PROJECT ASSESSMENT REPORT

Deer Valley Road Drainage Channel Improvements - Pima Road To Approximately 5000 Feet West

Entellus

Intelligent Engineering

Environmental *Solutions*

ENTELLUS

PROJECT NO. 410061A

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CITY OF SCOTTSDALE

Prepared for the City of Scottsdale

August 2009

PROJECT ASSESSMENT REPORT FOR DEER VALLEY ROAD DRAINAGE CHANNEL IMPROVEMENTS – PIMA ROAD TO APPROXIMATELY 5000 FEET WEST

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August 2009

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PROJECT ASSESSMENT REPORT FOR DEER VALLEY ROAD DRAINAGE CHANNEL IMPROVEMENTS – PIMA ROAD TO APPROXIMATELY 5000 FEET WEST CONTRACT NO. S-0602

DRAFT

TABLE OF CONTENTS

SECTION 1: INTRODUCTION/BACKGROUND 1-1

1.1 INTRODUCTION/BACKGROUND 1-1

1.2 PRE-CONDITIONS PRIOR TO LOS GATOS 1-1

SECTION 2: EXISTING CONDITIONS 2-1

2.1 ENVIRONMENTAL (404) 2-1

2.2 EXISTING UTILITIES 2-1

2.3 EXISTING RIGHT-OF-WAY & OWNERSHIP OF PROPERTIES 2-1

2.4 ENVIRONMENTALLY SENSITIVE LAND (ESL) AREA 2-1

SECTION 3: PROJECT SCOPE 3-1

3.1 PROJECT PURPOSE 3-1

3.2 PROJECT OBJECTIVE 3-1

SECTION 4: HYDROLOGIC AND HYDRAULIC AND SEDIMENTATION ANALYSIS 4-1

4.1 HYDROLOGIC ANALYSIS 4-1

4.1.1 Previous Hydrology Models 4-1

4.1.2 Methodology 4-1

4.1.3 Model Modifications 4-1

4.1.4 Pima Road: Pinnacle Peak Road to Deer Valley Road Alignment 4-2

4.1.5 Deer Valley Road Channel: West of Pima Road and the Deer Valley Road Alignment to Sedimentation Basin 4-2

4.2 HYDRAULIC ANALYSIS 4-5

4.2.1 Methodology 4-5

4.2.2 Survey 4-6

4.2.3 Capacity of Existing Deer Valley Road Channel 4-7

4.3 SEDIMENTATION ANALYSIS 4-11

4.3.1 Methodology 4-11

4.3.1.1 Scour 4-11

4.3.1.2 Sediment Loss 4-11

4.3.2 Results of Analysis 4-12

SECTION 5: ALTERNATIVES ANALYSIS 5-1

5.1 DEER VALLEY ROAD CHANNEL: PIMA ROAD TO DRAINAGE BASIN 5-1

5.1.1 Alternative 1 5-2

5.1.1.1 Alternative Description 5-2

5.1.1.2 Alternative Analysis 5-3

5.1.1.3 Alternative Cost 5-3

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CITY OF SCOTTSDALE

5.1.1.4 Alternative Pros and Cons 5-4
5.1.2 Alternative 2 5-4
5.1.2.1 Alternative Description 5-4
5.1.2.2 Alternative Analysis 5-5
5.1.2.3 Alternative Cost 5-5
5.1.2.4 Alternative Pros and Cons 5-6
5.1.3 Alternative 3 5-6
5.1.3.1 Alternative Description 5-6
5.1.3.2 Alternative Analysis 5-7
5.1.3.3 Alternative Cost 5-7
5.1.3.4 Alternative Pros and Cons 5-8
5.1.4 Alternative 4 5-8
5.1.4.1 Alternative Description 5-8
5.1.4.2 Alternative Analysis 5-9
5.1.4.3 Alternative Cost 5-10
5.1.4.4 Alternative Pros and Cons 5-10
5.2 COST ESTIMATES 5-11

SECTION 6: LANDSCAPING 6-1

6.1 DEER VALLEY ROAD CHANNEL: PIMA ROAD TO DRAINAGE BASIN 6-1
6.2 Access Roads and Trails 6-2

SECTION 7: STORM DRAIN OUTFALL AND FLOW CONTROL STRUCTURES AND GRADE CONTROL STRUCTURES 7-1

7.1 STORM DRAIN OUTFALL 7-1
7.2 FLOW CONTROL STRUCTURES 7-1
7.3 GRADE CONTROL STRUCTURES 7-1

SECTION 8: RECOMMENDED SOLUTIONS 8-1

8.1 RECOMMENDED ALTERNATIVE FOR DEER VALLEY ROAD CHANNEL 8-1
8.2 Recommended Improvements to the Existing Western Channel 8-1
8.3 HEC-RAS Model for Recommended Alternative 8-2
8.3.1 Method Description 8-2
8.3.2 Hydraulic Model Results 8-3

SECTION 9: PROPOSED DESIGN SCHEDULE 9-1

9.1 PROPOSED DESIGN SCHEDULE 9-1
APPENDIX A: REFERENCES A-1
APPENDIX B: PLAN AND PROFILES FOR ALTERNATIVES B-1
APPENDIX C: LANDSCAPE CROSS SECTIONS C-1
APPENDIX D: SURVEY INFORMATION D-1
APPENDIX E: HYDROLOGY DOCUMENTATION E-1

Entellus

CITY OF SCOTTSDALE

APPENDIX F: EXISTING CONDITIONS HYDRAULIC DOCUMENTATION F-1
APPENDIX G: ALTERNATIVES DOCUMENTATION FOR CHANNEL AND STORM DRAIN G-1
APPENDIX H: CALCULATIONS FOR FLOW CONTROL STRUCTURE H-1
APPENDIX I: SEDIMENTATION ANALYSIS I-1
APPENDIX J: RECOMMENDED ALTERNATIVE HYDRAULIC DOCUMENTATION J-1
APPENDIX K: COST ESTIMATES K-1
APPENDIX L: CD L-2

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CITY OF SCOTTSDALE

LIST OF TABLES

Table 1 - Deer Valley Road Channel Total Scour 4-12
Table 2 - Deer Valley Road Channel Soil Loss Analysis 4-13
Table 3 - Pima Road Drainage Improvements Cost Estimates 5-11

LIST OF FIGURES

Figure 1 - Vicinity Map 1-3
Figure 2 – Deer Valley Road Improvements 4-9
Figure 3 – Deer Valley Road Hydraulic Flows 4-10
Figure 4 – Comparison of Hydrology Flows From Others 4-4
Figure 5 – Soil Erodibility Factors 4-14
Figure 6 – Average Slope 4-15
Figure 7 – Contributing Areas 4-16

EXHIBITS

Plan and Profiles for Alternatives (Half Size) ..... Appendix B
Landscape Cross Sections ..... Appendix C

SECTION 1: INTRODUCTION/BACKGROUND

1.1 INTRODUCTION/BACKGROUND

This project is the result of drainage concerns in the area of Deer Valley Road and Pima Road. This project is necessary to facilitate the widening of Pima Road from Deer Valley Road to Pinnacle Peak Road in order to bring the proposed new roadway into compliance with the City's drainage requirements for a major arterial roadway. See **Figure 1** for a general location map of this project.

As a result of the drainage concerns, the City of Scottsdale entered into a contract with Entellus, Inc. to perform a Project Assessment of the Deer Valley Road drainage channel improvements. The scope of work includes developing alternatives to convey the proposed flows along the Deer Valley Road alignment. The flows used in the Project Assessment Study were obtained from another report prepared by Entellus, Inc. titled *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**). Also, once an alternative is selected by the City, Entellus will be preparing the necessary construction documents to implement the recommended alternative.

1.2 PRE-CONDITIONS PRIOR TO LOS GATOS

The natural flow of the watershed along Pima Road from Pinnacle Peak to Deer Valley Road is, in general, from the northeast to the southwest. The existing design of Pima Road utilizes several wet crossings to pass flow across this stretch of roadway with an occasional culvert. Pima Road adjacent to the Los Gatos subdivision provides a slightly different scenario. A wall exists along Pima Road (west of Pima Road) bordering the Los Gatos subdivision. This wall has holes in the bottom of the wall to allow flow to enter the properties. These holes are relatively small and somewhat perched so minimal flow (if any) would be able to cross through them. The stability of the wall under a large flow event is questionable since it does not appear to be a flood wall. Despite this, there is the possibility that the wall could divert flow south along Pima Road. To compensate for the unknown nature and stability of the wall, two existing conditions models were created, one assuming the wall holds in place and the other assuming that the wall is not present. See the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**) for details regarding the hydrological modeling of the entire watershed.

Los Gatos subdivision borders a portion of the Deer Valley Road Channel. This channel has had several assumptions regarding the flows, how the flows arrive at the channel and the channels design. There are two particular previous reports by Others that detail the assumptions of the Deer Valley Road Channel concept. Those reports are: *Deer Valley Road Channel Phase 2 – Hydrologic and Hydraulic Design Report* by Pacific Advanced Civil Engineering in 1996 (**Reference 8**), hereinafter referred to as the PACE report; and *Addendum to Planning Unit Drainage Plan for Grayhawk Villages 2 and 3* by DEI professional Services in 1996 (**Reference 2**), hereinafter referred to as the DEI report.

These reports detail the flows entering the Grayhawk Golf Course to the south at two locations: ~1/2 mile west of Pima Road; and ~1 mile west of Pima Road at the end of the Deer Valley Road Channel. The two outfall locations are shown on **Figure 1** and called out as "Drainage Outlet Points" which discharge into the Grayhawk Golf Course. The existing channel is split into two channels, one that enters Grayhawk at the first outlet, and the second outlet which is the outfall. The PACE report closely corresponds to this condition. This PACE report also details an interim condition prior to improvements by the Desert Greenbelt Project in the watershed. The Deer Valley Road Channel was designed for these interim conditions with no freeboard.

The DEI report assumes a continuous channel for the entire length with a split flow structure onto the Grayhawk Golf Course. The flows from these reports are summarized below. They are also shown on **Figure 4** at their respective locations for the 100 year – 6 hour flows (see **Section 4.1**).

Flow Location	DEI report	PACE Report Ultimate Condition	PACE Report Interim Condition
Deer Valley Road Channel prior to golf course split	1,113 cfs	310 cfs	640 cfs
Flow to golf course (~1/2 mile west of Pima Road)	334 cfs	310 cfs	640 cfs
Flow continuing along Deer Valley Road alignment past golf course split (~1/2 mile west of Pima Road	779 cfs	0 cfs	0 cfs
Flow at end of Deer Valley Road Channel	637 cfs	720 cfs	1,110 cfs

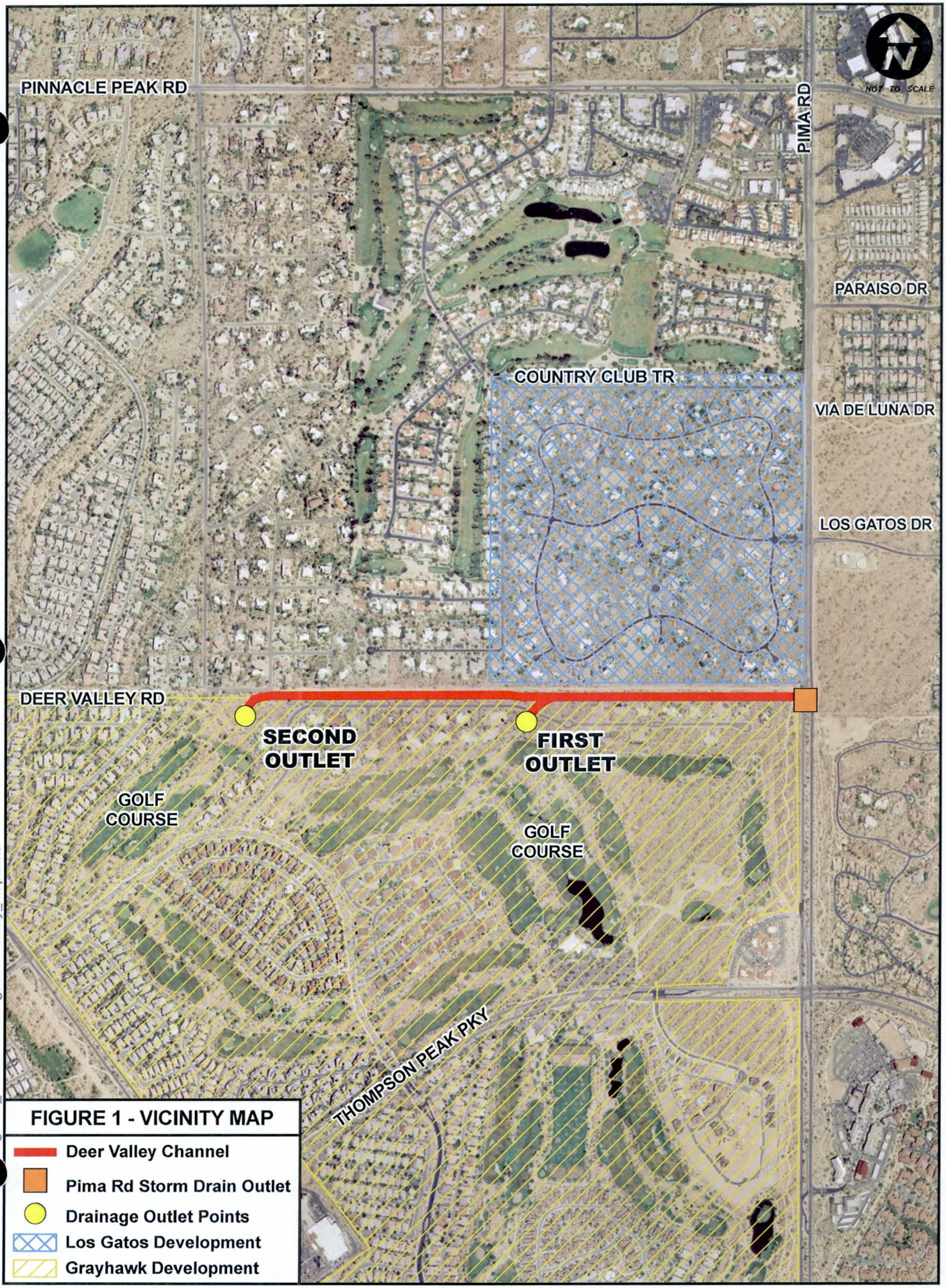


FIGURE 1 - VICINITY MAP

SECTION 2: EXISTING CONDITIONS

2.1 ENVIRONMENTAL (404)

The project limits will be evaluated for "waters of the United States" as regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. A Section 404 Preliminary Jurisdictional Delineation (JD) is currently being prepared for the project and will be submitted to the USACE to identify any features (e.g., washes) under the jurisdiction of the USACE. Upon receipt of the approved JD, project impacts to any jurisdictional feature will be assessed and the appropriate Section 404 Permit will be prepared, if necessary.

