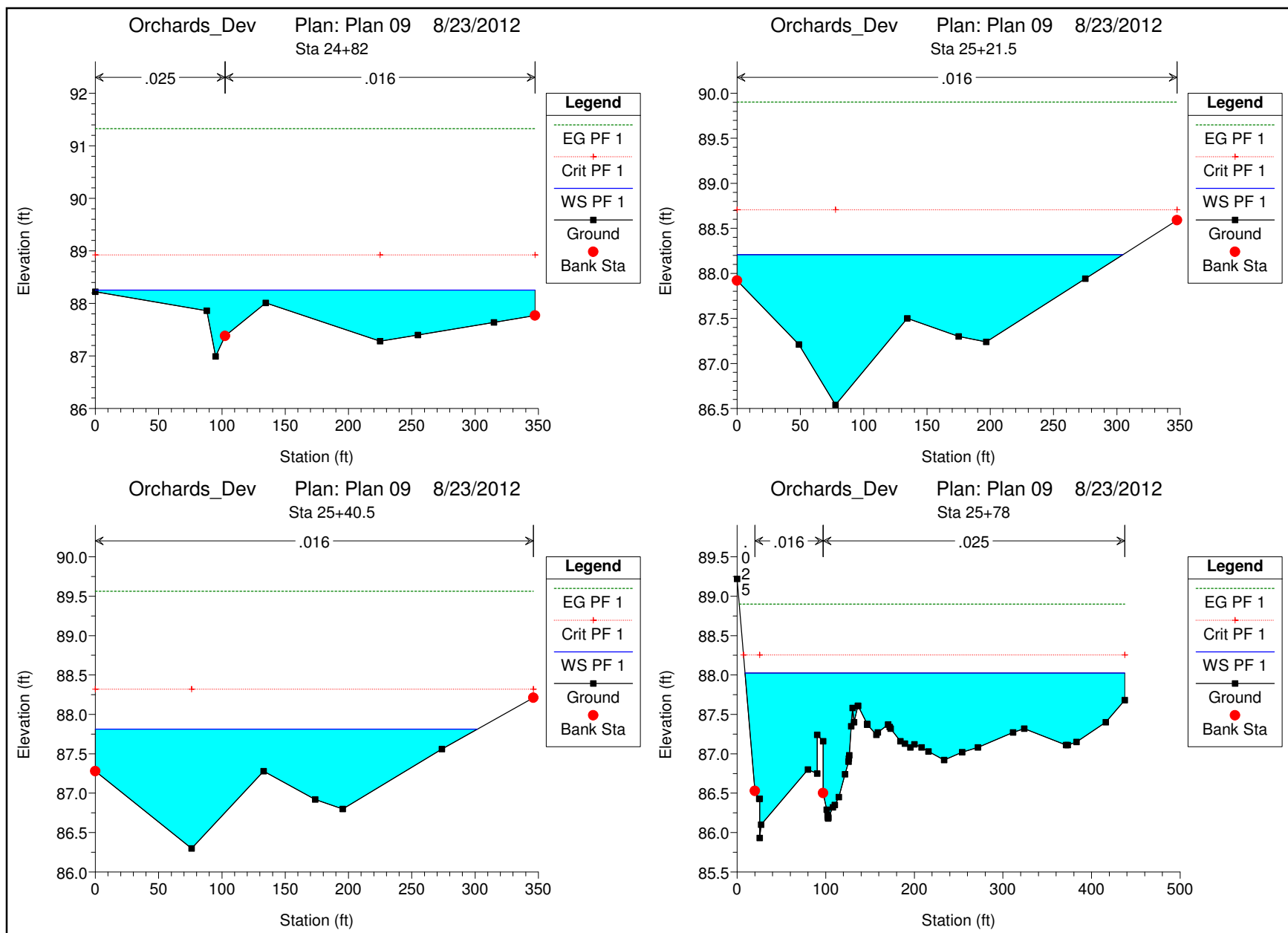


Orchards_Dev Plan: Plan 09 8/23/2012
Sta 24+00



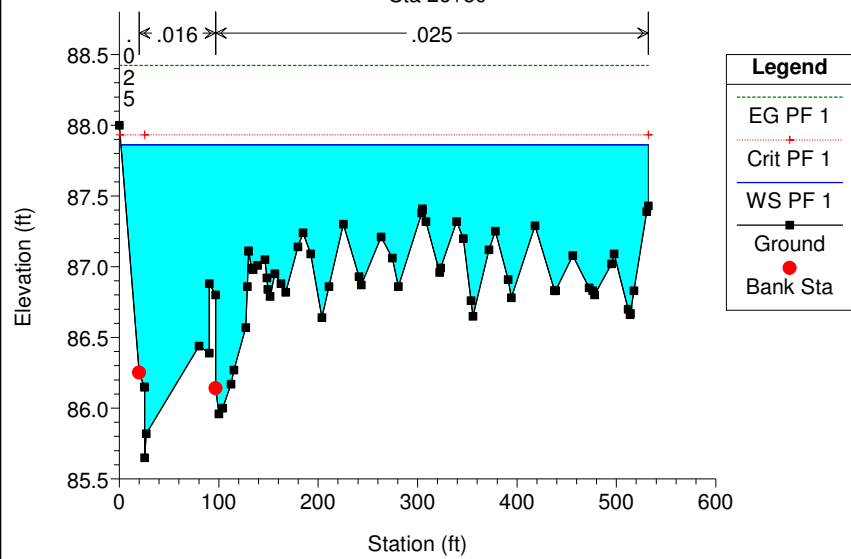
Orchards_Dev Plan: Plan 09 8/23/2012
Sta 24+50

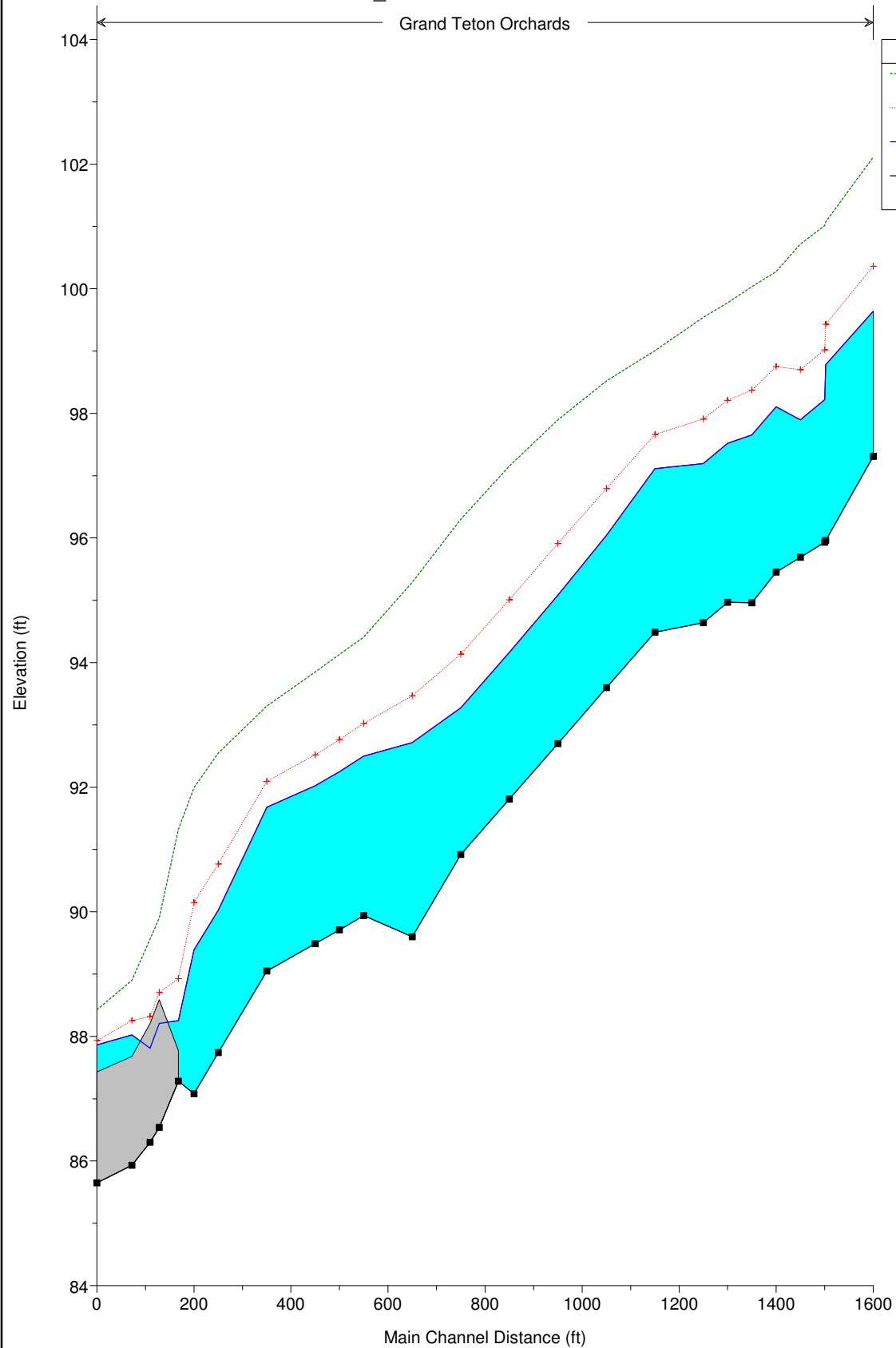




Orchards_Dev Plan: Plan 09 8/23/2012

Sta 26+50





APPENDIX E

References

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: August 16, 2012
TO: Land Development Services Department of Public Works		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: The Orchards at Grand Teton & Tenaya (Update to Spinnaker Homes at the Orchards DS4274)	
Cross Streets:	SWC of Grand Teton Drive & Tenaya Way	COPIES TO: Taney Engineering
File Number:	F:\Depot\DSMemos\DS4558B.doc	D. R. Horton
Parcel Number:	125-15-101-003	Bart Anderson, P.E., DevCo
Zoning Action:	EOT-45057; EOT-45335 & TMP-45536	CCRFGD
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1 st Submittal	6/26/2012	7/5/2012	Not Approved	\$400.00	287661: \$400
2 nd Submittal & Supplement	7/19/2012 & 8/6/2012	8/16/2012	See Comments Below	\$400.00	290139: \$400
			TOTAL FEES (LDDRS):	\$800.00	----

REMARKS:

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

	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.
X	is conditionally approved subject to the following Condition #3.