2.2 EXISTING UTILITIES

There are existing utilities in the project area of the proposed Deer Valley Road Channel and in the area of the proposed drainage improvements along Pima Road from Deer Valley Road alignment to Thompson Peak Parkway. The utilities in the project area along the proposed Deer Valley Road Channel include the following:

- City water lines
- City sewer lines
- APS (underground line)
- Cox Communications (underground line)
- Qwest (underground line)

At this time, it is anticipated that some removal or relocation of water line facilities, electric lines, and irrigation lines will be needed along the proposed Deer Valley Road Channel.

2.3 EXISTING RIGHT-OF-WAY & OWNERSHIP OF PROPERTIES

Along the alignment of the proposed Deer Valley Road Channel, there is an existing 100 foot drainage easement south of the section line. This easement belongs to the Grayhawk Homeowners Association. North of the section line adjacent to the drainage easement there is 50 feet of existing right-of-way (ROW). The alternatives for the Deer Valley Road Channel presented in this study are within the existing easement and ROW. Therefore, no additional easements or ROW will need to be obtained. A copy of the plat that shows the separate tracts in the project area is included in **Appendix A.**

2.4 ENVIRONMENTALLY SENSITIVE LAND (ESL) AREA

This project falls within the Environmentally Sensitive Lands (ESL) Areas of the City. As a result, the design of the drainage improvements will need to follow the standards and criteria for the area as provided in the Environmentally Sensitive Lands Ordinance (ESLO).

SECTION 3: PROJECT SCOPE

3.1 PROJECT PURPOSE

The purpose of this study is to determine the conveyance capacity of the existing facilities and to develop and evaluate alternatives to convey flows to the two existing outfalls into Grayhawk Golf Course. Furthermore, as described in the scope of work, this Project Assessment Study will present alternatives to the City for consideration and will make a recommendation to the City on a preferred alternative to implement. Upon acceptance by the City of the recommended alternative, Entellus will prepare the final construction documents for the recommended alternative. These construction documents will be included with the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**) construction documents and will be constructed under the same contract number.

3.2 PROJECT OBJECTIVE

The project objective is to develop and evaluate cost effective alternatives that appropriately convey the flows to the downstream outfall points which are acceptable to the City and the adjoining developments. In addition, the objective of the study is to identify a recommended alternative for the City's consideration and, if acceptable, implementation.

SECTION 4: HYDROLOGIC AND HYDRAULIC AND SEDIMENTATION ANALYSIS

4.1 HYDROLOGIC ANALYSIS

A hydrologic analysis was performed to determine the base flows for the alternatives presented in this Project Assessment Report. The analysis includes the modeling of the proposed Pima Road Channel from Pinnacle Peak Road to approximately Via De Luna Drive and the Pima Road Storm Drain from that location to the Deer Valley Road alignment. The proposed alternative configuration is presented in the proposed model and documented in the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**). See this report for details regarding the hydrological modeling of the entire watershed.

4.1.1 Previous Hydrology Models

Nearly all of the current hydrology for the region is based on the original modeling developed for the *Core North State Land parcel* by Robert L. Ward (**Reference 14**), hereinafter referred to as the Core North Model. It should be noted that the current hydrology is a compilation of various modeling efforts, and is not solely the product of Mr. Ward. For this project, Entellus utilized *The City of Scottsdale Desert Greenbelt, Pima Road Three Basin Project* by Stantec Consulting Inc., dated March 1999 (**Reference 1**), hereinafter referred to as the Three Basins Model. The Three Basins Model makes many assumptions based on the implementation of the Scottsdale Desert Greenbelt Flood Control Project improvements; however, the Desert Greenbelt project was never completed. In order to model current existing conditions, it was necessary to modify the Three Basins Model to adequately account for current conditions.

Portions of the DEI Report composite models were utilized and inserted where appropriate in the model. This appears to be the model that was utilized by Grayhawk to design the Deer Valley Road Channel and other downstream drainage improvements. Several drainage analyses by Others have been conducted in the watershed with varying assumptions. Entellus prepared a drainage review memorandum to the City of the previous studies which is included in **Appendix E**.

4.1.2 Methodology

The U.S. Army Corps of Engineers' HEC-1 Flood Hydrograph Package, hydrologic rainfall/runoff computer program, Version 4.1 (**Reference 9**), was utilized to perform the hydrologic analysis for the study area.

4.1.3 Model Modifications

In order to adequately model the improved conditions, several modifications to the hydrologic model were required. Several existing route reaches along Pima Road from Pinnacle Peak Road to Deer Valley Road were modified to model the proposed Pima Road Channel and storm drain. Also, route reaches representing the proposed Deer Valley Road Channel were modified. In addition, a diversion representing the split from the proposed Deer Valley Road Channel into Grayhawk Golf Course was modified. The existing online sedimentation basin

at the end of Deer Valley Road Channel was introduced into HEC-1 hydrologic model. These modifications are discussed in the following sections; however, see the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak*for details regarding the hydrological modeling (**Reference 10**).

4.1.4 Pima Road: Pinnacle Peak Road to Deer Valley Road Alignment

There are proposed improvements upstream of the Deer Valley Road Channel to convey flows south along Pima Road to the Deer Valley Road Channel. These proposed improvements include a nearly half mile drainage channel starting at Pinnacle Peak Road, continuing along the east side of Pima Road and ending at the Via De Luna Drive alignment. The proposed Pima Road drainage channel empties into 2 – 78" storm drain pipes, which start at Via De Luna Drive and continue south to Los Gatos Drive where they transition to 3 – 78" storm drain pipes and continue to the Deer Valley Road alignment. These proposed structures are not a part of this report, but details regarding the proposed design and analysis can be found in the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**).

4.1.5 Deer Valley Road Channel: West of Pima Road and the Deer Valley Road Alignment to Sedimentation Basin

Based on discussions with the City, it was decided to match the design flows without freeboard entering the Grayhawk Golf Course at the two outlet points, it was determined that all flow arriving at the intersection of Pima Road and Deer Valley Road alignment could be conveyed to the west, and not exceed the design flows at the two outlet points. Therefore, for the proposed condition, all flow is assumed to be conveyed to the west along the proposed Deer Valley Road Channel.

The Deer Valley Road Channel routes in HEC-1 were modified to be a representative eight point typical cross section of the recommended alternative. The 100-year peak flow in the channel ranges from 1309 cfs to 715 cfs. For details on the channel cross section, the hydraulic structures, the existing and proposed capacity of the Deer Valley Road Channel, see **Section 4.2**.

The split at Pima Road and Deer Valley Road alignment was modeled such that the existing conditions were maintained. The diversion representing the split from the Deer Valley Road Channel into the Grayhawk Golf Course through the existing 1 - 10' x 5' RCB, located 2300 feet west of Pima Road, was also modified to represent the proposed diversion structure at this location. As a result, the 100-year peak flow draining into Grayhawk Golf Course was determined to be approximately 640 cfs. The existing conditions at this location were also maintained for the 2 and 10-year frequency storms (see **Appendix E**).

The existing sedimentation basin at the end of Deer Valley Road Channel (~1 mile west of Pima Road) was introduced into HEC-1 hydrologic model. A stage – storage – discharge record was utilized to model the online basin. The elevation and area data used was based on survey conducted as explained in **Section 4.2.2**. As no outlet was found at the time of survey, it was determined from the survey information and the hydraulic analysis based upon the existing conditions that the basin will overtop the southern portion of the sedimentation basin then continue to flow south into the golf course without additional

storage occurring (See **Section 4.2** for more details on the hydraulic modeling portion). Using the conic method, the basin capacity was determined to be approximately 4 acre-feet (see **Appendix E**). The 100-year peak flow at this location was reduced from the existing conditions flow of just over 1500 cfs to approximately 1075 cfs for the post-developed condition.

The hydrology flows used for the alternative analysis for the proposed Deer Valley Road Channel at the two outlet locations are shown on **Figure 4**.

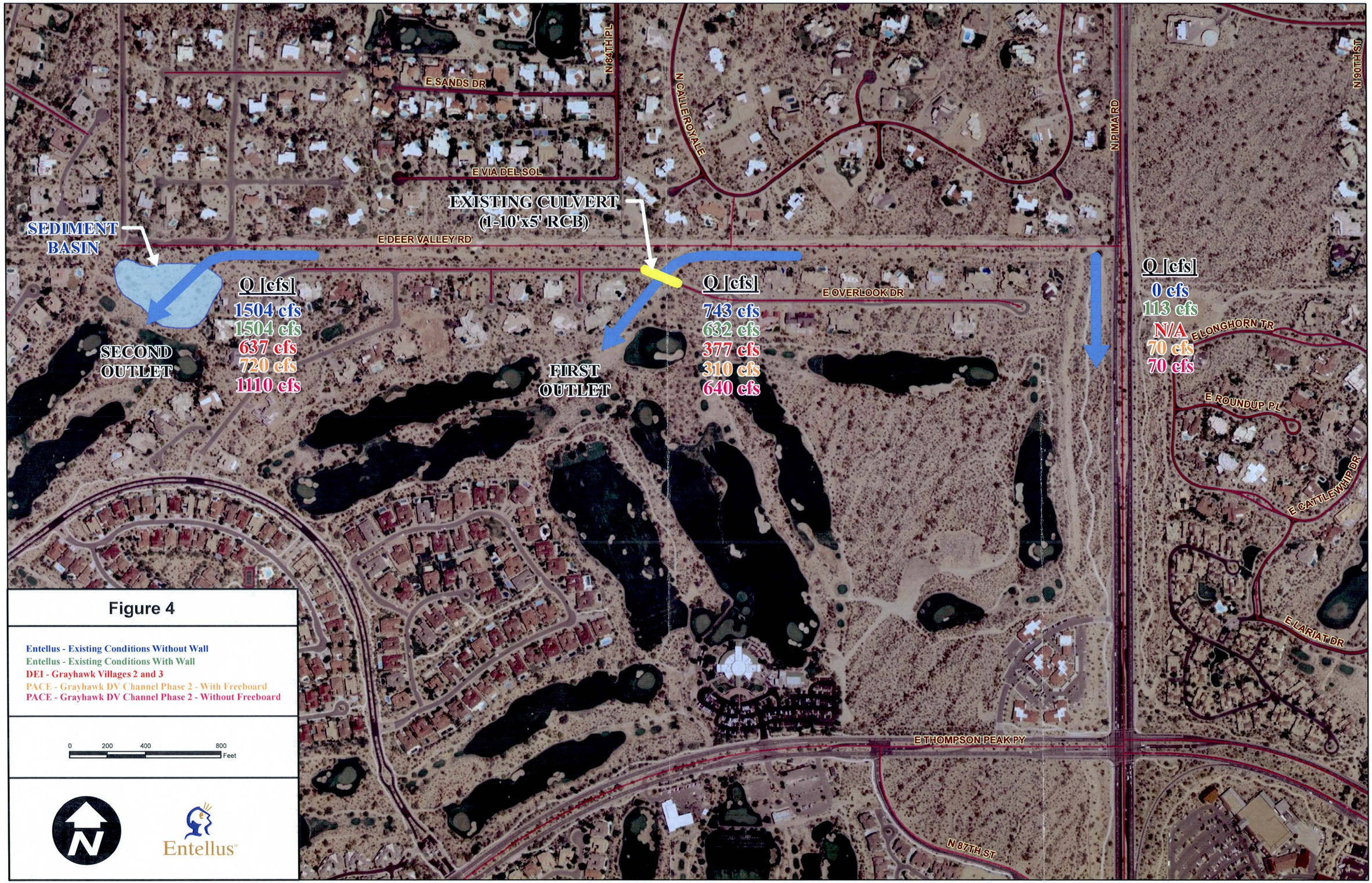


Figure 4

Entellus - Existing Conditions Without Wall
Entellus - Existing Conditions With Wall
DEI - Grayhawk Villages 2 and 3
PACE - Grayhawk DV Channel Phase 2 - With Freeboard
PACE - Grayhawk DV Channel Phase 2 - Without Freeboard

0 200 400 800 Feet

P:\400\410061a\drainage\DV_PA\GIS\MXD\Figure4.mxd

4.2 HYDRAULIC ANALYSIS

The purpose of the hydraulic analysis was to develop and evaluate alternatives for different proposed channel configurations for the proposed Deer Valley Road Channel; and develop a concept for the flow control structures to split the flow along the Deer Valley Road Channel at approximately 2300 feet west of Pima Road. Also, the hydraulic analysis evaluated flow into the golf course at the existing box culvert and flows west along the Deer Valley Road Channel to an existing sedimentation basin that outlets into the golf course. In order to accomplish this, the future conditions flows were used for the hydraulic analysis. **Figure 3** shows the future condition flows used for different portions of the Deer Valley Road Channel. The hydraulic analysis includes the proposed channel from the proposed storm drain outfall at the southwest corner of Pima Road and Deer Valley Road alignment to the west 2700 feet. A proposed flow control structure at the entrance into the golf course, approximately 2300 feet west of Pima Road, allowed ~~50%~~ 49 of the flow to move south through an existing 1 - 10' x 5' box culvert and over the existing roadway. The remainder of the flow (5~~0~~1%) continues west along the proposed Deer Valley Road Channel which outlets into an existing sedimentation basin approximately 5000 feet west of Pima Road. The outfall of this sedimentation basin goes into the golf course.

640/1310

4.2.1 Methodology

Along the Deer Valley Road Channel, the methodology used for the channel alternatives was normal depth analysis using Flowmaster (**Reference 3**). Flowmaster was used to estimate the proposed channel size west of the storm drain outfall at the intersection of Pima Road and the Deer Valley Road alignment to approximately 2700 feet west of the intersection. For all alternatives, the proposed condition flows, longitudinal slope, side slopes of the channel, depth for channel, Manning's roughness coefficient were entered into Flowmaster to estimate the channel size. Additionally, one foot of freeboard was included in the channel to develop the channels ultimate size. The normal depth output can be found in **Appendix G.**

The methodology used for the design of the flow control structures approximately 2300 feet west of Pima Road were analyzed as weir flow. Two different weir options were used together. The lower portion of the weir was assumed to be a trapezoidal weir that allowed the lower storm flows to flow through this opening. The upper portion is assumed to be a broad crested weir where the higher storm flows are conveyed over this area. For both weirs, the side slopes of the weirs are 4V:1H. The purpose of the two weirs together is to control the lower and higher storm flow split. The weir coefficients, the top length and height for both weirs were all used in the weir equations. The weir calculations can be found in **Appendix H**.

At the location of the existing box culvert approximately 2300 feet west of Pima Road, the methodology used was a part of the HEC-RAS V.3.1.1 (**Reference 6**) program. The type of culvert, culvert opening size, number of culverts, length of culvert, Manning's roughness coefficient of the culvert, and invert of the culvert were entered into HEC-RAS. The option in HEC-RAS for bridge modeling approach, which also applies to culverts, was used as follows: 1) for low flows, the methodologies used were energy and momentum; 2) and for high flows, the methods used were pressure and/or weir. This option allowed HEC-RAS to perform the hydraulic output based upon cross sections and the existing culvert location in the reach. This

output is a part of both the existing conditions (**Appendix F**) and the proposed conditions for the recommended alternative (**Appendix J**).

what conditions

An existing sedimentation basin located approximately 5000 feet west of Pima Road was reviewed to estimate the depth of flow over the basin and to locate the approximate outfall area. The methodology used to estimate these conditions was normal depth utilizing HEC-RAS V.3.1.1 (**Reference 6**). A cross section along the highest point of the basin on the southern edge was entered in HEC-RAS; Manning's roughness coefficient was entered; the proposed condition flow was entered; and the longitudinal slope was obtained from the topographic mapping. With the known input parameters, HEC-RAS was run and the normal depth output can be found along with the existing conditions (**Appendix F**) and the proposed conditions for the recommended alternative (**Appendix J**). Using the cross sections at the downstream end, the HEC-RAS output from both flow conditions was used to estimate the location of the outfall of the basin and the depth of flow over the outfall area.

Along the Deer Valley Road Channel, two separate hydraulic models were put together to estimate the existing conditions utilizing HEC-RAS V.3.1.1 (**Reference 6**). The first model is the eastern segment which is located just west of the intersection of Deer Valley Road alignment and Pima Road to approximately 2300 feet west of Pima Road. The second model is the western segment which is located approximately 2700 feet west of Pima Road to approximately 5000 feet west of Pima Road. The cross sections, thalweg, bank stations, and reach lengths were extracted from ArcGIS (**Reference 15**) using HEC-Geo RAS V.4.1.1 (**Reference 5**). HEC-GeoRAS is an ArcGIS extension that allows the geometry data to be extracted from GIS to be used in HEC-RAS. The tools within HEC-GeoRAS allow the user to create geometric data (cross sections, bank stations, river centerline, ineffective areas, levees, n-value boundaries, etc.). The extracted information was imported into HEC-RAS for further detailed modeling. This process was done for the existing conditions model along the Deer Valley Channel. This model was used for reviewing the existing drop structures, velocities, capacity of existing channel, and hydraulic depths. The existing condition models helped to propose channel geometries for the alternatives along the Deer Valley Road Channel and to place grade control structures. For additional discussion of the capacity of the existing conditions channels, see **Section 4.2.3**.

Lastly, for proposed storm drain (see Alternative 4) which runs longitudinally along the northside of the Deer Valley Road Channel, the methodologies used for the storm drain were both the direct step and standard step gradually varied flow methods using StormCad (**Reference 4**). The proposed pipe size, proposed condition flows, longitudinal slope, Manning's roughness coefficient were entered into StormCad to estimate the velocities and hydraulic grade lines. The boundary condition used was free outfall not to exceed one foot from top of pipe. Additionally, the hydraulic grade line was at least one foot below the existing grade at all locations of the pipe layout. The StormCad output can be found in **Appendix G**.

4.2.2 Survey

As part of the hydraulic analysis for this project, field survey data was obtained in April 2009 by Entellus for the area just west of the intersection of the Deer Valley Road alignment and Pima Road to approximately 5000 feet west of Pima Road. The purpose of the field survey

was to gather preliminary cross sectional information for hydraulic analysis, verify capacity of an existing sedimentation basin, and to obtain information on any existing structures within the project area. As part of the City's recommendation to create a more detailed hydraulic analysis in the Deer Valley Road Channel, a more detailed survey was obtained in July 2009 by Entellus. The detailed survey was gathered in the same area; therefore, better cross sectional information was obtained from the survey. Also the upstream and downstream location of the existing drop structures was obtained and is included in the hydraulic model.

The cross sectional data information was entered into HEC-RAS for hydraulic modeling purposes. The cross sections were obtained at a spacing of approximately 250 feet, except at locations of existing grade controls.

The existing sedimentation basin which is located approximately 5000 feet west of Pima Road along the Deer Valley Road alignment was surveyed. The footprint of the basin was surveyed and the surrounding area. The footprint of the basin allowed a calculation of the volume of the basin. The volume of the basin was calculated using the conic method as described in the HEC-1 manual (**Reference 9**). The provided volume calculated from the surveyed information was entered into the HEC-1 model; see **Section 4.1** for more information. The footprint of the basin was also reviewed to identify the location of the outfall. The outfall location was used to cut a cross section and entered into the HEC-RAS program for modeling purposes.

Only one existing structure approximately 2300 feet west of Pima Road along the Deer Valley Road alignment was surveyed. The existing structure is 1 - 10' x 5' box culvert which allows flow to move south through the culvert into the golf course. The dimensions and inverts of the existing culvert were entered into the HEC-RAS program for modeling purposes. As a part of this structure, the existing roadway was also surveyed at different locations along the road. The edges of road and the roadway centerline were surveyed. The points from the roadway were used in the HEC-RAS program for modeling purposes as part of the weir and pressure flow option.

The survey information along with supporting documentation is included in **Appendix D**.

4.2.3 Capacity of Existing Deer Valley Road Channel

A hydraulic analysis of the existing Deer Valley Road Channel was made. The channel was modeled using HEC-RAS and was used to estimate the existing capacity of the channel.

Two separate models were created for the Deer Valley Road Channel. The first model is the eastern segment, which is located just west of the intersection of Deer Valley Road alignment and Pima Road to approximately 2300 feet west of Pima Road. The second model is the western segment, which is located approximately 2700 feet west of Pima Road to approximately 5000 feet west of Pima Road. The boundary condition used for the eastern segment model was normal depth with a slope of 0.025 ft/ft for the downstream cross section and critical depth for the upstream cross section; and the boundary condition for the western segment model was normal depth with a slope of 0.015 ft/ft for the downstream cross section and critical depth for the upstream cross section. The Manning's roughness coefficient used was 0.045 for the main channel and both overbanks; and 0.065 for the main channel where the

existing drop structures are located both upstream and downstream to account for the rip-rap. Both models were run as mixed flow conditions to get a better representation of the hydraulic output within the channel segments. The information was reviewed and modified where needed.

The eastern segment of the Deer Valley Road Channel just west of the intersection of Pima Road and the Deer Valley Road alignment to approximately 2300 feet west of Pima Road was the first segment. The proposed flow of 1310 cfs was entered into the model to see if this segment of the channel could convey the proposed flows. The analysis reflected that this channel segment would not be able to convey the proposed flow with adequate freeboard. The next step was looking at the flows that could be conveyed in certain parts of the channel by using the flow distribution option in HEC-RAS. This flow distribution option allows the user to divide the cross section into segments by entering a number to slice the overbanks and/or channels. The number entered into HEC-RAS divides the overbanks or channels into these segments and calculates the hydraulic output for each segment. Therefore, using the initial flow of 1310 cfs only, the channel area was reviewed to see how much flow is within the channel. Then after reviewing the results of the flow distribution option at each cross section, the estimated flow was entered into HEC-RAS and run again. Through this trial and run process, it was estimated that the flow ranges for the eastern segment was between 50 cfs to 1310 cfs with little or no freeboard included. Therefore, it was concluded from this analysis that the entire eastern channel segment needed improvements.

The western segment of the Deer Valley Road Channel from approximately 2300 feet west of Pima Road to 5000 feet west of Pima Road was the second segment. First the proposed flows of 870 cfs and 1100 cfs were entered into the model to see if this segment of the channel would convey the proposed flows. The analysis reflected that the channel segment would be able to convey the proposed flows in the entire length of the western channel segment, except where the eastern segment ties into the western segment. This tie in location is from approximately 2300 feet west of Pima Road to 2700 feet west of Pima Road for a total length of 400 feet for improvements. Therefore, it was concluded from this that the western channel segment only needed improvements for 400 feet where the eastern channel segment transitions into the western channel segment to continue the conveyance of flow towards the western channel segment then eventually to the existing sediment basin 5000 feet west of Pima Road.

The output from the existing conditions model can be found in **Appendix F** and the HEC-RAS models for both reaches (eastern segment and western segment) can be found on the CD included in **Appendix L**. **Figure 2** shows the Deer Valley Road Improvement areas and **Figure 3** shows the future condition flows used in the hydraulic model.