- The final approval of this drainage study is for the construction of Unit 1 and the half street improvements of *Whispering Sands Drive* only. Upon construction of Unit 2, Unit 3 and so on, a separate technical drainage study will be required to address each future Unit.
- It is understood that *Grand Teton Boulevard* will not be improved with the construction of Unit 1. The engineer/developer must consult with *City Planning Department* for acceptable landscaping such as tree wells or bushes to be installed in the 20'-Trail Corridor in future phases.
- The engineer/developer was informed to coordinate with the *Clark County School District* (CCSD) regarding their concerns of the property wall along the west boundary. The school district's concerns must be resolved prior to the final approval of the drainage study. Please forward any email or letter correspondences between the engineer/developer and the CCSD to *City of Las Vegas Flood Control Section* for filing.
- All drainage easements must be public drainage easements and common lots to be privately maintained by the Homeowners Association to be labeled on the grading plans and to be dedicated as such in the final map.

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

ays

T/R/S: T19S/R60E/15

AREA G-15

Rec'd: 2/7/08

DS 4274

SPINNAKER HOMES AT THE ORCHARD

CITY OF LAS VEGAS

TCE# 011-07011

Prepared for:

ROYAL CONSTRUCTION

4511 West Cheyenne Avenue, Suite 105

North Las Vegas, Nevada 89032

Prepared by:

TCE

3277 East Warm Springs Road, Suite 400

Las Vegas, Nevada 89120

(702) 932-6125

FAX (702) 932-6129

January 2008

G-15

\$400

CCRFCD

CCDDS

ANX-19110

☐ T ☐ THOMASON
☐ C ☐ CONSULTING
☐ E ☐ ENGINEERS

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		September 12, 2008
TO: Land Development Services Department of Public Works		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Drainage Study for Spinnaker Homes at the Orchards – Unit 1		COPIES TO: Thomason Consulting Engineers
Cross Streets:	SWC of Grand Teton Drive & Tenaya Way	Royal Construction
File Number:	F:\Depot\DSMemos\DS4274D.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-15-101-003	CCRFC
Zoning Action:	ANX-19110, TMP-27023 & SDR-27226	CCDDS
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1 st Submittal	2/7/2008	2/14/2008	Not Approved	\$400.00	87636: \$400
2 nd Submittal	3/21/2008	4/4/2008	Not Approved	\$400.00	90838: \$400
3 rd Submittal & Supplement	4/22/2008, 5/8/2008 & 5/28/2008	5/29/2008	Conditional Approval	\$400.00	93099: \$400
CCDDS & CCRFC	8/28/2008	9/11/2008	Concurrence	N/C	N/C
TOTAL FEES (LDDRS):				\$1,200.00	----

REMARKS:

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

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

- The final approval of this drainage study is for the construction of Unit 1 and the half street improvements of *Whispering Sands Avenue* only. The complete built out of the project is conceptually accepted. However, upon construction of Unit 2, Unit 3 and Unit 4, a separate technical drainage study will be required to address each future Unit.
- It is understood that *Grand Teton Boulevard* will not be improved with the construction of Unit 1. Cross Section 1/D1 is conceptually approved. The engineer/developer must consult with City Planning Department for acceptable landscaping such as tree wells or bushes to be installed in the 20'-Trail Corridor.
- Sheet D1 of Unit 1: Section 13/D1: Specify the 3-solid grout courses to be "8"-CMU".
- Revise all drop inlets to Type "CM" or Neenah Pre-cast inlets. Contact Raul Cruz at 229-6171 for an AutoCAD detail to be included within the improvement plans if Type "CM" drop inlets are used. Note that the lengths of all Type "CM" inlets are in the multiple of 2.5'. Review and revise accordingly.

5. All drainage easements must be public drainage easements and common lots to be privately maintained by the Homeowners Association to be labeled on the grading plans and to be dedicated as such in the final map.
6. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

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

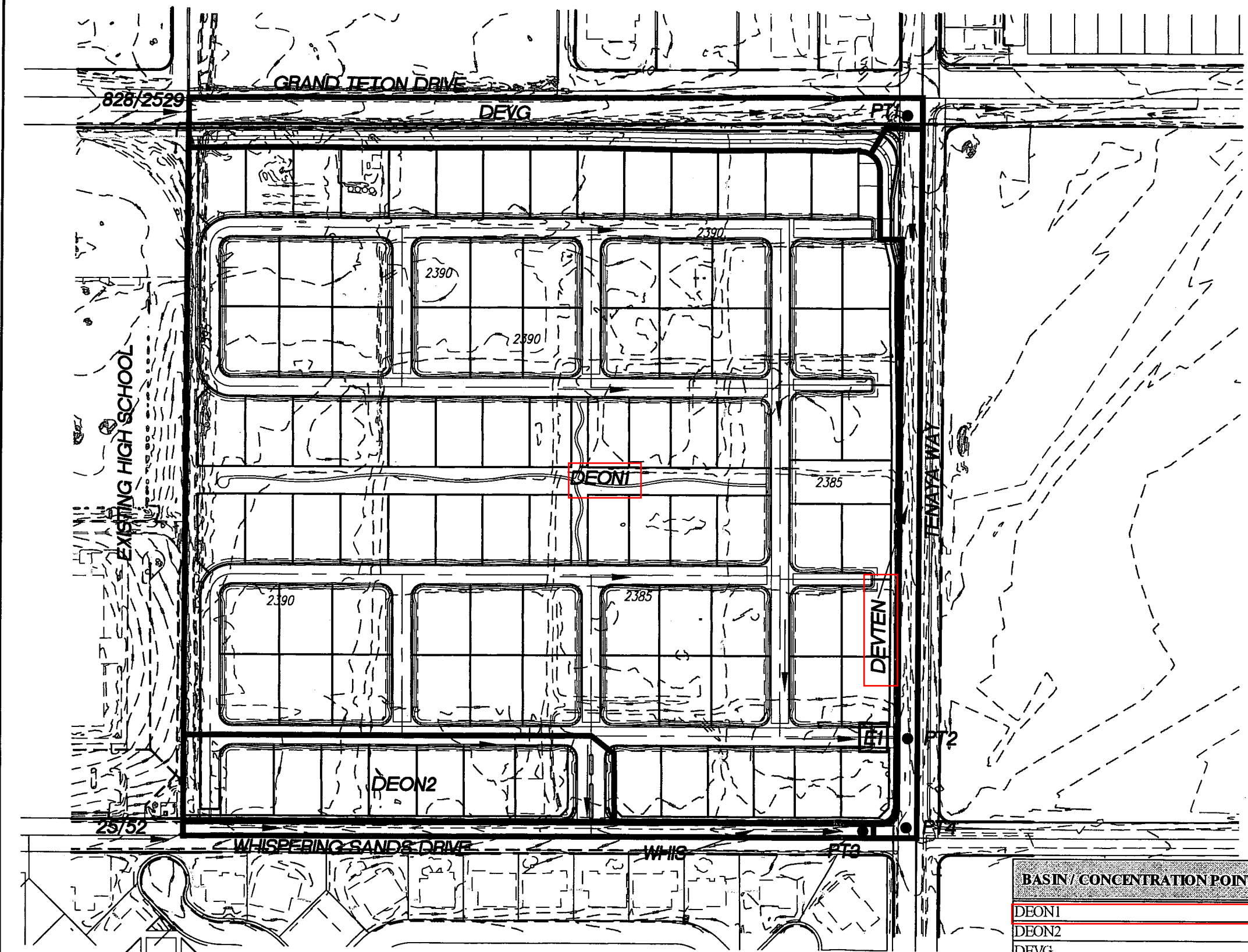
NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on 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
ays

T/R/S: T19S/R60E/15
AREA G-15

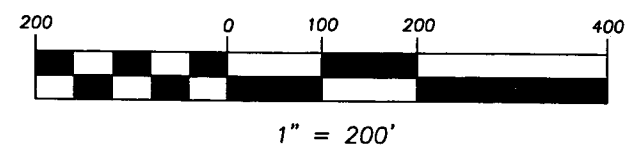
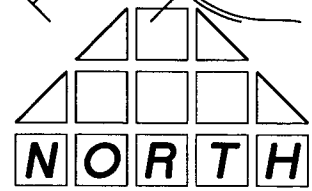
HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total (cfs)	Min Chl El (ft)	W/S Elev. (ft)	Chl W/S (ft)	E.G. Elev. (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	15	PF 1	2534.00	2396.75	2399.91	2400.57	2402.28	0.005802	12.00	215.06	104.91	1.42
Reach-1	14	PF 1	2534.00	2395.27	2400.02	2399.16	2400.17	0.000337	4.11	964.11	442.55	0.37
Reach-1	13.5	Lat Struct										
Reach-1	13	PF 1	2089.31	2396.75	2399.58	2399.58	2400.10	0.002110	8.49	456.58	357.14	0.89
Reach-1	12	PF 1	2089.31	2395.90	2398.01	2398.01	2398.07	0.000518	3.47	1165.14	417.23	0.42
Reach-1	11	PF 1	2089.31	2395.00	2397.01	2397.01	2397.08	0.000662	3.80	1079.65	418.40	0.47
Reach-1	10.5	Lat Struct										
Reach-1	10	PF 1	1824.77	2393.00	2395.37	2394.89	2395.52	0.001129	5.54	809.29	418.22	0.63
Reach-1	9.5	Lat Struct										
Reach-1	9	PF 1	1511.58	2392.00	2395.34		2395.43	0.000430	4.17	938.61	415.47	0.41
Reach-1	8	PF 1	1511.58	2391.90	2394.13	2394.13	2395.12	0.003745	9.24	194.76	97.82	1.13
Reach-1	7	PF 1	1511.58	2391.00	2393.09	2393.39	2394.53	0.005702	11.09	164.71	91.65	1.39
Reach-1	6.5	Lat Struct										
Reach-1	6	PF 1	1413.33	2390.80	2391.87	2392.59	2394.42	0.018985	12.51	113.84	98.58	2.24
Reach-1	5.5	Lat Struct										
Reach-1	5	PF 1	1308.46	2390.10	2391.39	2392.22	2394.37	0.021691	15.34	97.26	84.22	2.48
Reach-1	4.5	Lat Struct										
Reach-1	4	PF 1	1279.77	2389.10	2389.74	2390.69	2394.22	0.052564	15.03	78.84	100.99	3.44
Reach-1	3	PF 1	2153.77	2386.58	2388.58	2389.29	2391.20	0.031720	12.99	165.81	183.53	2.41
Reach-1	2.5	Lat Struct										
Reach-1	2	PF 1	2082.84	2385.81	2387.90	2388.83	2391.14	0.017325	14.65	150.01	112.48	2.25
Reach-1	1	PF 1	2082.84	2385.68	2387.88	2388.44	2389.94	0.008421	12.40	185.57	106.36	1.64



- LEGEND**
- DEON1 BASIN NAME
 - BASIN BOUNDARY
 - FLOW ARROW
 - PT1 CONCENTRATION POINT
 - STREET SECTION
 - E1 EASEMENT

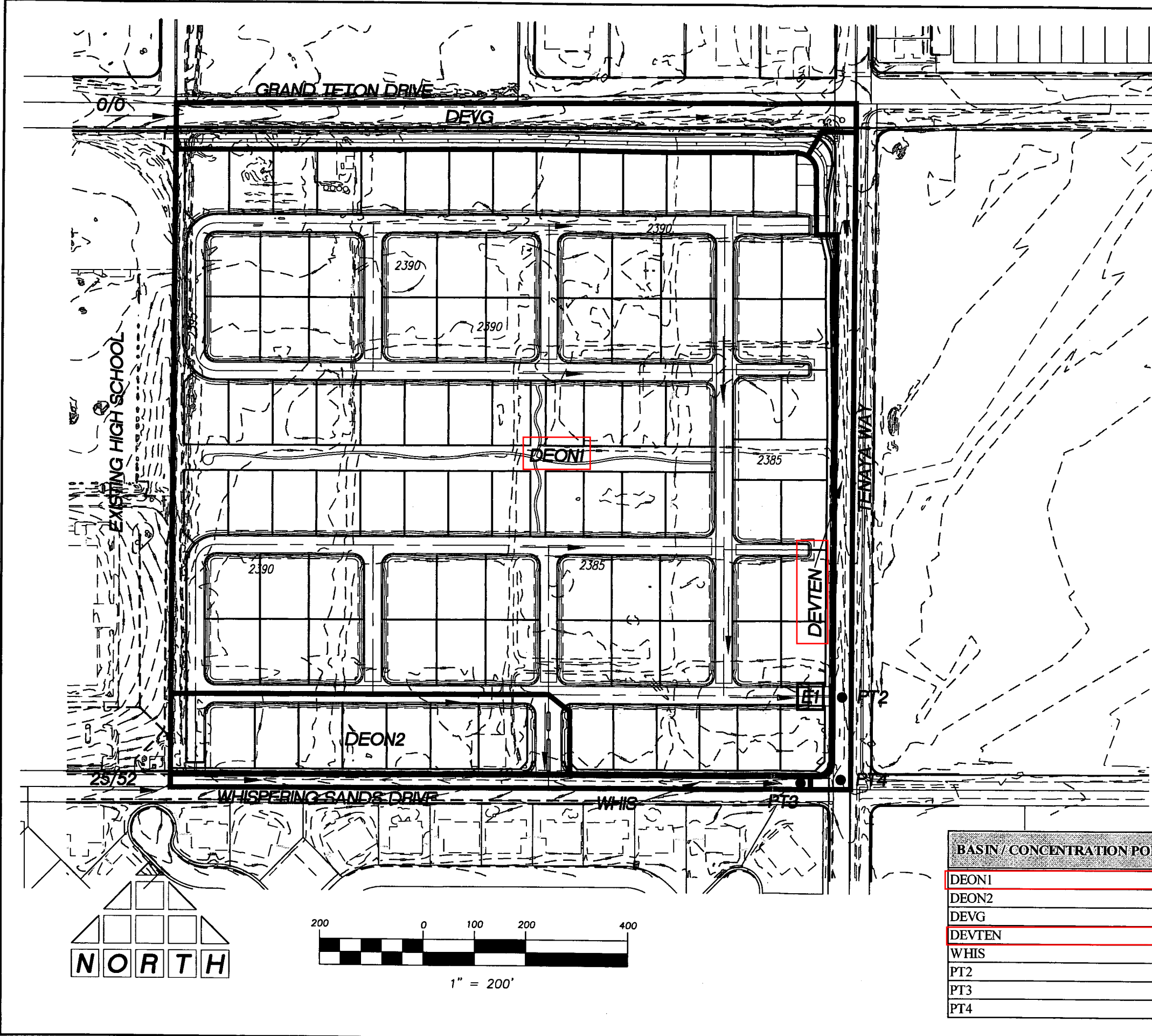
BASIN / CONCENTRATION POINT	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
DEON1	6	30
DEON2	1	3
DEVG	5	8
DEVTEN	2	4
WHIS	1	2
PT1	833	2538
PT2	84	110
PT3	27	57
PT4	111	156



SPINNAKER HOMES
AT THE ORCHARDS

INTERIM ONSITE BASINS
FIGURE 8

**THOMASON
CONSULTING
ENGINEERS**
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129



- LEGEND**
- DEON1 BASIN NAME
 - BASIN BOUNDARY
 - FLOW ARROW
 - PT1 CONCENTRATION POINT
 - STREET SECTION
 - E1 EASEMENT

BASIN / CONCENTRATION POINT	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
DEON1	6	30
DEON2	1	3
DEVG	5	8
DEVTEN	2	4
WHIS	1	2
PT2	7	33
PT3	27	57
PT4	34	79

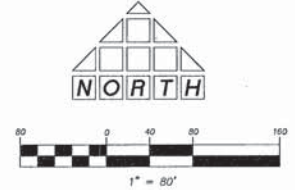
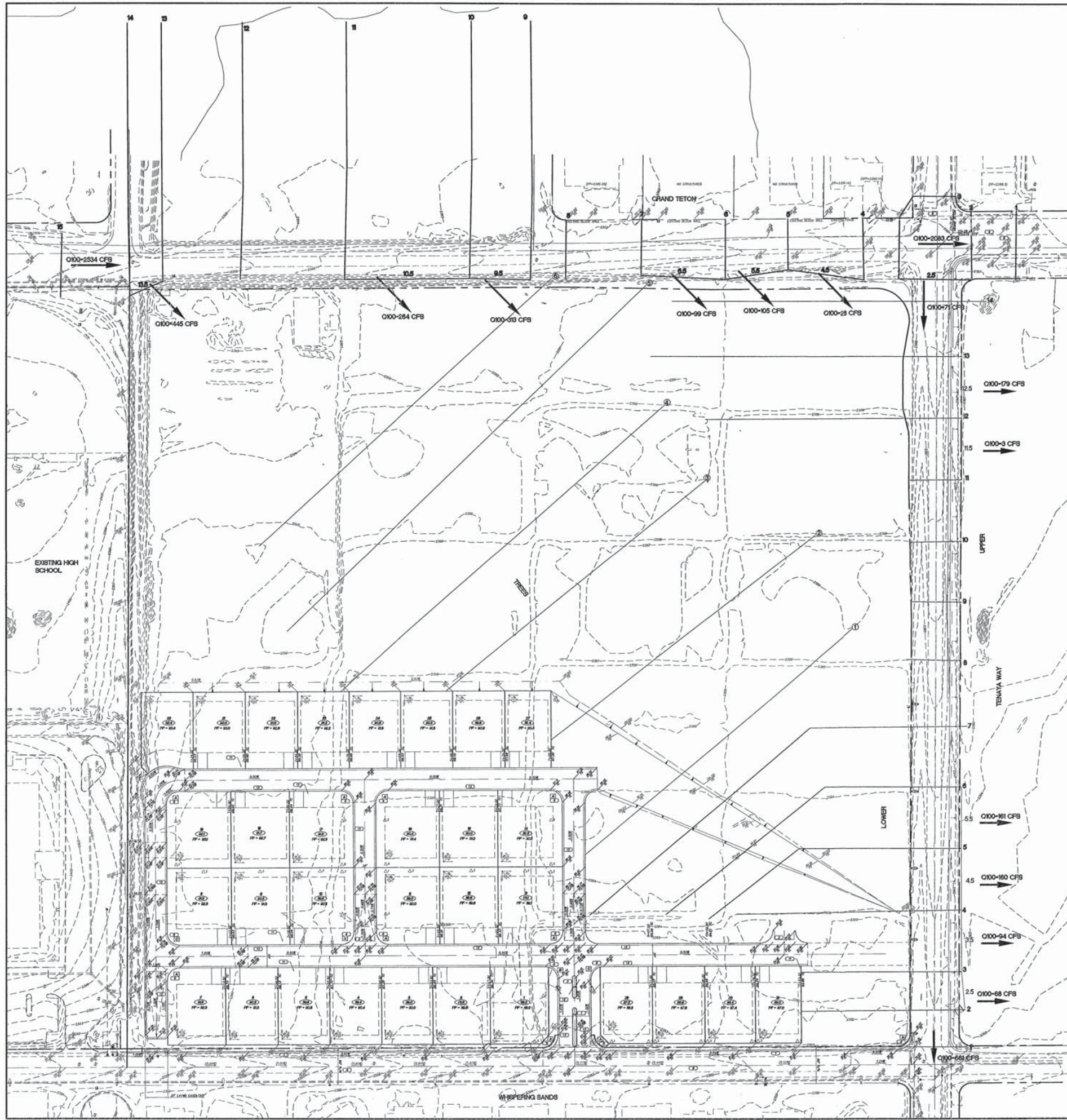
SPINNERAKER HOMES
AT THE ORCHARDS