P:\400\410061 nage\DV_PA\GIS\MXD\Figure2.mxd

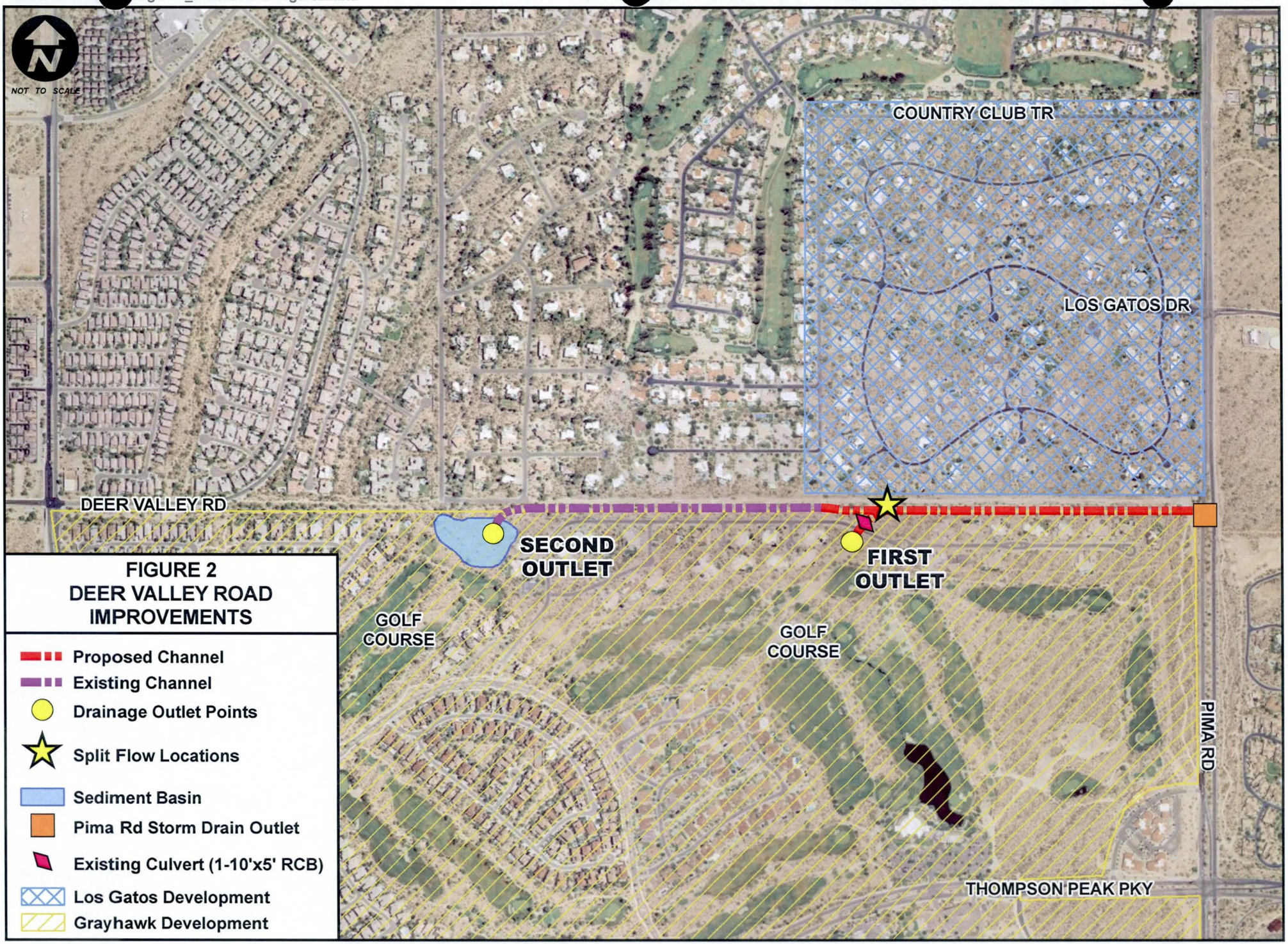


FIGURE 2
DEER VALLEY ROAD
IMPROVEMENTS

P:\400\410061a[illegible]nage\DV_PA\GIS\MXD\Figure3.mxd

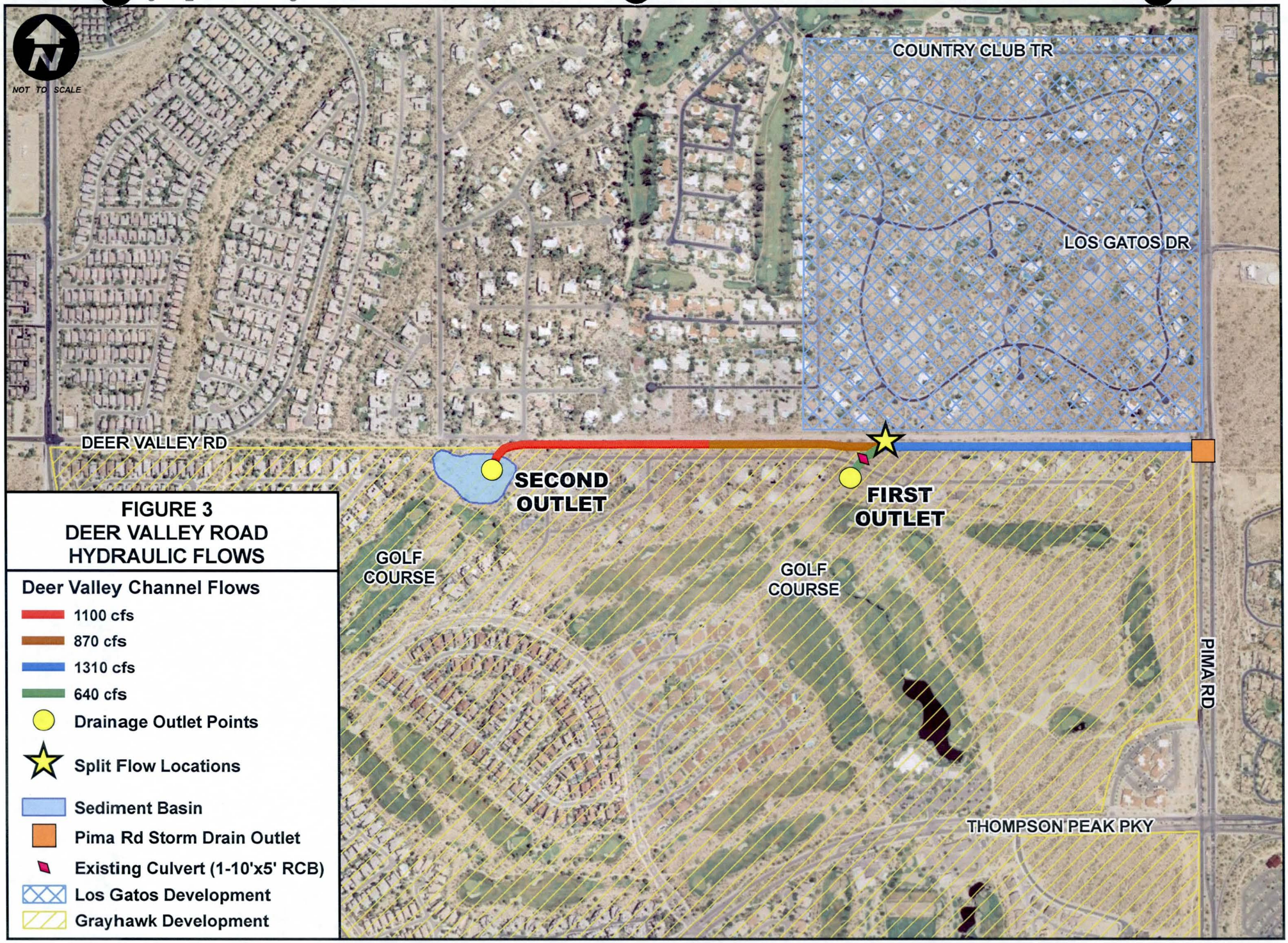


FIGURE 3
DEER VALLEY ROAD
HYDRAULIC FLOWS

4.3 SEDIMENTATION ANALYSIS

The purpose for this analysis is to present the findings of the sediment yield and scour analysis for the proposed Deer Valley Road Channel. Scour depths were evaluated for the 100-year, 6-hour flood event, whereas sediment yield was evaluated for:

2-year, 6 hour

100-year, 6-hour

annual average

At this point no sediment gradation analysis is available for the Deer Valley Road Channel. Thus, gradation test results from the Southwest Corner of Pima Road and Sierra Pinta Drive, approximately one mile south of the Deer Valley Road and Pima Road intersection, by Geotechnical Evaluation Pima Road Drainage Junction Structure Southwest Corner of Pima Road and Sierra Pinta Drive Scottsdale, AZ (**Reference 16**) were used. Even though it is expected that the soils in this area are similar in type, consisting mainly of clayey sand, it is recommended that gradation tests be performed at the locations of interest and scour depths be re-evaluated during the design. As part of the sedimentation analysis, the available gradation sample was obtained from a depth of 6 to 6.8 feet was used for the calculations. Any analytic results that show scour or degradation beyond the sample depth will require additional sampling to confirm. This is due to the fact that the soil gradation will probably differ as the soil depth is increased.

4.3.1 Methodology

4.3.1.1 Scour

The scour depth calculations follow procedures described in the *Arizona State Standard 5-96* (**Reference 12**) and *Arizona Floodplain Management Association (AFMA) Scour Analysis for Small to Mid-Size Desert Washes short course* (**Reference 11**).

The equilibrium (stable) slope was determined utilizing the Meyer-Peter, Muller methodology. Long term degradation was determined based on the calculated stable slopes and assuming that the existing drop structures would act as control elevations. The greatest distance between grade control structures was used to determine the long term degradation.

The channel general scour was calculated utilizing Lacey's equation, and the total scour was obtained by adding the long term degradation and general scour.

4.3.1.2 Sediment Loss

Sediment loss calculations follow the procedures described in the *Agricultural Handbook 537 (AH-537)* (**Reference 13**). The Universal Soil Loss Equation was utilized to estimate the sediment loss for the proposed Deer Valley Road Channel. Soil erodibility factor (K) (**Figure 5**) was obtained from SCS soil survey (AZ645). Additionally, the rainfall and runoff factor (R) was calculated using the 6-hour storm distribution (Pattern III) for Maricopa County. An

extension of ArcMap called Spatial Analyst was utilized to determine the average slope for each subarea (**Figure 6**) based on the DEM provided by the City.

4.3.2 Results of Analysis

Scour depth analysis for Deer Valley Road Channel was performed for both west (Slope=0.5%) and the east (Slope=0.7%) portions of the channel and is presented in **Table 1** below. The equilibrium (stable) slope for the channel was found to be a very mild 0.0003 ft/ft with the total scour depth of 3.12 and 4.08 feet for the west and east portions, respectively. The channel design discharge and depth were used in these calculations. Also, the greatest distance of 450 feet, between grade control structures was used. The distance between grade control structures for the existing channel ranges from 100 feet to 450 feet; therefore, the total scour depths should be smaller for some segments of the channel.

Table 1. Deer Valley Road Channel Total Scour

Deer Valley Road Channel			
ID	**West**	**East**	**Description**
K_{mpm}	0.19	0.19	Dimensionless coefficient
Q / Q_{bf}	1	1	Ratio of total flow to flow over the channel
Q [cfs]	1100	1310	Discharge, (cfs)
n_s	0.045	0.045	Manning's *n* for the stream bed
D_{90} [mm]	5	5	Bed sediment diameter for 90% finer
D_{50} [mm]	1	1	Mean sediment diameter
d [ft]	4	4	Mean depth
S_L [ft/ft]	**0.0003**	**0.0003**	Stable slope $S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D_{50}/d$
S_o [ft/ft]	0.005	0.007	Existing channel slope
S_L [ft/ft]	0.0003	0.0003	Equilibrium (Stable) slope
L [ft]	450	450	Distance between downstream control point and point of interest
y_{lt} [ft]	**2.12**	**3.02**	Long-term degradation $y_{lt} = (S_o - S_L) L$
L_f	1.76	1.76	Dimensionless Lacey's silt factor $L_f = 1.76(D_m)^{1/2}$
Q [cfs]	1100	1310	Design discharge
Ym [ft]	4.02	4.26	Mean water depth at design discharge $Y_m = 0.47 (Q/ L_f)^{1/3}$
D_m [mm]	1	1	Mean grain size of bed material
Z	0.25	0.25	Multiplying factor from Table 7
y_{gs} [ft]	**1.00**	**1.06**	General scour depth using Lacey's Equation $y_{gs} = Z(Y_m)$
y_{lt} [ft]	2.12	3.02	Long-term scour depth
y_{gs} [ft]	1.00	1.06	General scour depth
y_s [ft]	**3.12**	**4.08**	Total Scour depth $y_s = y_{lt} + y_{gs}$

Sediment loss calculations for the Deer Valley Road Channel are presented in **Table 2** below. It should be noted that the calculations presented in this report consider only local contributing area and do not include the sediment entering the channel from the Pima Road Storm Drain. Sediment loss analysis for Pima Road Channel and Storm Drain are presented in the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**). As shown in **Figure 7**, local contributing areas used for sediment loss calculation are

based on the proposed conditions HEC-1 hydrology model. Sediment loss was calculated for three alternatives:

- 2-year, 6-hour
- 100-year, 6 hour
- Annual average

Even though determining sediment loss for a specific storm event is not recommended by USDA (**Reference 13**); it is presented here as an additional analysis. For detail calculations of rainfall and runoff factor R and other reference materials, see **Appendix I**. The total sediment entering Deer Valley Road Channel from the local contributing area was found to be 111 tons annually. It is recommended that the channel be cleaned periodically and especially after significant storm events.

Table 2. Deer Valley Road Channel Soil Loss Analysis

Procedure follows USDA AH 537 - Predicting Railfall Erosion Losses, 1978							
Universal Soil Loss Equation (USLE) A = RKLSCP							
ID	**Area [acre]**	**$A_{annually}$ [tons/acre/year]**	**$A_{2\text{-}yr,6\text{-}hr}$ [tons/acre]**	**$A_{100\text{-}yr,6\text{-}hr}$ [tons/acre]**	**Soil $Loss_{annually}$ [tons]**	**Soil $Loss_{2\text{-}yr,6\text{-}hr}$ [tons]**	**Soil $Loss_{100\text{-}yr,6\text{-}hr}$ [tons]**
1	342.4	0.51	0.084	0.247	174.6	28.6	84.6
2	106.6	0.51	0.084	0.247	54.4	8.9	26.4

FIGURE 5 - SOIL ERODIBILITY FACTORS
SOIL LOSS ANALYSIS

DEER VALLEY CHANNEL PROJECT ASSESSMENT REPORT

P:\400\410061a\drainage\DV_PA\GIS\MXD\Fig 6 Soil Erodibility Factors.mxd

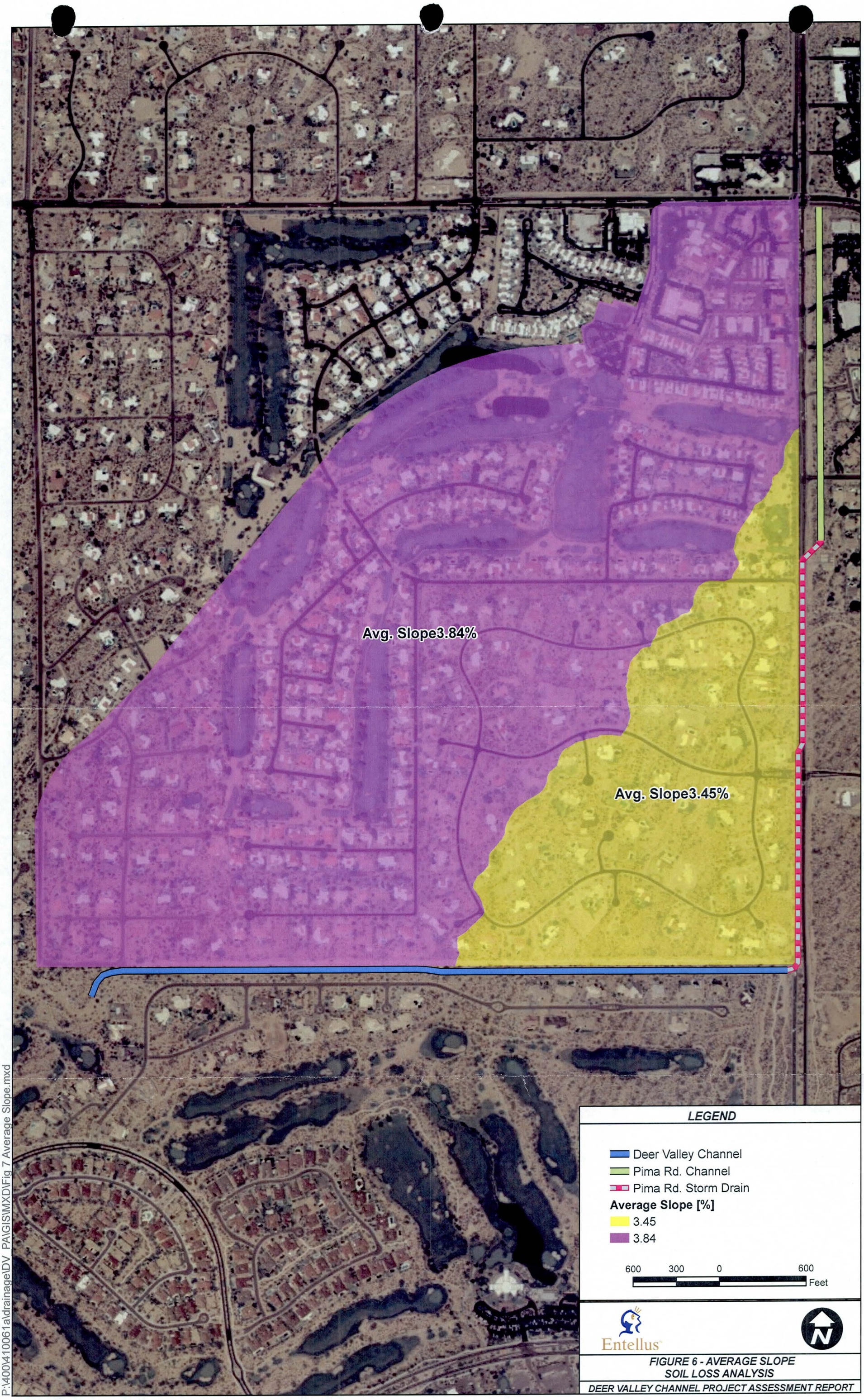


FIGURE 6 - AVERAGE SLOPE
SOIL LOSS ANALYSIS

DEER VALLEY CHANNEL PROJECT ASSESSMENT REPORT

P:\400\410061a\drainage\DV_PA\GIS\MXD\Fig 7 Average Slope.mxd

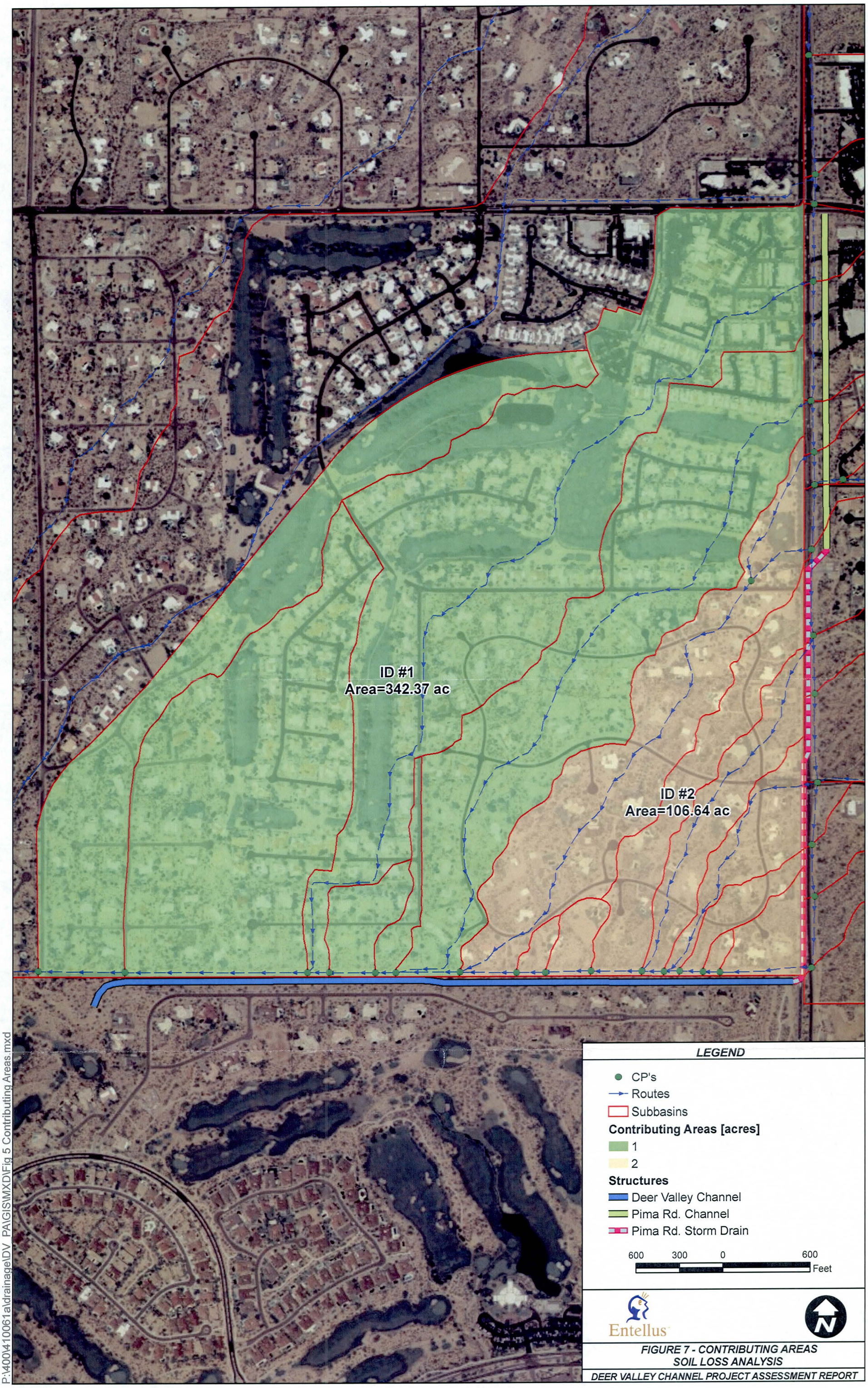


FIGURE 7 - CONTRIBUTING AREAS
SOIL LOSS ANALYSIS

DEER VALLEY CHANNEL PROJECT ASSESSMENT REPORT

P:\400\410061a\drainage\DV_PA\GIS\MXD\Fig 5 Contributing Areas.mxd

SECTION 5: ALTERNATIVES ANALYSIS

5.1 DEER VALLEY ROAD CHANNEL: PIMA ROAD TO DRAINAGE BASIN

As part of this study, alternative drainage solutions were developed and analyzed that comply with the City's Design Standards. The flows vary along the proposed Deer Valley Road Channel as shown in **Figure 3**. For all the alternatives, the flows shown in **Figure 3** were used in developing the alternatives. Descriptions of the alternatives are provided along with the results of the analysis for each alternative. Plan and profiles for each alternative can be found in **Appendix B**.

As part of the Pima Road improvements from Deer Valley Road to Pinnacle Peak Road, drainage improvements are planned to protect the new roadway from flooding. The improvements planned along this portion of Pima Road consist of storm drains, channels, and culverts which conveys the flow that impact the new roadway south along Pima Road from Pinnacle Peak Road to Deer Valley Road. For more information on the proposed drainage improvements along Pima Road, please see the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**).

The purpose of this study is to develop alternatives to convey the flow collected at the intersection of Pima Road and the Deer Valley Road alignment, as part of the Pima Road Improvements, west along the Deer Valley Road alignment to two outfall points which discharge into Grayhawk Golf Course (see **Figure 1**). The first discharge point is located approximately 2300 feet west of Pima Road just upstream of an existing 1 – 10' x 5' RCB culvert. The second is located approximately 5000 feet west of Pima Road. Both outlet points convey flow into the Grayhawk Golf Course.

A comparison of flows from current and previous studies at the two discharge points into the Grayhawk Golf Course was made. Additionally, flows moving south along Pima Road at the Deer Valley Road alignment were also compared. The studies compared for flows at each of these locations consisted of the following:

1. Existing condition flows without the wall along Los Gatos by Entellus (**Reference 10**)
2. Existing condition flows with the wall along Los Gatos by Entellus (**Reference 10**)
3. Addendum to Planning Unit Drainage Plan for Grayhawk Villages 2 and 3 by DEI (**Reference 2**)
4. Grayhawk Deer Valley Chanel Phase 2 – with Freeboard by PACE (**Reference 8**)
5. Grayhawk Deer Valley Channel Phase 2 – without Freeboard by PACE (**Reference 8**)

Figure 4 shows the results of this comparison of flows from these studies at each of these locations, see **Section 4.1**. From this comparison of flows, based on discussions with the City it was decided that Entellus will develop the Deer Valley Road alternatives using the flows identified at the two outlet points into the Grayhawk Golf Course based on the *Grayhawk Deer*

Valley Channel Phase 2 – without Freeboard by PACE. Therefore, all the Deer Valley Road alternatives were developed using a maximum flow at the discharge points into the golf course as follows:

- At the first outlet point (2300 feet west of Pima Road) – Q=640cfs
- At the second outlet point (5000 feet west of Pima Road) – Q=1110 cfs

The design criteria used to develop the alternatives consists of the following:

- Deer Valley East Channel - West of Pima Road to approximately 2300 feet west of Pima Road the flow used is Q=1310 cfs
- Deer Valley West Channel - Approximately 2300 feet west of Pima Road to approximately 2700 feet west of Pima Road the flows used is Q=870 cfs (*see hydrology output for this flow*)
- Earthen channels were sized with velocities generally less than 6 ft/s
- Lined channels were sized with velocities generally less than 10 ft/s
- Side slopes of unprotected earthen channels were set at 1V:4H
- Side slopes of protected earthen channels were set at 1V:2H
- Side slopes of lined channels were set at 1V:1H
- Maximum channel depth was set at 4 feet
- All channels were sized to have 1 foot of freeboard
- The drop across a grade control structure was limited to a maximum of 4 feet
- The total scour depth used in developing the alternatives was a maximum of 4.1 feet

5.1.1 Alternative 1

5.1.1.1 Alternative Description

This alternative involves constructing new channels that will replace the existing channel from the Pima Road and Deer Valley Road alignment west to approximately 2700 feet west of Pima Road, installing flow control structures at approximately 2300 feet west of Pima Road to control flow splits, and installing grade control structures at various locations to control velocities within the improved channel areas. Also, this alternative will utilize the existing channel from approximately 2700 feet to 5000 feet west of Pima Road.

At the intersection of Pima Road and Deer Valley Road alignment at the outfall of the Pima Road storm drain, flow is conveyed in a proposed landscaped earthen channel to approximately 2300 feet until it reaches a flow control structure. At 2300 feet west, two flow control structures are proposed to control the flow going south towards the golf course and west towards the Deer Valley Road Channel. The first flow control structure allows 640 cfs of the 1310 cfs to split from the Deer Valley Road Channel and flow through and over the existing 1-10' x 5' RCB culvert into the golf course. Currently, there is an existing grade control structure at this location, but the existing grade control structure will be replaced with a new flow control structure based upon the proposed flow splits, channel grades, and channel geometry. The second flow control structure, located approximately 2300 feet west of Pima Road on the proposed Deer Valley Road Channel, will convey 670 cfs to the west. Although the flow split of 670 cfs occurs at this location, the channel from approximately 2300 feet to

2700 feet west is designed for a flow of 870 cfs. The flow of 870 cfs was used for the design of the new channel segment to be conservative in order to convey the offsite flow coming in from the north. This new channel segment ties into the existing channel approximately 400 feet west of the second flow control structure location. At this location, the existing channel continues west approximately 2700 feet to an existing sedimentation basin located approximately 5000 feet west of Pima Road. This existing channel will remain since the existing channel has adequate capacity to convey the proposed flows with one foot of freeboard. The flow in the existing channel discharges into the existing sedimentation basin that will overtop on the southern edge and flow into the golf course.

A total of four (4) grade control structures are placed in the improved channel areas. Rip-rap is placed immediately upstream and downstream of the grade controls for channel protection.

5.1.1.2 Alternative Analysis

For this alternative, there are two main channel sections proposed for the improved channel area along the Deer Valley Road alignment. The first section from the intersection of Pima Road and the Deer Valley Road alignment to approximately 2300 feet west, the new channel is a landscaped earthen trapezoidal channel with a bottom width of 44 feet. The total top width including freeboard is 82 feet. The flow used for this channel is 1310 cfs. The Manning's roughness used for this channel is 0.045 for the channel and both overbanks. The velocity of this new channel is 5.8 ft/s with a longitudinal slope of 0.007 ft/ft.

The second proposed channel section runs from approximately 2300 feet west of Pima Road to 2700 feet west of Pima Road. This new channel section is a landscaped earthen trapezoidal channel with a bottom width of 27 feet. The total top width including freeboard is 65 feet. The flow used for this channel is 870 cfs. The Manning's roughness used for this channel is 0.045 for the channel and both overbanks. The velocity of this new channel is 5.5 ft/s with a longitudinal slope of 0.007 ft/ft.

Both channel configurations have side slopes of 1V:4H on both sides of the channel; and a depth of 4 feet with 1 foot of freeboard for a total height of 5 feet. At the proposed grade control structure locations, rip-rap is placed immediately upstream and downstream of the control structure for channel protection. Additional rip-rap is placed at various locations where offsite flow from the north come into the improved channel areas.

Figure 3 shows the flows used for each channel segment and the normal depth outputs for this alternative are found in **Appendix G**.

5.1.1.3 Alternative Cost

For this alternative, a preliminary construction cost estimate was prepared. Most of the costs associated with this alternative for the improved channel areas are: clearing and grubbing, excavation and fill, rip-rap protection for grade controls, removing and relocating of the existing utilities, and landscaping and irrigation. The total estimated cost for this alternative is $0.58M. For a more detailed breakdown of the costs, see **Appendix K**.

5.1.1.4 Alternative Pros and Cons

Based on the analysis of this proposed alternative, the following pros and cons were identified:

- Pros

  1. This alternative is a landscaped trapezoidal channel section that is similar to the existing channel section in character, slope and vertical drops.
  2. This alternative allows more landscaping of the channel section and minimizes the use of rip-rap.
  3. This alternative is the lowest in cost of the alternatives developed.
  4. Maintenance by the HOA would be similar to that of the existing channel.
  5. This alternative has a flow depth and velocity comparable to the existing channel

- Cons

  1. This alternative will disturb a larger area than the other alternatives resulting in a larger area to be re-landscaped.
  2. This alternative requires more grading which could result in greater impacts to the adjoining residences due to construction noise and dust.
  3. This alternative may require use of some of the existing ROW on the Deer Valley Road alignment.

5.1.2 Alternative 2

5.1.2.1 Alternative Description

This alternative, as with Alternative 1, involves constructing new channels that will replace the existing channel from the Pima Road and Deer Valley Road alignment west to approximately 2700 feet west of Pima Road, installing flow control structures at approximately 2300 feet west of Pima Road to control flow splits, and installing grade control structures at various locations to control velocities within the improved channel areas. Also, as with Alternative 1, this alternative will utilize the existing channel from approximately 2700 feet to 5000 feet west of Pima Road.

At the intersection of Pima Road and Deer Valley Road alignment at the outfall of the Pima Road storm drain, flow is conveyed in a proposed channel consisting of a rip-rap lining on the south bank and a landscaped earthen channel for both the main channel and the north bank approximately 2300 feet west until it reaches a flow control structure. At 2300 feet west, two flow control structures are proposed to control the flow going south towards the golf course and west towards the Deer Valley Road Channel. The first flow control structure allows 640 cfs of the 1310 cfs to split from the Deer Valley Road Channel and flow through and over the existing 1-10' x 5' RCB culvert then into the golf course. Currently, there is an existing grade control structure at this location, but the existing grade control structure will be replaced with a new flow control structure based upon the proposed flow splits, channel grades, and channel geometry. The second flow control structure is approximately 2300 feet west of Pima Road on the proposed Deer Valley Road Channel which will convey 670 cfs to the west. Although the flow split of 670 cfs occurs at this location, the channel from approximately 2300 feet to 2700 feet west is designed for a flow of 870 cfs. The flow of 870 cfs was used for the design

of this channel segment to be conservative in order to convey the offsite flow coming in from the north. This new channel segment ties into the existing channel 400 feet west of the second flow control structure location. At this location, the existing channel continues west to an existing sedimentation basin located approximately 5000 feet west of Pima Road. This existing channel will remain since the existing channel has adequate capacity to convey the proposed flows with one foot of freeboard. The flow in the existing channel discharges into the existing sedimentation basin that will overtop on the southern edge and flow into the golf course.