FUTURE ONSITE BASINS

FIGURE 9

THOMASON
CONSULTING
ENGINEERS

3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129



GRAND TETON		
Section	CFS	Water Surface
15	2534	2399.91
14	2534	2400.02
13	2089.31	2399.58
12	2089.31	2398.01
11	2089.31	2397.01
10	1824.77	2395.37
9	1511.58	2395.34
8	1511.58	2394.13
7	1511.58	2393.09
6	1413.33	2391.87
5	1308.46	2391.39
4	1279.77	2389.74
3	2153.77	2388.58
2	2082.84	2387.9
1	2082.84	2387.88

SITE AND TENAYA			
Reach	Section	CFS	Water Surface
Upper	14	303	2389.19
Upper	13	303	2388.64
Upper	12	123.5	2387.25
Upper	11	120.46	2386.43
Upper	10	120.46	2386.4
Upper	9	120.46	2385.82
Upper	8	120.46	2385.76
Lower	7	1142.46	2385.39
Lower	6	1142.46	2384.97
Lower	5	981.79	2384.21
Lower	4	822.07	2383.08
Lower	3	728.16	2382.58
Lower	2	660.49	2382.15
Lower	1	660.49	2382.11
TREES	6	1022	2391.84
TREES	5	1022	2390.61
TREES	4	1022	2389.46
TREES	3	1022	2388.25
TREES	2	1022	2387.2
TREES	1	1022	2385.75

This grading plan is a
part of drainage study
4274 which was received
on 4/22/08 and Rejection
5/6/08. Page 2 of 13

THOMASON
CONSULTING
ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

ROYAL CONSTRUCTION
431 W. CHEYENNE AVENUE, SUITE 105 LAS VEGAS, NV 89032
PH: (702) 873-7773 FAX: (702) 873-7776
SPINNAKER HOMES AT THE ORCHARD
PHASE 1 HEC-RAS OVERALL

011-07011

DESIGNED BY:	CHECKED BY:	COMMENTS ADDRESS BY:	PROJECT NO:	REV. DATE	BY

SHEET

OF

DRAWING NO.



BASIS OF BEARING
NORTH 00°12'00" EAST, BEING THE BEARING OF THE EAST LINE OF THE
NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (SW 1/4) OF
SECTION 15, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY,
NEVADA, AS SHOWN IN FILE 113 OF SURVEYS, AT PAGE 92, OFFICIAL RECORDS
OF CLARK COUNTY, NEVADA

CURVE	CURVE DATA			
	LENGTH	RADIUS	TANGENT	DELTA
C1	66.66'	21.31'	2260.25'	178°55'10"
C2	39.27'	25.00'	25.00'	90°00'00"
C3	39.27'	25.00'	25.00'	90°00'00"
C4	31.55'	20.00'	20.14'	90°24'34"
C5	31.27'	20.00'	18.86'	89°35'26"
C6	9.43'	3.00'	INFINITE	180°00'00"
C7	39.09'	25.00'	24.82'	89°35'26"
C8	31.42'	20.00'	20.00'	90°00'00"
C9	89.54'	57.00'	57.00'	90°00'00"
C10	31.42'	20.00'	20.00'	90°00'00"
C11	7.85'	5.00'	5.00'	90°00'00"

SOILS REPORT

GEO. TEK, INC.
3965 S. ESCONDIDO STREET, SUITE A
LAS VEGAS, NEVADA 89119-3828
(702) 697-1424

PROJECT NO. 5952-LV6
DATED JUNE 5, 2007

EARTHWORK QUANTITIES
CUT: 27,372 CY
FILL: 48,986 CY
TOTAL: 21,614 CY (FILL)

NOTE:
ALL PRIVATE STREETS ARE PUBLIC UTILITY EASEMENTS,
PUBLIC SEWER EASEMENTS AND DRAINAGE EASEMENTS
TO BE PRIVATELY MAINTAINED BY HOA.

	PAD DIFFERENCE	RET. WALL HEIGHT (# COURSES)
$\Delta 1$	-.4-7	8" (1 crs)
$\Delta 2$	.71-.83	1'4" (2 crs)
$\Delta 3$	.84-1.5	2' (3 crs)
$\Delta 4$	1.51-2.17	2'8" (4 crs)
$\Delta 5$	2.18-2.83	3'4" (5 crs)
$\Delta 6$	2.84-3.5	4' (6 crs)
$\Delta 7$	3.51-4.17	4'8" (7 crs)
$\Delta 8$	4.18-4.83	5'4" (8 crs)
$\Delta 9$	4.84-5.5	6' (9 crs)
$\Delta 10$	5.51-6.17	6'8" (10 crs)
$\Delta 11$	6.18-6.83	7'4" (11 crs)
$\Delta 12$	7.84-8.5	8' (12 crs)

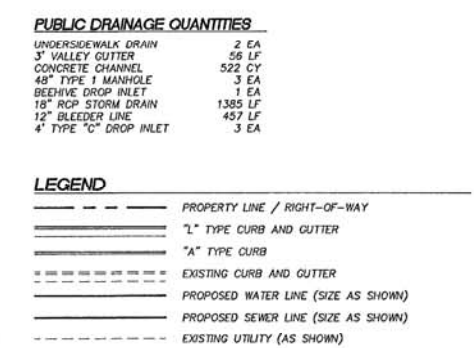
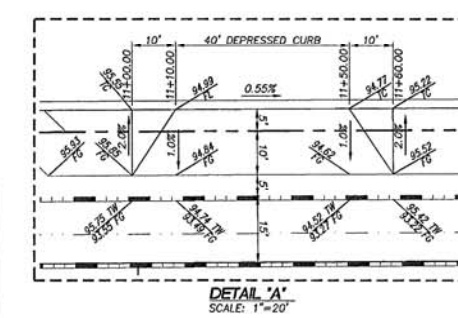
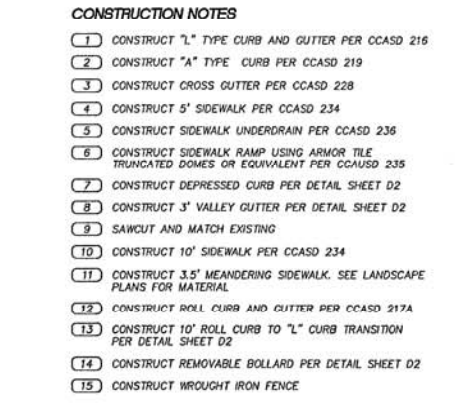


Figure 10-1.2: Pavement Schedule Symbols. The figure displays a series of symbols used in pavement schedules, each with a corresponding label. The symbols include:

- CROSS CUTTER**: A symbol showing a cross-section of a road with a vertical line representing a cross cut.
- WHEELCHAIR RAMP**: A symbol showing a cross-section of a road with a curved line representing a ramp.
- CUT OR FILL SLOPE**: A symbol showing a cross-section of a road with a horizontal line representing a slope.
- PROPOSED PAVEMENT AREA**: A symbol showing a cross-section of a road with a dashed line representing a proposed pavement area.
- EXISTING PAVEMENT AREA TO BE REMOVED AND REPLACED**: A symbol showing a cross-section of a road with a cross-hatched pattern representing an area to be removed and replaced.
- PHASE LINE**: A symbol showing a cross-section of a road with a vertical line representing a phase line.
- SIGHT VISIBILITY RESTRICTION ZONES**: A symbol showing a cross-section of a road with a curved line representing a sight visibility restriction zone.
- 6" SCREEN WALL**: A symbol showing a cross-section of a road with a horizontal line representing a 6-inch screen wall.
- STEM WALL**: A symbol showing a cross-section of a road with a horizontal line representing a stem wall.
- RETAINING WALL**: A symbol showing a cross-section of a road with a horizontal line representing a retaining wall.

The figure also includes a table with the following information:

PROPOSED ELEVATION (DESCRIPTION AS SHOWN)	EXISTING ELEVATION (DESCRIPTION AS SHOWN)	FUTURE DESIGN ELEVATION (DESCRIPTION AS SHOWN)	LOT NUMBER	PAD ELEVATION	FINISHED FLOOR ELEVATION
XXXX 16	(XXX) 16	(XXX) 16	10	95.5	FF = 96.3

FLOOD PLAIN NOTE
A REVIEW OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY-PANEL NUMBER 32003C1745 E, EFFECTIVE SEPTEMBER 27, 2002, INDICATES THAT THE SITE IS LOCATED WITHIN A FEMA ZONE 'X'. ZONE 'X' IS DESCRIBED BY FEMA AS AREAS OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD.

ZONE 'X' IS DESCRIBED BY FEMA AS AREAS OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD.

This grading plan is a part of drainage study # 4274 which was received on 5/28/08 and ^{Consent} ~~approved~~ _{timely} 5/29/2008. Page 1 of 5

CERTIFICATION

I HEREBY CERTIFY THAT THE GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE WITH THE CITY OF LAS VEGAS FOR THIS PROJECT. (05-4274)

 JOSEPH D. THOMASON, P.E. NO. 11097 DATE _____

T **THOMASON**
C **CONSULTING**
E **ENGINEERS**

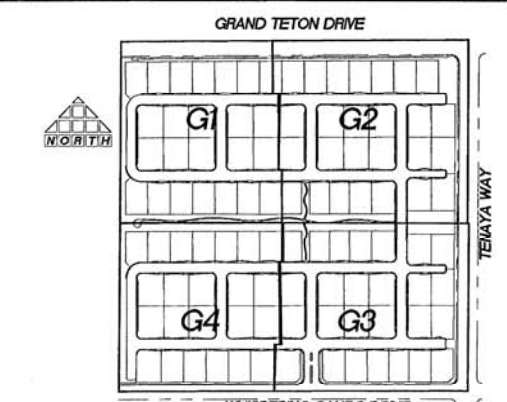
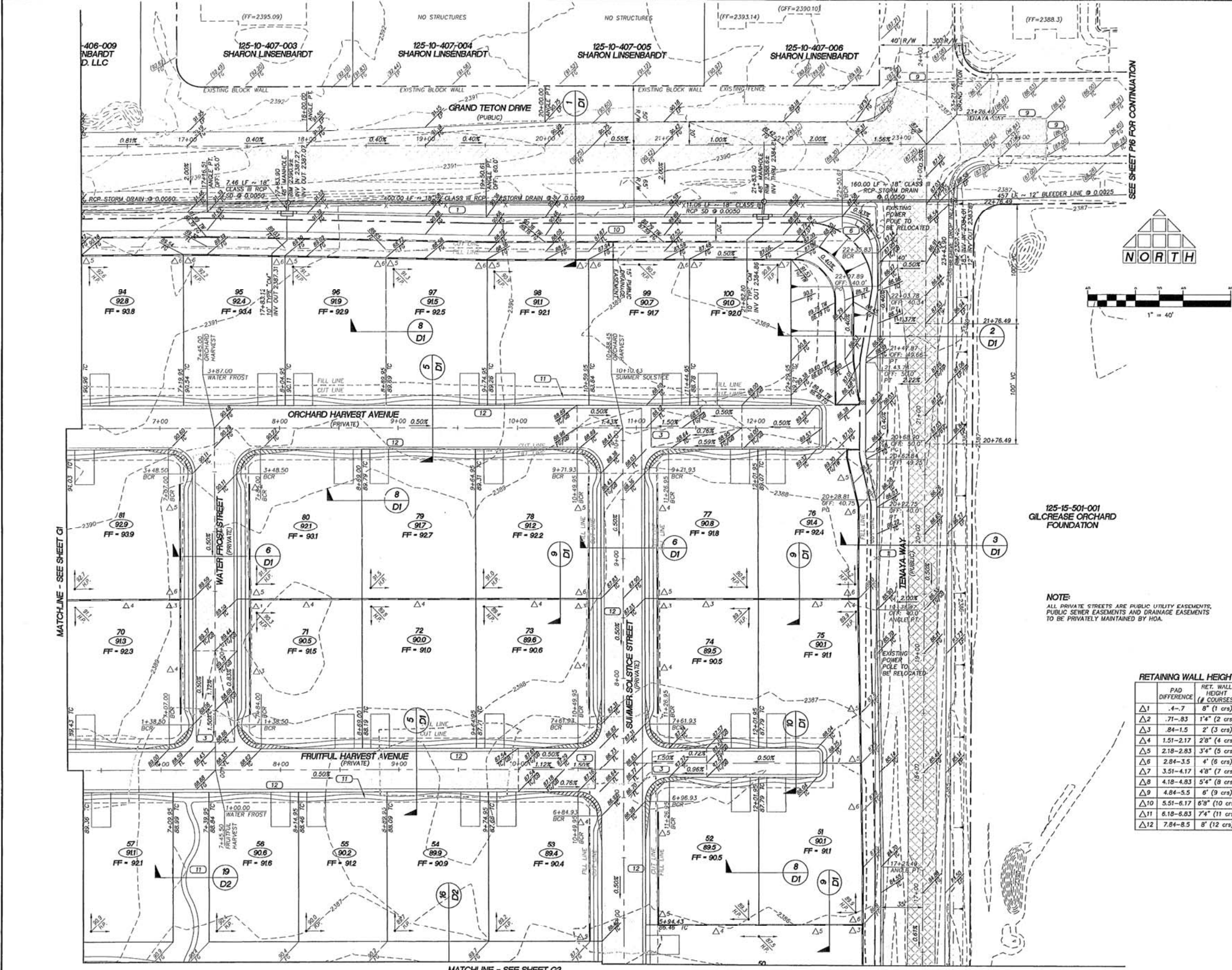
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

PH: (702) 873-7773 ROYAL CONSTRUCTION 431 W. CHEYENNE AVENUE, SUITE 105 LAS VEGAS, NV 89032 FAX: (702) 873-7776

SPINNAKER HOMES AT THE ORCHARD

GRADING PLAN

Professional Engineer Seal for Joshua N. Owen, State of Nevada, License No. 15748, Civil. The seal is circular with a rope-like border. The text inside reads "NORTHWESTERN ENGINEER-STATE OF NEVADA", "JOSHUA N. OWEN", "Exp: 12-31-09", and "CIVIL No. 15748". There is a handwritten signature across the seal and the date "5/27/08" written to the right.



- LEGEND**
- PROPERTY LINE / RIGHT-OF-WAY
 - "L" TYPE CURB AND GUTTER
 - "A" TYPE CURB
 - EXISTING CURB AND GUTTER
 - PROPOSED WATER LINE (SIZE AS SHOWN)
 - PROPOSED SEWER LINE (SIZE AS SHOWN)
 - EXISTING UTILITY (AS SHOWN)
 - CROSS GUTTER
 - WHEELCHAIR RAMP
 - CUT OR FILL SLOPE
 - PROPOSED PAVEMENT AREA
 - PROPOSED ELEVATION (DESCRIPTION AS SHOWN)
 - EXISTING ELEVATION (DESCRIPTION AS SHOWN)
 - FUTURE DESIGN ELEVATION (DESCRIPTION AS SHOWN)
 - LOT NUMBER
 - PAD ELEVATION
 - FINISHED FLOOR ELEVATION
 - EXISTING PAVEMENT TO BE REMOVED AND REPLACED
 - PHASE LINE
 - SIGHT VISIBILITY RESTRICTION ZONES PER STD. DWG. 201.1 (NOTHING OVER 24" IN HEIGHT ALLOWED IN SVZ EXCEPT TRAFFIC CONTROL DEVICES)
 - 6" SCREEN WALL
 - STEM WALL
 - RETAINING WALL

- CONSTRUCTION NOTES**
- CONSTRUCT "L" TYPE CURB AND GUTTER PER CCASD 216
 - CONSTRUCT "A" TYPE CURB PER CCASD 219
 - CONSTRUCT CROSS GUTTER PER CCASD 228
 - CONSTRUCT 5" SIDEWALK PER CCASD 234
 - CONSTRUCT SIDEWALK UNDERDRAIN PER CCASD 236
 - CONSTRUCT SIDEWALK RAMP USING ARMOR TILE TRUNCATED DOWNS OR EQUIVALENT PER CCASD 235
 - CONSTRUCT DEPRESSED CURB PER DETAIL SHEET D2
 - CONSTRUCT 3" VALLEY GUTTER PER DETAIL SHEET D2
 - SAWCUT AND MATCH EXISTING
 - CONSTRUCT 10" SIDEWALK PER CCASD 234
 - CONSTRUCT 3.5" MEANDERING SIDEWALK. SEE LANDSCAPE PLANS FOR MATERIAL
 - CONSTRUCT ROLL CURB AND GUTTER PER CCASD 217A
 - CONSTRUCT 10" ROLL CURB TO "L" CURB TRANSITION PER DETAIL SHEET D2
 - CONSTRUCT REMOVABLE BOLLARD PER DETAIL SHEET D2
 - CONSTRUCT WROUGHT IRON FENCE

FLOOD PLAIN NOTE
A REVIEW OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY-PANEL NUMBER 32003C1745 E, EFFECTIVE SEPTEMBER 27, 2002, INDICATES THAT THE SITE IS LOCATED WITHIN A FEMA ZONE "X". ZONE "X" IS DEEMED BY FEMA AS AREAS OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD.