A total of four (4) grade control structures are placed in the improved channel areas. Rip-rap is placed immediately upstream and downstream of the grade control structures and on the south bank for erosion protection.

5.1.2.2 Alternative Analysis

For this alternative, there are two main channel sections proposed for the improved channel area along the Deer Valley Road alignment. The first section from the intersection of Pima Road and the Deer Valley Road alignment to approximately 2300 feet west, the new channel consisting of a rip-rap lining on the south bank and a landscaped earthen channel for both the main channel and the north bank with a bottom width of 48 feet. The total top width including freeboard is 78 feet. The flow used for this channel is 1310 cfs. The Manning's roughness used is 0.045 for the channel and for the north bank. The Manning's roughness used for the south bank is 0.055. The velocity of this new channel is 5.7 ft/s with a longitudinal slope of 0.007 ft/ft.

The second proposed channel section runs from approximately 2300 feet west to 2700 feet west of Pima Road. This new channel section consists of a rip-rap lining on the south bank and a landscaped earthen channel for both the main channel and the north bank with a bottom width of 32 feet. The total top width including freeboard is 62 feet. The flow used for this channel is 870 cfs. The Manning's roughness used is 0.045 for the channel and for the north bank. The Manning's roughness used for the south bank is 0.055. The velocity of this new channel is 5.4 ft/s with a longitudinal slope of 0.007 ft/ft.

The first and second channel configurations have side slopes of 1V:4H on the north side and 1V:2H on the south side of the channel; and a depth of 4 feet with 1 foot of freeboard for a total height of 5 feet. At the proposed grade control structure locations, rip-rap is placed immediately upstream and downstream of the control structure for channel protection. Additional rip-rap is placed at various locations where offsite flow from the north come into the improved channel areas and along the south bank.

Figure 3 shows the flows used for each channel segment and the normal depth outputs for this alternative are found in **Appendix G**.

5.1.2.3 Alternative Cost

For this alternative, a preliminary construction cost estimate was prepared. Most of the costs associated with this alternative for the improved channel areas are: clearing and grubbing, excavation and fill, rip-rap protection for grade controls and south bank, removing and relocating of the existing utilities, and landscaping and irrigation. The total estimated cost for this alternative is $0.69M. For a more detailed breakdown of the costs, see **Appendix K**.

5.1.2.4 Alternative Pros and Cons

Based on the analysis of this proposed alternative, the following pros and cons were identified:

- Pros

  1. A portion of the proposed channel section for this alternative is a landscaped trapezoidal channel section (the main channel and north bank) which is similar to the existing channel section in character, slope and vertical drops.
  2. This alternative has a protected side slope on the southern side of the channel to protect against erosion and scour.
  3. This alternative has landscaping on the north side slope of the channel section.
  4. Maintenance by the HOA would be similar to that of the existing channel.
  5. This proposed alternative fits within the existing drainage easement.

- Cons

  1. This alternative ranks 2nd highest in cost of the alternatives developed.
  2. This alternative has a protected side slope on the southern side of the channel which results in a large area to be rip-rap.
  3. This alternative ranks 2nd highest in the amount of grading required for the proposed channel which could impact adjoining residences due to construction noise and dust.
  4. This alternative eliminates landscaping on the south bank of the channel which will increase visibility of the channel to the adjoining residences.

5.1.3 Alternative 3

5.1.3.1 Alternative Description

This alternative involves constructing new lined channels that will replace the existing channel from the Pima Road and Deer Valley Road alignment west to approximately 2700 feet west of Pima Road, installing flow control structures at approximately 2300 feet west of Pima Road to control flow splits, and installing grade control structures at various locations to control velocities within the improved channel areas. Also, as with Alternatives 1 and 2, this alternative will utilize the existing channel from approximately 2700 feet to 5000 feet west of Pima Road.

At the intersection of Pima Road and Deer Valley Road alignment at the outfall of the Pima Road storm drain, flow is conveyed in a proposed lined channel (colored concrete) to approximately 2300 feet until it reaches a flow control structure. At 2300 feet west two flow control structures are proposed to control the flow going south towards the golf course and west towards the Deer Valley Road Channel. The first flow control structure allows 640 cfs of the 1310 cfs to split from the Deer Valley Road Channel and flow through and over the existing 1-10' x 5' RCB culvert then into the golf course. Currently, there is an existing grade control structure at this location, but the existing grade control structure will be replaced with a new flow control structure based upon the proposed flow splits, channel grades, and channel geometry. The second flow control structure is approximately 2300 feet west of Pima Road on the proposed Deer Valley Road Channel which will convey 670 cfs to the west. Although

the flow split of 670 cfs occurs at this location, the channel from approximately 2300 feet to 2700 feet west is designed for a flow of 870 cfs. The flow of 870 cfs was used for the design of this channel segment to be conservative in order to convey the offsite flow coming in from the north. This new channel segment ties into the existing channel 400 feet west of the second flow control structure location. The location where the new lined channel ties into the existing channel will be protected with rip-rap on the bottom of the existing channel for approximately 20 feet downstream to protect against the high velocities in the lined channel. This protection will allow the flows to decrease in velocities and minimize the threat of scour and erosion in the existing channel. At this location, the existing channel continues west to an existing sedimentation basin located approximately 5000 feet west of Pima Road. This existing channel will remain since the channel has adequate capacity to convey the proposed flows with one foot of freeboard. The flow in the existing channel discharges into the existing sedimentation basin which will overtop on the southern edge and flow into the golf course.

A total of five (5) grade control structures are placed in the improved channel areas. Rip-rap is placed immediately upstream and downstream of the grade controls for channel protection.

5.1.3.2 Alternative Analysis

For this alternative, there are two main channel sections proposed for the improved channel area along the Deer Valley Road alignment. The first section from the intersection of Pima Road and the Deer Valley Road alignment to approximately 2300 feet west, the new channel is a lined trapezoidal channel with a bottom width of 50 feet. The total top width including freeboard is 60 feet. The flow used for this channel is 1310 cfs. The Manning's roughness used is 0.025 for the channel and both overbanks. The velocity of this new channel is 9.4 ft/s with a longitudinal slope of 0.005 ft/ft.

The second proposed channel section runs from approximately 2300 feet west of Pima Road to 2700 feet west of Pima Road. This new channel section is a lined trapezoidal channel with a bottom width of 33 feet. The total top width including freeboard is 43 feet. The flow used for this channel is 870 cfs. The Manning's roughness used is 0.025 for the channel and both overbanks. The velocity of this new channel is 8.9 ft/s with a longitudinal slope of 0.005 ft/ft.

Both channel configurations have side slopes of 1V:1H on both sides of the channel; and a depth of 4 feet with 1 foot of freeboard for a total height of 5 feet. A large amount of rip-rap is placed at the bottom of the earthen channel where the new lined channel ties into the existing channel approximately 2700 feet west of Pima Road. Additional rip-rap is placed at various locations where offsite flow from the north come into the improved channel areas.

Figure 3 shows the flows used for each channel segment and the normal depth outputs for this alternative are found in **Appendix G**.

5.1.3.3 Alternative Cost

For this alternative, a preliminary construction cost estimate was prepared. Most of the costs associated with this alternative for the improved channel areas are: clearing and grubbing, excavation and fill, concrete lining, rip-rap protection on the existing channel from approximately 2700 feet west of Pima Road to the existing sedimentation basin, and removing and relocating of the existing utilities. The total estimated cost for this alternative is $1.34M. For a more detailed breakdown of the costs, see **Appendix K**.

5.1.3.4 Alternative Pros and Cons

Based on the analysis of this proposed alternative, the following pros and cons were identified:

- Pros

  1. This alternative will provide the greatest protection for the channel against erosion and scour in the lined channel areas.
  2. This alternative will require the smallest area for construction.
  3. This alternative reduces the amount of landscaping thus reducing landscaping maintenance.

- Cons

  1. This alternative does not have any landscaping for the improved channel areas.
  2. This alternative is ranked the highest in cost as compared to Alternatives 1, 2, and 4.
  3. This alternative doesn't fit the character of the current existing channel or surrounding.
  4. This alternative eliminates landscaping on both the north and south sides which will make the drainage facilities more noticeable.
  5. Maintenance cost will increase over time due to the large amount of concrete.
  6. This alternative will take longer to construct resulting in more disturbances to the adjoining residences.

5.1.4 Alternative 4

5.1.4.1 Alternative Description

This alternative involves constructing new channels that will replace the existing channel from the Pima Road and Deer Valley Road alignment west to approximately 2700 feet west of Pima Road, installing a storm drain pipe just west of the intersection to approximately 2300 feet west of Pima Road, installing flow control structures at approximately 2300 feet west of Pima Road to control flow splits, and installing grade control structures at various locations to control velocities within the improved channel areas. Also, as with Alternatives 1, 2, and 3, this alternative will utilize the existing channel from approximately 2700 feet to 5000 feet west of Pima Road.

At the intersection of Pima Road and Deer Valley Road alignment at the outfall of the Pima Road storm drain, flow is conveyed in a proposed landscaped earthen channel and storm drain to approximately 2300 feet until it reaches a flow control structure. At 2300 feet west, two flow control structures are proposed to control the flow going south towards the golf course and west towards the Deer Valley Road Channel. The first flow control structure allows 640 cfs of the 1310 cfs to split from the Deer Valley Road Channel and flow through and over the existing 1-10' x 5' RCB culvert then into the golf course. Currently, there is an existing grade control structure at this location, but the existing grade control structure will be replaced with a new flow control structure based upon the proposed flow splits, channel grades, and channel geometry. The second flow control structure is approximately 2300 feet west of Pima Road on the proposed Deer Valley Road Channel which will convey 670 cfs to the west. Although

the flow split of 670 cfs occurs at this location, the channel from approximately 2300 feet to 2700 feet west is designed for a flow of 870 cfs. The flow of 870 cfs was used for the design of the new channel segment to be conservative in order to convey the offsite flow coming in from the north. This new channel segment ties into the existing channel 400 feet west of the second flow control structure location. At this location, the existing channel continues west to an existing sedimentation basin located approximately 5000 feet west of Pima Road. This existing channel will remain since the existing channel has adequate capacity to convey the proposed flows with one foot of freeboard. The flow in the existing channel discharges into the existing sedimentation basin which will overtop on the southern edge and flow into the golf course.

Approximately 175 feet west of the intersection, of Pima Road and Deer Valley Road alignment, a proposed 60" storm drain pipe is designed to convey 240 cfs. The purpose of the storm drain pipe is to reduce the proposed channel size. The outlet of the storm drain pipe is placed where the flow control structure along the Deer Valley Road Channel is proposed approximately 2700 feet west of Pima Road. Downstream of the storm drain outlet is protected by rip-rap for channel protection.

A total of four (4) grade control structures are placed in the improved channel areas. Rip-rap is placed immediately upstream and downstream of the grade controls for channel protection.

5.1.4.2 Alternative Analysis

For this alternative, there are two main channel sections proposed for the improved channel area along the Deer Valley Road alignment and a storm drain pipe that runs along the north side of the proposed channel. The first section from the intersection of Pima Road and the Deer Valley Road alignment to approximately 2300 feet west, the new channel is a landscaped earthen trapezoidal channel with a bottom width of 36 feet. The total top width including freeboard is 76 feet. The flow used for this channel is 1110 cfs. The Manning's roughness used for this channel is 0.045 for the channel and both overbanks. The velocity of this new channel is 5.7 ft/s with a longitudinal slope of 0.007 ft/ft.

The second proposed channel section runs from approximately 2300 feet west of Pima Road to 2700 feet west of Pima Road. This new channel section is a landscaped earthen trapezoidal channel with a bottom width of 27 feet. The total top width including freeboard is 67 feet. The flow used for this channel is 870 cfs. The Manning's roughness used for this channel is 0.045 for the channel and both overbanks. The velocity of this new channel is 5.5 ft/s with a longitudinal slope of 0.007 ft/ft.

Both channel configurations have side slopes of 1V:4H on both sides of the channel; and a depth of 4 feet with 1 foot of freeboard for a total height of 5 feet. At the proposed grade control structure locations, rip-rap is placed immediately upstream and downstream of the control structure for channel protection. Additional rip-rap is placed at various locations where offsite flow from the north come into the improved channel areas.

The proposed storm drain pipe is 60 inches in diameter and is 1980 feet in length. The inlet of the storm drain pipe is approximately 175 feet west of Pima Road; and the outlet is approximately 2300 feet west of Pima Road. The longitudinal slope of the storm drain pipe varies from 0.004 ft/ft to 0.008 ft/ft; with velocities that vary from 12.2 ft/s to 13.7 ft/s,

Figure 3 shows the flows used for each channel segment; and the normal depth outputs and storm drain outputs for this alternative are found in **Appendix G**.

5.1.4.3 Alternative Cost

For this alternative, a preliminary construction cost estimate was prepared. Most of the costs associated with this alternative for the improved channel areas are: clearing and grubbing, excavation and fill, rip-rap protection for grade controls, concrete pipe, removing and relocating of the existing utilities, and landscaping and irrigation. The total estimated cost for this alternative is $1.16M. For a more detailed breakdown of the costs, see **Appendix K**.

5.1.4.4 Alternative Pros and Cons

Based on the analysis of this proposed alternative, the following pros and cons were identified:

- Pros
  1. This alternative is a landscaped trapezoidal channel section that is similar to the existing channel section in character, slope and vertical drops.
  2. This alternative allows more landscaping of the channel section and minimizes the use of rip-rap.
  3. Maintenance by the HOA would be similar to that of the existing channel.