RETAINING WALL HEIGHT

PAD DIFFERENCE	RET. WALL HEIGHT (# COURSES)
Δ1 .4'-7	8" (1 crs)
Δ2 .71'-83	1'4" (2 crs)
Δ3 .84'-1.5	2' (3 crs)
Δ4 1.51'-2.17	2'8" (4 crs)
Δ5 2.18'-2.83	3'4" (5 crs)
Δ6 2.84'-3.5	4' (6 crs)
Δ7 3.51'-4.17	4'8" (7 crs)
Δ8 4.18'-4.83	5'4" (8 crs)
Δ9 4.84'-5.5	6' (9 crs)
Δ10 5.51'-6.17	6'8" (10 crs)
Δ11 6.18'-6.83	7'4" (11 crs)
Δ12 7.84'-8.5	8' (12 crs)

CURVE DATA

CURVE	LENGTH	RADIUS	TANGENT	DELTA
C1	66.56'	21.31'	2260.25'	178°55'10"
C2	39.27'	25.00'	25.00'	90°00'00"
C3	39.27'	25.00'	25.00'	90°00'00"
C4	31.56'	20.00'	20.00'	90°00'00"
C5	31.27'	20.00'	18.86'	89°35'26"
C6	9.42'	3.00'	INFINITE	180°00'00"
C7	39.09'	25.00'	24.82'	89°35'26"
C8	31.42'	20.00'	20.00'	90°00'00"
C9	89.54'	57.00'	57.00'	90°00'00"
C10	31.42'	20.00'	20.00'	90°00'00"
C11	7.85'	5.00'	5.00'	90°00'00"

SIDEWALK RAMP DATA
PER STD. DWG. 235

A	B	TYPE
8'	8'	1

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

Call before you Overhead
Avoid overhead power line contact.

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

1-800-227-2600
CLARK COUNTY PUBLIC UTILITIES
1-702-445-7544

BENCHMARK
CLARK COUNTY VERTICAL CONTROL POINT "BLV90 10SSWS", BEING A CITY OF LAS VEGAS RITE IN A CONCRETE CINDER, NORTHWEST CORNER OF GRAND TETON DRIVE AND PIONEER WAY NEAR PT. OF PIONEER WAY

ELEVATION: 2397.47 (FEET)
730.750 (METERS)

CLARK COUNTY VERTICAL CONTROL #2003 BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

BASIS OF BEARING
NORTH 001°20'00" EAST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (SW 1/4) OF SECTION 15, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M. CLARK COUNTY, NEVADA, AS SHOWN IN FILE 113 OF SURVEYS, AT PAGE 92, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA

CERTIFICATION
I HEREBY CERTIFY THAT THE GRADING PLAN IS IN ACCORDANCE WITH THE APPROVED DRAINAGE STUDY ON FILE WITH THE CLARK COUNTY ENGINEER FOR THIS PROJECT. (DS-4274)

JOSEPH D. THOMASON, P.E. NO. 11097

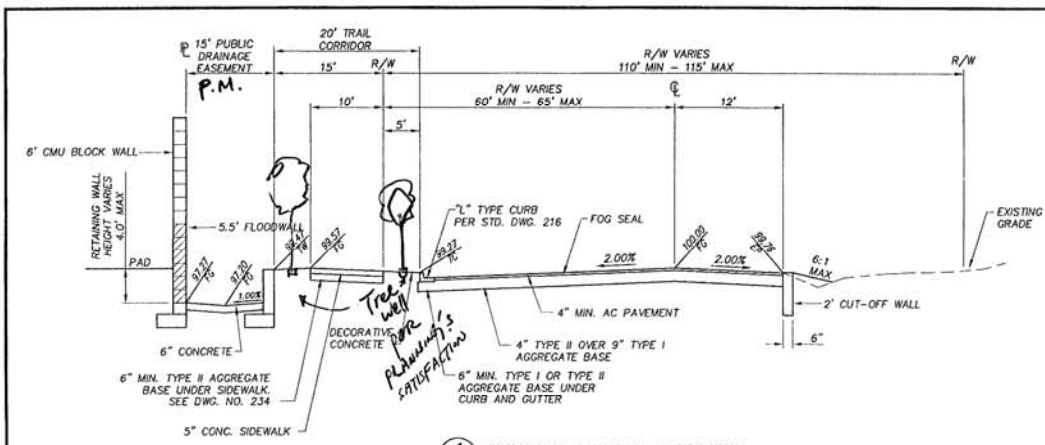
THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
FAX: 702-932-6125

ROYAL CONSTRUCTION
431 W. CHEYENNE AVENUE, SUITE 105 LAS VEGAS, NV 89032
PH: (702) 873-7773

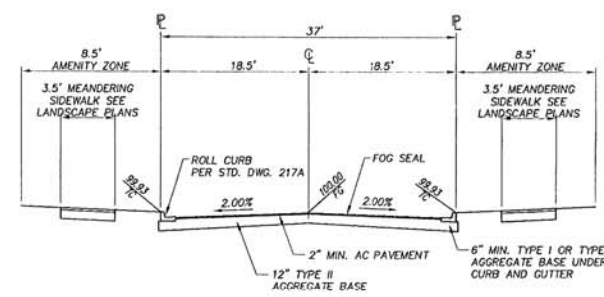
SPINNER HOMES AT THE ORCHARD
GRADING PLAN

ENGINEER
JOSEPH D. THOMASON
Exp: 12-31-09
No. 15145

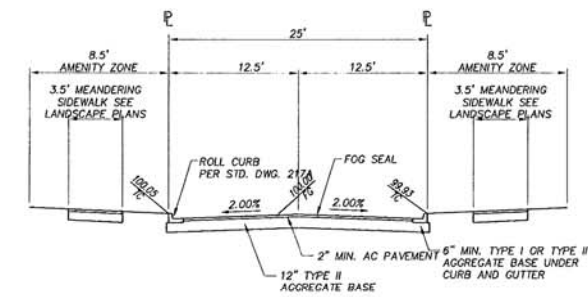
5 of 5
DRAWING NO.



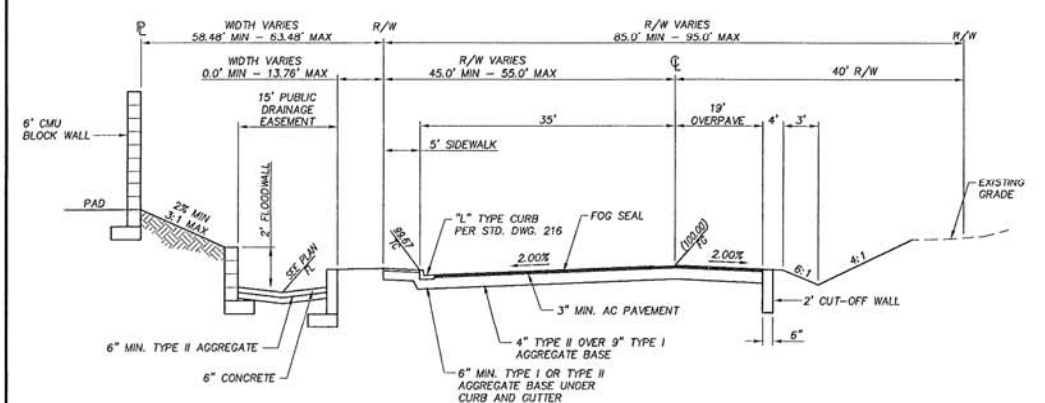
1 PUBLIC STREET SECTION - GRAND TETON
NOT TO SCALE



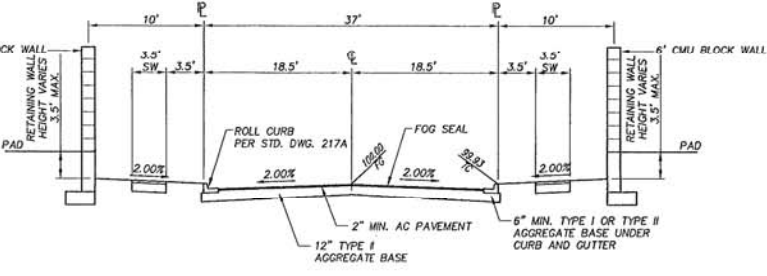
5 37' PRIVATE STREET SECTION
NOT TO SCALE



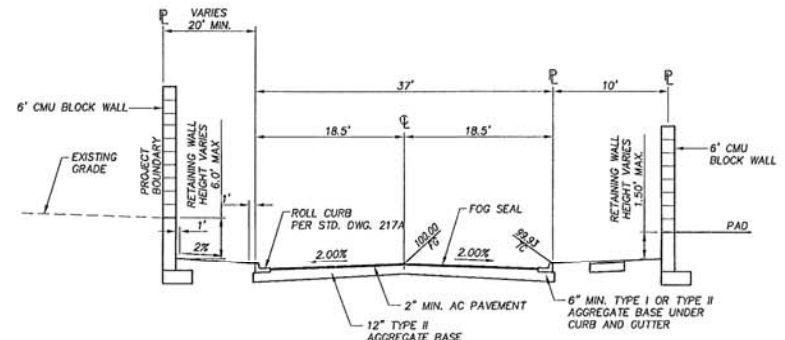
10 25' PRIVATE DRIVE SECTION
NOT TO SCALE



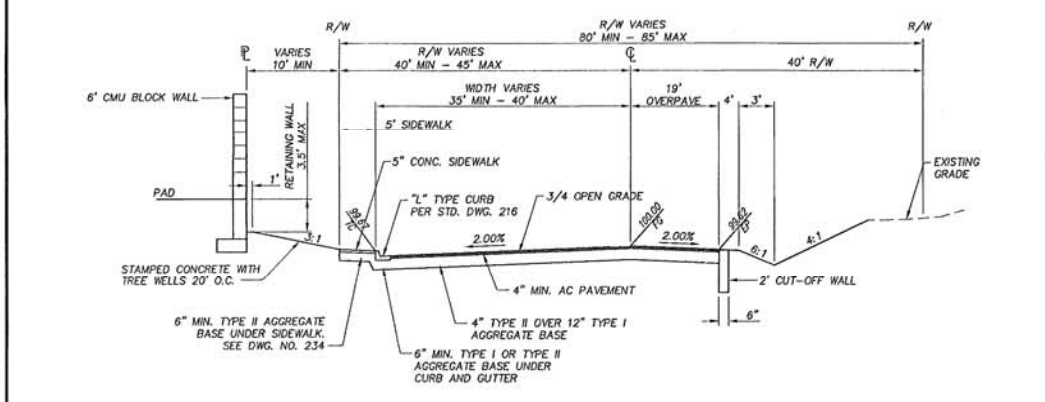
2 PUBLIC STREET SECTION - TENAYA WAY
NOT TO SCALE



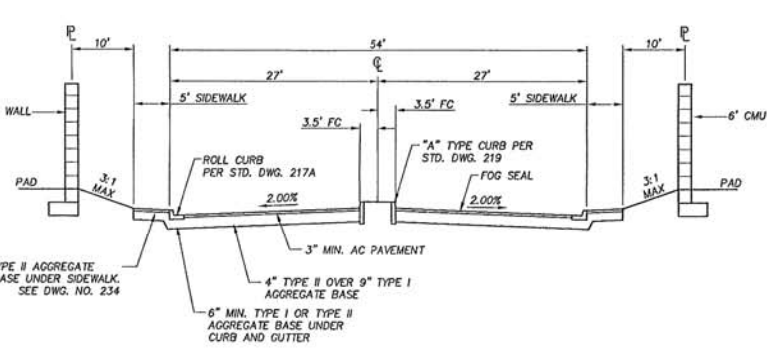
6 37' PRIVATE STREET SECTION
NOT TO SCALE



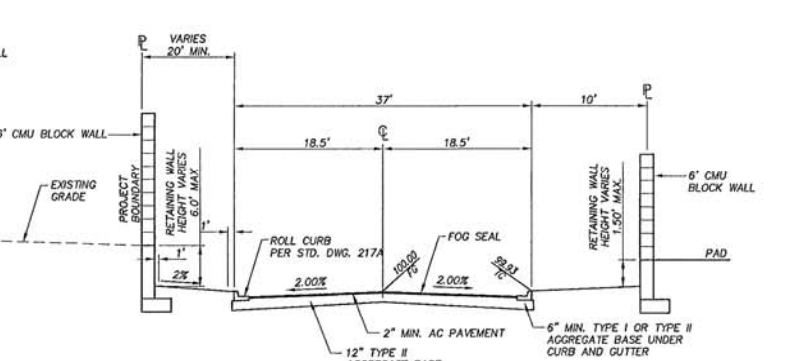
12 SECTION
NOT TO SCALE



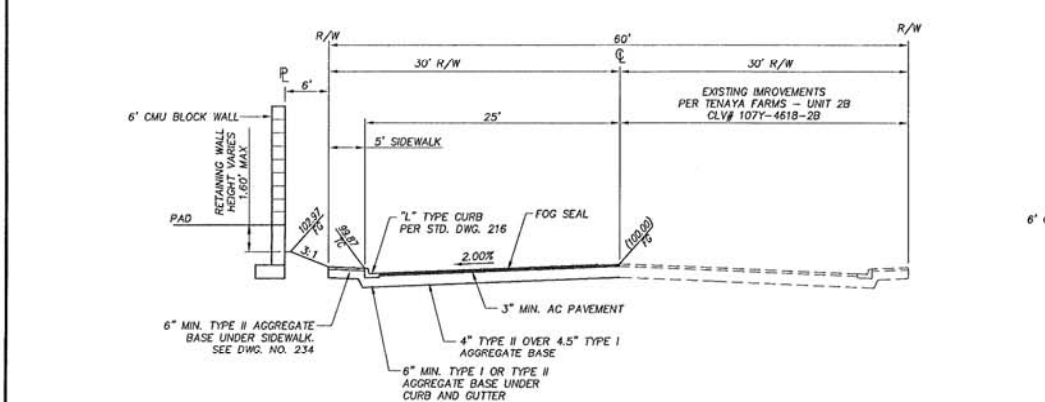
3 PUBLIC STREET SECTION - TENAYA WAY
NOT TO SCALE



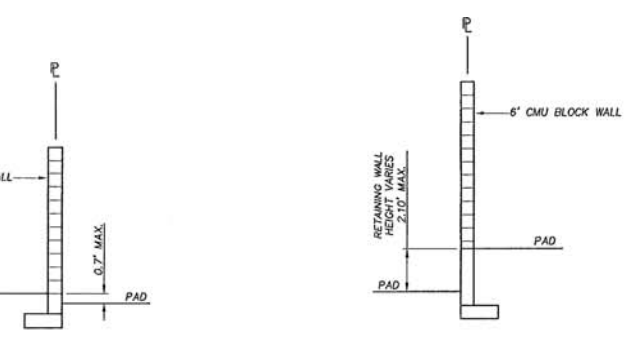
7 54' ENTRY STREET SECTION
NOT TO SCALE



13 SECTION
NOT TO SCALE

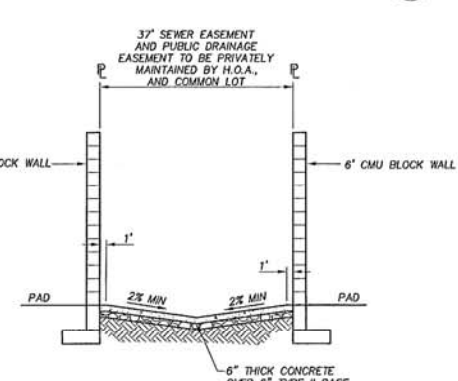


4 60' PUBLIC STREET SECTION - WHISPERING SANDS DRIVE
NOT TO SCALE



8 SECTION
NOT TO SCALE

9 SECTION
NOT TO SCALE



14 SECTION
NOT TO SCALE

This grading plan is a part of drainage study # 4274 which was received on 5/28/08 and approved on 5/29/2008. Page 3 of 5

DRAWN BY: _____ RP		SCALE: _____																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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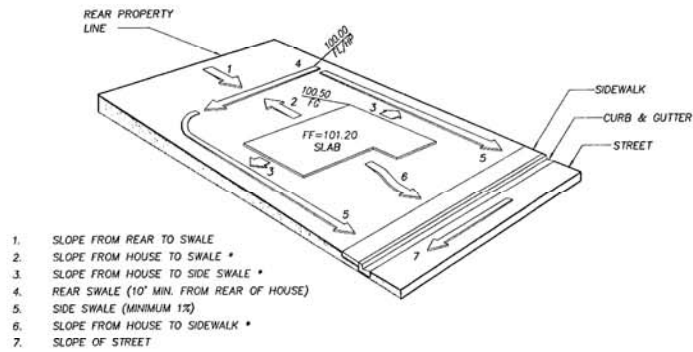
THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX: 702-932-6129

ROYAL CONSTRUCTION
431 W. CHEYENNE AVENUE, SUITE 105 LAS VEGAS, NV 89032
PH: (702) 873-7773 FAX: (702) 873-7776

SPINNAKER HOMES AT THE ORCHARD
DETAILS AND SECTIONS

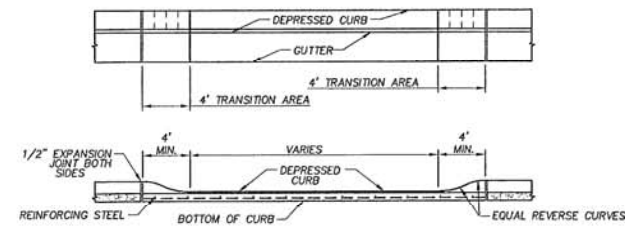
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CIVIL
NO. 15148
5/27/08

SHEET **D1** OF
DRAWING NO.



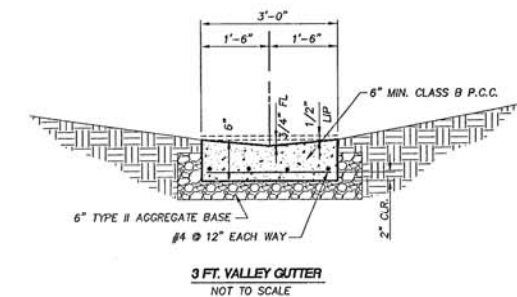
* 3% MINIMUM SLOPE FOR 10' AWAY FROM FOUNDATIONS OR TO A SWALE WITH A MINIMUM 1% SLOPE.