- Cons
  1. This alternative is the 2nd highest in cost of the alternatives developed.
  2. This alternative will take longer to construct resulting in more disruption to the adjoining residences.
  3. This alternative requires more grading which could impact adjoining residences due to construction noise and dust.
  4. This alternative would require maintenance of the storm drain pipe.
  5. This alternative ranks 2nd in disturbance of the area.

5.2 COST ESTIMATES

For the Deer Valley Road Channel alternatives, a preliminary construction cost estimate was prepared for each alternative to compare costs. **Table 3** shows the estimated costs for each alternative. . A contractor (Knochel Bros, Inc.) was contacted to provide Entellus with some costs associated with earthwork. For more information regarding the detailed breakdown of the costs, see **Appendix K**.

Table 3. Deer Valley Road Channel Alternatives Cost Estimates

Alternative 1	$ 0.58 M
Alternative 2	$ 0.69 M
Alternative 3	$ 1.34 M
Alternative 4	$ 1.16 M

SECTION 6: LANDSCAPING

6.1 DEER VALLEY ROAD CHANNEL: PIMA ROAD TO DRAINAGE BASIN

This section of Pima Road and the abutting development is subject to City scenic corridor guidelines and requirements. The City requires disturbance areas such as the channel improvements to be stabilized and replanted in a natural manner as part of construction activities within the scenic corridor. The landscape for these channel improvements will be a combination of salvaged site soils; nursery grown container native shrubs, cactus, and trees; and native seed mix. Salvaged on-site native trees and cactus will also be reused in the up-slope and perimeter landscape areas where possible. The native seeding will occur along the channel bottom and sides in the alternatives with natural material slopes. A temporary drip irrigation system will be provided for the container and salvaged plants for an up to 3-year establishment period that allows for the gradual reduction of irrigation over time thus acclimatizing the plants to natural rainfall conditions. The cross sections represent the landscape intent of the improvements and these can be found in **Appendix C**.

The following are a list of proposed plants for the project area:

	Proposed Plant List					
	Botanical Name	**Common Name**	**Height**	**Width/Spread**		**Color**
	Trees					
1	Cercidium floridum	Blue Palo Verde	20	25		grn/ylw
2	Olneya tesota	Desert Ironwood	20	25		grn
4	Prosopis velutina	Native Mesquite	20	20		grn
5	Cercidium microphyllum	Little Leaf Palo Verde	15	15		grn/ylw
6	Chilopsis linearis	Desert Willow	15	15		grn/purp
	Shrubs					
1	Ambrosia deltoidea	Triangle-leaf Bursage	18"	2		bgrn
2	Callandra eriophylla	Pink Fairy Duster	3	3		pink
4	Encelia farinosa	Brittlebush	3	3		ylw
5	Erigonum fasciculatum var. poliofolium	Flattop Buckwheat	18"	3		wht
6	Justicia californica	Chuparosa	3	4		rd
7	Larrea tridentata	Creosote	5	5		ylw
8	Simmondsia chinensis 'Vista'	Compact Jojoba	4	4		grn

	Proposed Plant List					
	Accents					
4	Asclepias subulata	Desert Milkweed	4	3		grn/ylw
5	Carnegiea gigantea	Saguaro	12+	n/a		grn
6	Dasylirion acrotriche	Green Desert Spoon	4	4		grn
7	Echinocereus engelmannii	Hedgehog Cactus	12"	12"		pink
8	Euphorbia antisyphilitica	Wax Plant	2	3		grn
9	Ferocactuscylindraceus	Fishhook Barrel	2 to 5	n/a		grn/rd
10	Fouquieria splendens	Ocotillo	10	6		grn/org
11	Opuntia basilaris	Beavertail Pricklypear	12"	3		grn/purp
12	Thamnosma montana	Turpertine Broom	18"	3		grn
	Groundcovers					
1	Baileya multiradiata	Desert Marigold	18"	12"		bg/ylw
3	Hechtia montana	Sonoran Hechtia	12"	3		grn
4	Penstemon eatonii	Firecracker Penstemon	18"	18"		rd
5	Psilostophe cooperi	Paperflower	18"	2		wht

6.2 Access Roads and Trails

As part of the alternatives presented in this report, the access roads and trails will be kept. The only modification will be the area of the proposed storm drain outfall at the intersection of Pima Road and Deer Valley Road alignment; and approximately 2300 feet west of Pima Road to 2700 feet west of Pima Road to tie the two channels together. The final concept of the trail modification areas will be a part of the final construction documents when an alternative is selected by the City.

SECTION 7: STORM DRAIN OUTFALL AND FLOW CONTROL STRUCTURES AND GRADE CONTROL STRUCTURES

7.1 STORM DRAIN OUTFALL

As part of the Pima Road improvements from Deer Valley Road to Pinnacle Peak Road drainage improvements the flow is discharged at the intersection of Pima Road and the Deer Valley Road alignment, also see the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**). The flow from the storm drain pipes at this location is 1260 cfs. In order to convey the flow from the storm drain pipes towards the Deer Valley Road Channel, a storm drain outfall is proposed at this location to direct the flow west towards the channel. The storm drain outfall (headwall and wingwalls) structure meets the City's design standards and is protected at the downstream end with rip-rap to protect the channel from high velocities. See Exhibit A – Detail No. 1 located in **Appendix B** for details of this structure.

7.2 FLOW CONTROL STRUCTURES

Two flow control structures are proposed approximately 2300 feet west of Pima Road. The purpose of the flow control structures is to control the flow split going south into the golf course and west in the Deer Valley Road Channel. For both flow control structures, a broad crested weir is proposed that would convey the higher storm flows, but for the lower storm flows a trapezoidal weir is proposed. The details for both structures are located in **Appendix B**, see Exhibit A - Detail No. 3. At both flow control structures, rip-rap is placed immediately upstream and downstream of the structure for channel protection.

A stage – discharge relationship was used to estimate the lower flows going through the trapezoidal weir and the higher flows over and through the broad crested weir area. The calculations used to design the two flow control structures are found in **Appendix H**.

For Alternatives 1, 2, and 4 the two flow control structures will be constructed using rip-rap. For Alternative 3, the flow control structures will use the same concrete lining as the proposed channel. For all alternatives, the design intent of the flow control structures will be the same; the only difference is the type of material used for the structures.

7.3 GRADE CONTROL STRUCTURES

For Alternatives 1, 2, and 4, grade control structures are proposed in the channel along the Deer Valley Road alignment, see Exhibit A - Detail No. 2 located in **Appendix B**. For these alternatives, at the proposed grade control locations rip-rap is placed immediately upstream and downstream of the structure for channel protection. For Alternative 3, the grade control structures will use the same concrete lining as the proposed channel. The purpose for the grade control structures in all alternatives is to reduce the slope of the proposed channels to control velocities.

From the July 2009 survey, more detailed information was obtained on the existing grade control structures. Therefore, this survey information at the upstream and downstream locations of the

existing grade controls was used in the HEC-RAS model. Cross sections were cut and modeled as part of the existing conditions model. In Alternatives 1 through 4, the existing channel from approximately 2700 feet to 5000 feet west of Pima Road and existing grade controls will be left undisturbed. A field visit verified that these structures would adequately convey the flows to the existing sedimentation basin.

For the recommended alternative, a detailed HEC-RAS hydraulic analysis which includes the grade control structure was performed (see **Section 8.3**). A detailed analysis was performed that includes the grade control structures in a hydraulic model for the recommended alternative (see **Section 8**).

SECTION 8: RECOMMENDED SOLUTIONS

8.1 RECOMMENDED ALTERNATIVE FOR DEER VALLEY ROAD CHANNEL

For the Deer Valley Road Channel, Entellus recommends Alternative 1. This alternative is recommended because of the following reasons:

1. This alternative effectively and safely conveys the needed flows to the appropriate outfalls.
2. This alternative is the lowest cost of all alternatives that were evaluated.
3. This alternative appears to best fit with the surrounding environment and development.
4. This alternative most closely matches the channel that currently exists in this area.
5. Maintenance of the recommended alternative by the HOA will closely match what maintenance the HOA currently performs on the existing channel.
6. This alternative closely matches the existing conditions; therefore, any of the sedimentation and scour which occurs will be similar to the existing channel.

Additionally, as part of this recommended alternative, Entellus recommends that Grayhawk Golf Course and HOA be contacted to discuss this alternative and to obtain their input. Also, it is recommended that the capacity of the golf course to convey the planned flows be confirmed.

8.2 Recommended Improvements to the Existing Western Channel

The following section explains the recommended channel improvement on the existing channel areas from approximately 2700 feet west to 5000 feet west of Pima Road.

Based on more detailed survey information, Entellus determined the existing channel from 2700 feet to 5000 feet west of Pima Road has adequate capacity to convey the required flows. Also, from a field visit, it was found that the existing grade control structures, the offsite flow rip-rap protection, the existing channel bottom and banks, and the outfall into the sedimentation basin were generally in good condition. However, there are a few areas from approximately 3300 feet west of Pima Road to the sedimentation basin where some scour and erosion on the north bank is occurring. From the field visit, six areas were identified to be improved (see **Figure 8** for the locations of improvements). The improvements in these six areas are mainly installing rip-rap to safely convey the offsite flow into the channel without creating scour or erosion on the channel side slopes.

Also, as a result of this field visit, it was concluded that no maintenance access ramps will be proposed in the entire length of the Deer Valley Road Channel, since they currently don't exist and the HOA appears to access the channel from the existing side slope. Additionally, the access

ramps were not included because of the additional impacts to the aesthetics that constructing the ramps would cause.

8.3 HEC-RAS Model for Recommended Alternative

The purpose of this analysis was to determine the affects of the recommended Alternative 1. The Deer Valley Road Channel at the intersection of Pima Road and the Deer Valley Road alignment to approximately 2700 feet west of Pima Road has new channel improvements as shown in Alternative 1. The existing Deer Valley Road Channel at approximately 2700 feet west of Pima Road to approximately 5000 feet west of Pima Road is kept undisturbed since this channel can convey the proposed flows with no improvements. At approximately 2300 feet west of Pima Road, there is a flow control structure that allows flows to move west towards the Deer Valley Road Channel and south towards the existing box culvert (1 – 10' x 5'). All these channel configurations, flow control structures, grade controls structures immediately upstream and downstream, and one culvert are modeled in HEC-RAS.

8.3.1 Method Description

The hydraulic conditions of the Deer Valley Road Channel were analyzed using HEC-Geo RAS V.4.1.1 (**Reference 5**). HEC-GeoRAS is an ArcGIS extension that allows the geometry data to be extracted from GIS to be used in HEC-RAS V.3.1.3 (**Reference 6**). The tools within HEC-GeoRAS allow the user to create geometric data (cross sections, bank stations, river centerline, ineffective areas, levees, n-value boundaries, etc.). The extracted information was imported into HEC-RAS for further detailed modeling. The information was reviewed and modified where needed. This process was done for the recommended alternative model.

Cross sections were cut approximately 250 feet apart from both the April and July 2009 survey data, except where grade control structures are placed. The aerial photographs from both the City and ESRI along with the survey information were used to locate the critical areas for cross sections. The expansion contraction coefficients used were 0.1 and 0.3, respectively, throughout the channel; except at the culvert and flow control structure locations where 0.3 and 0.5 were used at the culvert location and 0.2 and 0.4 were used at the flow control structures, respectively. The reach lengths were measured from the base map with the aid of HEC-GeoRAS and the n-values used were 0.045 for the landscape areas, 0.065 for both the drop structure locations and the flow control structures, and 0.015 for the box culvert and flow control structures.

The downstream boundary condition used the slope-area method. The longitudinal slope at the downstream end was measured from survey data to be 0.025 ft/ft at approximately 2300 feet west of Pima Road (downstream from the existing box culvert) and 0.015 ft/ft at approximately 5000 feet west of Pima Road (at the existing sedimentation basin). The upstream boundary condition was set to a known water surface elevation (1865.21 feet). This known water surface elevation was a result of the storm drain pipe outlet location along Pima Road, see the *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak* (**Reference 10**). For the analysis of the recommended alternative in the model, a mixed flow option was used because the likelihood of flows are changing from subcritical to supercritical and vice versa. The models used the average conveyance option of HEC-RAS to calculate the friction slope.

8.3.2 Hydraulic Model Results

For the recommended alternative model, the output was reviewed by looking at water surface elevations, velocities, and any instability as generated by the warnings and error output. The output results are included in **Appendix J**.

There are several modeling issues that should be mentioned. The first is deviation from the HEC-RAS general assumption of gradually varied flow. The recommended alternative model includes several grade control structures. This does not satisfy the gradually varied flow condition, as this is a very abrupt change in topography. Therefore, the results that are contained within the cross sections immediately upstream and downstream are suspect and may not accurately reflect flow conditions.

Other issues include the various hydraulic jumps and locations of critical depth within the modeling reach. Based on the Froude numbers calculated by HEC-RAS, the flow does change flow regimen from subcritical to supercritical back and forth throughout the entire reach.

Another issue is near the location of the first outlet (see **Figure 1**). The flow in the proposed channel downstream of the proposed flow control structure is not fully contained in the open channel. Flow will move through the culvert and pond behind the local road until it eventually overtops the roadway crossing creating a sheet flow across the area. The depth of flow over the roadway is approximately 0.5 feet. Eventually the sheet flow will move south towards the golf course where the ultimate outfall was assumed to be.

Overall, the hydraulics of the Deer Valley Road Channel provides the capacity for the proposed flows with adequate freeboard. Also, the velocities are reasonable, except at the grade controls but that is a result of the drop in the channel. The recommended alternative will need to be maintained, so the channel will continue to operate as designed.

The output and model for the recommended alternative can be found in **Appendix J**.