TYPICAL GRADING - FHA TYPE 'A' DRAINAGE
NOT TO SCALE

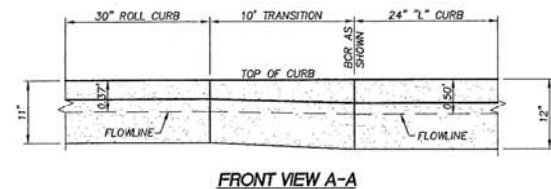


- NOTES:
1. NO. 4 BARS AT 16" O.C. BOTH WAYS CONTINUOUS THROUGH GUTTER. NO. 4 BARS SHALL BE PLACED 3" ABOVE BOTTOM OF CONCRETE.
 2. WHEN CONSTRUCTING DRIVEWAY WHERE CURB AND GUTTER EXISTS, COMPLETELY REMOVE INTERFERING PORTIONS OF EXISTING CURB AND GUTTER. DRIVEWAY SHALL BE MONOLITHIC TO A.C. LINE.

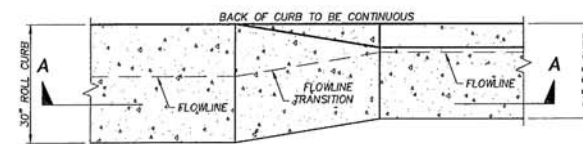
DEPRESSED CURB
NOT TO SCALE



3 FT. VALLEY GUTTER
NOT TO SCALE

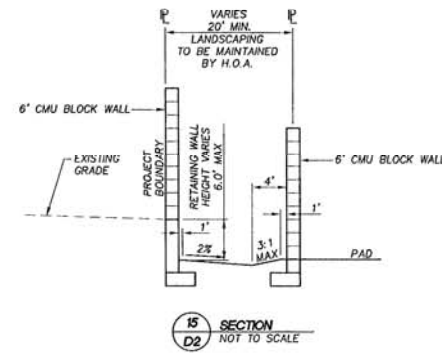


FRONT VIEW A-A

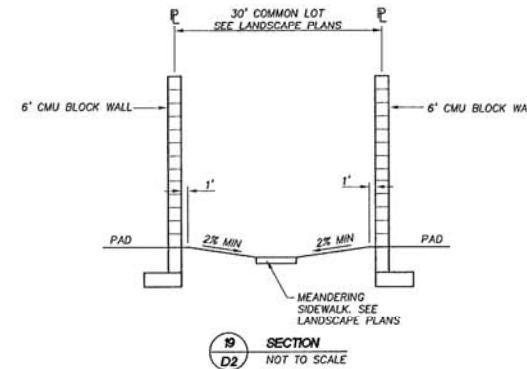


PLAN VIEW

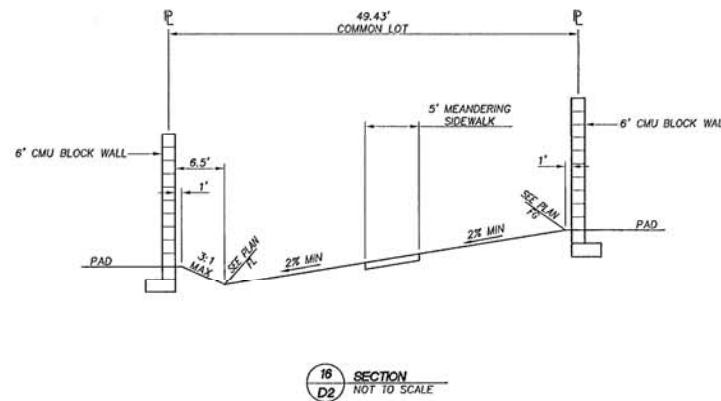
1" CURB TO ROLL CURB TRANSITION
NOT TO SCALE



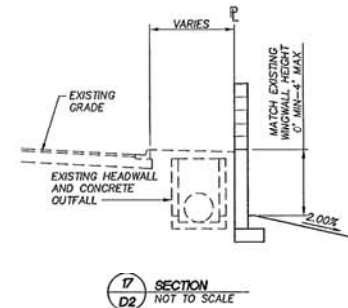
SECTION D2
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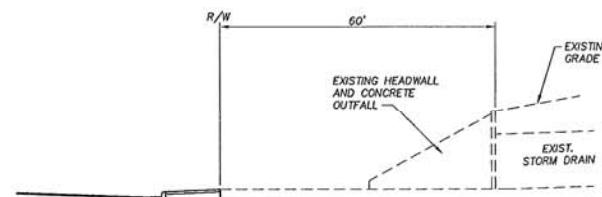
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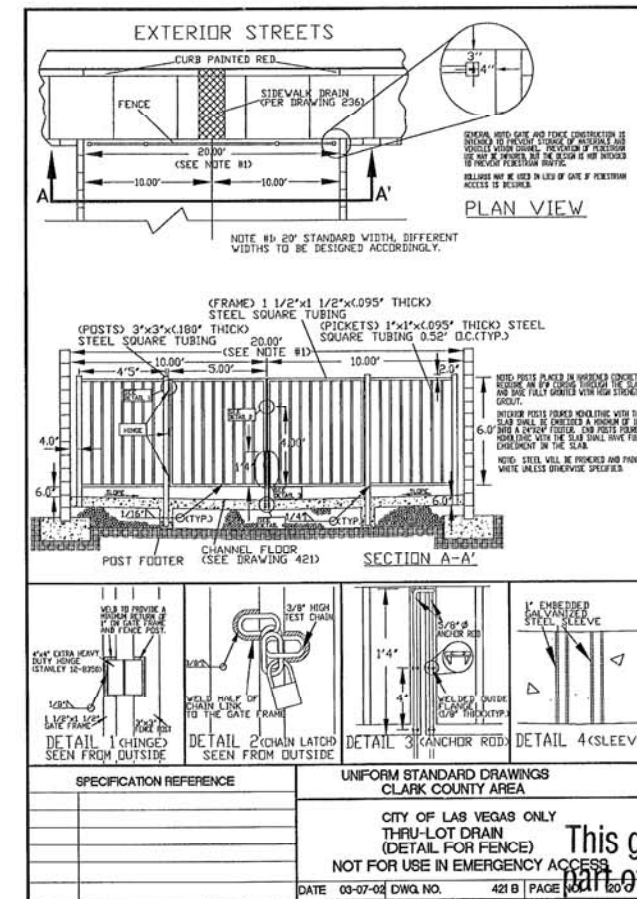
SECTION D2
NOT TO SCALE



SECTION 17
NOT TO SCALE



SECTION D2
NOT TO SCALE



SPECIFICATION REFERENCE

UNIFORM STANDARD DRAWINGS
CLARK COUNTY AREA

CITY OF LAS VEGAS ONLY
THRU-LOT DRAIN
(DETAIL FOR FENCE)
NOT FOR USE IN EMERGENCY ACCESS

DATE 03-07-02 DWG NO. 421 B PAGE NO. 20

SCALE	DATE	BY	REVISION
DRAWN BY: BP	DESIGNED BY: BP	COMMENTS ADDRESSED BY:	PROJECT NO. 01107011

THOMASON CONSULTING ENGINEERS
3277 E. WARM SPRINGS ROAD, SUITE 400
LAS VEGAS, NEVADA 89120
702-932-6125 FAX 702-932-6129

ROYAL CONSTRUCTION
431 W. CHEYENNE AVENUE, SUITE 105 LAS VEGAS, NV 89032
PH: (702) 875-7773 FAX: (702) 875-7778

SPINNAKER HOMES AT THE ORCHARD
DETAILS AND SECTIONS

CLARK COUNTY ENGINEER
JOSHUA LOWEN
Exp: 12-31-09
CIVIL
No. 15748

This grading plan is a part of drainage study #4274 which was received on 5/28/08 and approved on 5/28/08. Page 4 of 5

TEN-YEAR CONSTRUCTION PROGRAM

REGIONAL FLOOD CONTROL DISTRICT



**FISCAL YEAR 2013
THROUGH
FISCAL YEAR 2022**

**GALE WM. FRASER, II. P.E.
GENERAL MANAGER/CHIEF ENGINEER**

**ADOPTED
JUNE 14, 2012**

Las Vegas (continued)

programmed in FY 19/20. The TYCP includes approximately \$6.4 million for this project.

Upper Northern LV Wash – Upper Western Tributary – Brent Drainage System – Floyd Lamb Park to Durango Drive (PV = 78.5)

BRDB 0043 – This project consists of an 8' x 6' reinforced concrete box culvert in Brent Lane extending from Durango Drive to the South Environmental Enhancement Area. Design is programmed in FY 14/15 and construction funding is programmed in FY 17/18. The TYCP includes approximately \$4.1 million for this project.

Upper Northern LV Wash – Upper Western Tributary – Las Vegas Wash – Grand Teton, Mountain Spa to Durango Drive (PV = 80.5)

LVMD 2632 through 2789 – This project consists of a reinforced concrete box culvert ranging in size from 6' x 5' to 18' x 5' in Grand Teton Drive extending from Durango Drive to just west of Rainbow Boulevard. Design is underway. Construction funding is programmed in FY 12/13. The TYCP includes approximately \$15.9 million for this project.

The funding programmed for the Upper Northern Las Vegas Wash, Central Basin and Gowan Planning Areas in Las Vegas totals approximately \$219.8 million on the TYCP.

APPENDIX F

Improvement Plans