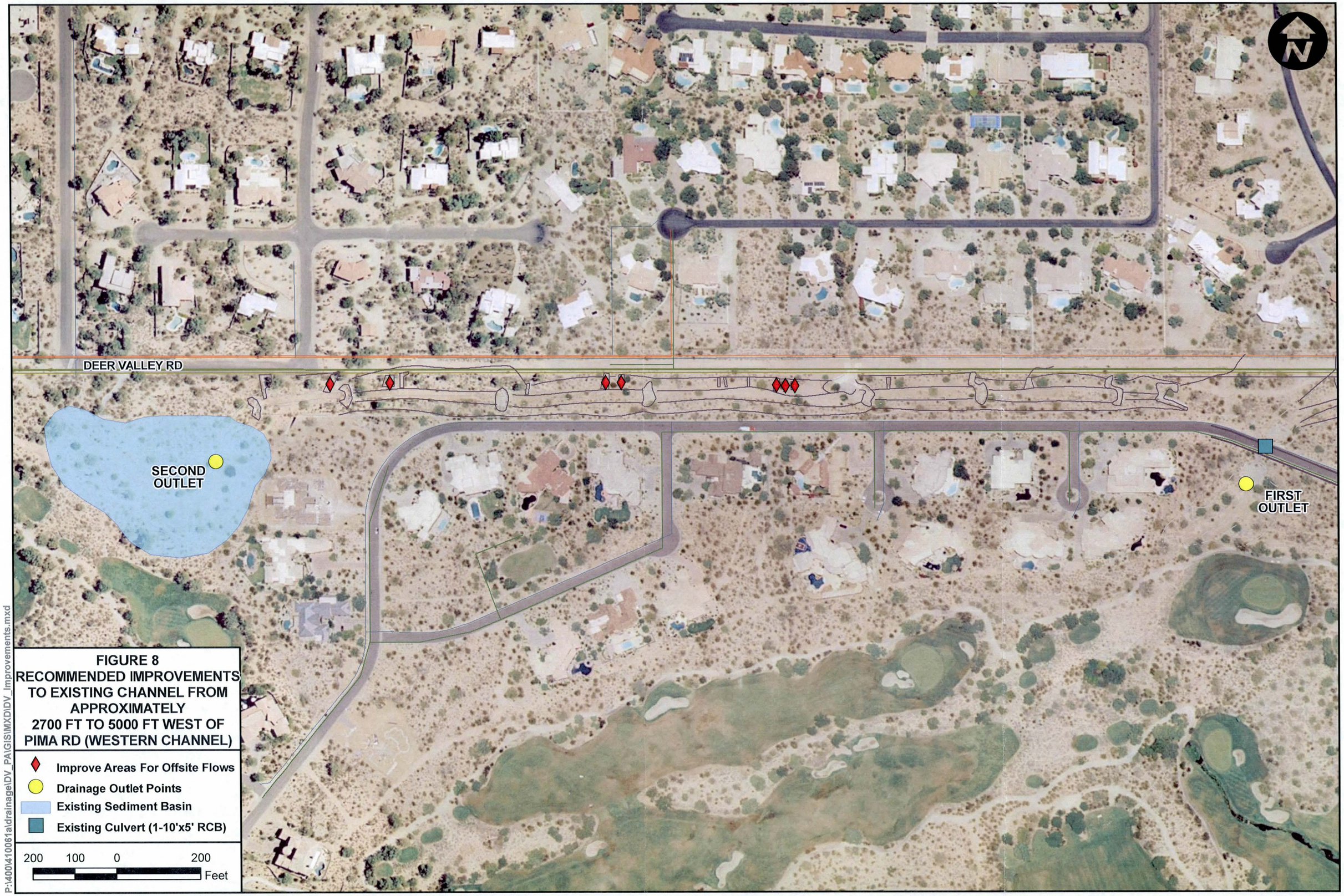


FIGURE 8
RECOMMENDED IMPROVEMENTS TO EXISTING CHANNEL FROM APPROXIMATELY 2700 FT TO 5000 FT WEST OF PIMA RD (WESTERN CHANNEL)

SECTION 9: PROPOSED DESIGN SCHEDULE

9.1 PROPOSED DESIGN SCHEDULE

Once a recommended alternative is selected by the City and the Notice-to-Proceed (NTP) is issued for design, the following design schedule is proposed for the project that includes the Deer Valley Road Channel between the intersection of the Deer Valley Road alignment and Pima Road; and 5000 feet west of Pima Road.

Activity	Time from NTP
1. Survey	2 weeks
2. Preparation of Base Sheets	6 weeks
3. 60% Plans	14 weeks
4. 60% Plan Review	17 weeks
5. 90% Plans	21 weeks
6. 90% Plan Review	23 weeks
7. Final Plans	25 weeks

APPENDIX A: REFERENCES

1. *The City of Scottsdale Desert Greenbelt, Pima Road Three Basin Project,* prepared by Stantec Consulting, March 1999
2. *Addendum to Planning Unit Drainage Plan for Grayhawk Villages 2 and 3,* prepared by DEI Professionals, 1996. Original prepared in March 1995.
3. *Flowmaster,* developed by Bentley Systems, Inc., 2008.
4. *StormCAD V8 XM Edition,* developed by Bentley Systems, Inc., 2007.
5. *HEC-GeoRAS V.4.1.1,* developed by U.S. Army Corps of Engineers, January 2006.
6. *HEC-RAS V.3.1.3,* developed by U.S. Army Corps of Engineers, May 2005.
7. *Hydraulic Design of Highway Culverts, HDS 5,* developed by Federal Highway Administration, September 1985.
8. *Deer Valley Road Channel Phase 2 – Hydrologic and Hydraulic Design Report,* prepared by Pacific Advanced Civil Engineering, 1996.
9. *HEC-1 Flood Hydrograph Package, hydrologic rainfall/runoff computer program, Version 4.1,* developed by U.S. Army Corps of Engineers, June 1998.
10. *Drainage Report – Pima Road Project from Pinnacle Peak to Thompson Peak,* prepared by Entellus, Inc. August 2009.
11. *Scour Analysis for Small to Mid-Size Desert Washes Short Course*, by Arizona Floodplain Management Association (AFMA), January 2004.
12. *State Standard for Watercourse System Sediment Balance (SSA 5-96),* by Arizona Department of Water Resources (ADWR), Flood Warning and Dam Safety Section, September 1996.
13. *Predicting Rainfall Erosion Losses (AH-537),* by *Wischmeier, W. H., Smith, D.D;* United States Department of Agriculture (USDA), Science and Education Administration, December 1978.
14. *Core North Detention Basin Concept Design Report Draft and Final Hydrology HEC-1 input file,* prepared by BRW in Association with Robert Ward PE, Report 10/17/2001 and HEC-1 5/15/2002.
15. *ArcMap 9.3.1,* ESRI, 2009.

16. *Geotechnical Evaluation Pima Road Drainage Junction Structure Southwest Corner of Pima Road and Sierra Pinta Drive Scottsdale, Arizona,* prepared by Ninyo & Moore, November 21, 2007.

DEDICATION

STATE OF ARIZONA)
)ss.
COUNTY OF MARICOPA)

KNOWN ALL MEN BY THESE PRESENTS: THAT GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION, AS OWNER, HAS SUBDIVIDED UNDER THE NAME OF "GRAYHAWK, PARCEL 2g(a) EAST", THOSE PORTIONS OF TRACTS 2g(a) AND 7, FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED, CORE NORTH, AS RECORDED IN BOOK 395 OF MAPS, PAGE 21, RECORDS OF MARICOPA COUNTY AND SITUATED IN THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 4 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA, AS SHOWN PLATTED HEREON AND HEREBY PUBLISHES THIS PLAT AS AND FOR THE PLAT SAID "GRAYHAWK PARCEL 2g(a) EAST" AND HEREBY DECLARES THAT SAID PLAT SETS FORTH THE LOCATION AND GIVES THE DIMENSIONS OF THE LOTS, STREETS, TRACTS AND EASEMENTS CONSTITUTING SAME AND THAT EACH LOT, TRACT, AND STREET SHALL BE KNOWN BY THE NUMBER, LETTER OR NAME GIVEN TO EACH ON SAID PLAT. THE EASEMENTS AS SHOWN HEREON ARE DEDICATED TO THE CITY FOR THE USE AS SHOWN OR NOTED.

TRACT "A" IS DEDICATED AS A PRIVATE STREET FOR THE PRIVATE USE AND CONVENIENCE (INCLUDING INGRESS AND EGRESS) OF PROPERTY OWNERS SERVED BY THE RETREAT VILLAGE ASSOCIATION AT GRAYHAWK. A NON-EXCLUSIVE EASEMENT OVER TRACT "A" IS DEDICATED TO THE CITY FOR EMERGENCY SERVICE AND REFUSE COLLECTION VEHICLE ACCESS, DRAINAGE, PUBLIC UTILITIES AND LANDSCAPING PURPOSES.

A PUBLIC UTILITY EASEMENT (P.U.E.) IS HEREBY DEDICATED TO THE CITY AS INDICATED ON THE PLAT, FOR THE PURPOSES OF INSTALLATION, OPERATION, MAINTENANCE, REPAIR, REMOVAL, RELOCATION AND ACCESS AS IS NECESSARY TO PROVIDE PUBLIC UTILITIES.

A PUBLIC MULTI USE TRAIL (P.M.U.T.) IS HEREBY DEDICATED TO THE CITY OF SCOTTSDALE UPON, OVER AND ACROSS THE NORTH 100 FEET OF TRACT "B", AS SHOWN HEREON, FOR THE PURPOSE OF PERMANENTLY PRESERVING SUCH LAND FOR PUBLIC ACCESS.

A 30 FOOT WIDE PRIVATE WATERLINE AND SEWER LINE EASEMENT OVER TRACT "C", AS SHOWN HEREON, IS HEREBY DEDICATED TO THE RAPTOR GOLF COURSE FOR THE BENEFIT OF THE EXISTING RESTROOM FACILITIES.

A 20 FOOT WIDE TRAIL ACCESS EASEMENT (T.A.E.) OVER THOSE PORTIONS OF TRACTS "B" AND "D" AND LOT 42, AS SHOWN HEREON, IS HEREBY DEDICATED TO THE MEMBERS OF THE RETREAT VILLAGE ASSOCIATION AT GRAYHAWK, ACCORDING TO INSTRUMENT 95-0641337 M.C.R., INCLUDING THEIR INVITEES AND GUESTS AND THE OWNERS OF THE PROPERTY WITHIN TRACT 2n AS SHOWN ON STATE PLAT No. 46, CORE NORTH, ACCORDING TO BOOK 460 OF MAPS, PAGE 34, RECORDS OF MARICOPA COUNTY, ARIZONA, INCLUDING THEIR INVITEES AND GUESTS.

EASEMENTS FOR DRAINAGE OVER A PORTION OF TRACTS "A", "B" AND "C", AS SHOWN ON THE PLAT, ARE HEREBY DEDICATED TO THE CITY OF SCOTTSDALE.

EASEMENTS FOR NATURAL AREA OPEN SPACE ("N.A.O.S.") OVER TRACTS "B" AND "C" ARE HEREBY DEDICATED TO THE CITY OF SCOTTSDALE UPON, OVER AND ACROSS THOSE AREAS AS SHOWN. N.A.O.S. EASEMENTS ARE FOR THE PURPOSE OF PERMANENTLY PRESERVING SUCH LANDS IN ITS NATURAL DESERT STATE. THE N.A.O.S. EASEMENT SHALL NOT BE USED FOR ANY PURPOSE INCONSISTENT WITH THE PRESERVATION OF SAID LAND IN ITS NATURAL STATE AND NO GRADING, GRUBBING, EXCAVATING, OR CONSTRUCTION OF ANY STRUCTURE OR DEVELOPMENT OF ANY KIND SHALL BE PERMITTED ON OR WITHIN SAID EASEMENT EXCEPT AS ALLOWED UNDER CITY OF SCOTTSDALE ORDINANCES. MAINTENANCE OF THE N.A.O.S. EASEMENT SHALL BE THE RESPONSIBILITY OF AN ASSOCIATION OF HOMEOWNERS.

TRACTS "A", "B", "C" AND "D" SHALL BE OWNED AND MAINTAINED BY AN ASSOCIATION OF HOMEOWNERS.

OWNER WARRANTS AND REPRESENTS TO THE CITY OF SCOTTSDALE TO BE THE SOLE OWNER OF THE PROPERTY COVERED HEREBY AND THAT ANY HOMEOWNERS ASSOCIATION, LENDER, EASEMENT HOLDER OR OTHER PERSON OR ENTITY HAVING ANY INTEREST IN SAID PROPERTY HAS CONSENTED TO AND JOINED IN THIS PLAT, AS EVIDENCED BY INSTRUMENTS RECORDED WITH THE MARICOPA COUNTY RECORDER'S OFFICE OR WHICH OWNER WILL RECORD, NOT LATER THAN THE DATE ON WHICH THE PLAT IS RECORDED.

IN WITNESS WHEREOF: GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION HAS HEREUNTO CAUSED ITS NAME TO BE SIGNED AND THE SAME TO BE ATTESTED BY THE UNDERSIGNED OFFICER THEREUNTO DULY AUTHORIZED THIS 19 DAY OF June 2001.

GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION, AS OWNER.

BY: [signature]

ITS: VP

ACKNOWLEDGMENT

STATE OF ARIZONA)
) SS.
COUNTY OF MARICOPA)

ON THIS THE 19th DAY OF June, 2001, BEFORE ME, THE UNDERSIGNED OFFICER APPEARED, Brian Bachr WHO ACKNOWLEDGED HIMSELF TO BE Vice President, OF GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION, AS OWNER, AND ACKNOWLEDGED THAT HE, AS SUCH OFFICER, BEING AUTHORIZED SO TO DO, EXECUTED THE FOREGOING INSTRUMENT FOR THE PURPOSES THEREIN CONTAINED.

IN WITNESS WHEREOF: I HEREUNTO SET MY HAND AND OFFICIAL SEAL.

BY: Pamela R. Brown
NOTARY PUBLIC

PAMELA R. BROWN
Notary Public - Arizona
Maricopa County
My Comm. Expires Mar 19, 2002

MY COMMISSION EXPIRES: 3/19/02

APPROVALS

APPROVED BY THE COUNCIL OF THE CITY OF SCOTTSDALE, ARIZONA, THIS 21st DAY OF August, 2001.

BY: Mary Manross
MAYOR

ATTEST: Sonia Robertson
CLERK

I HEREBY CERTIFY THAT THIS PLAT SUBSTANTIALLY CONFORMS TO THE APPROVED PRELIMINARY PLAT.

BY: [signature] Chase DATE: 7/12/01
DEVELOPMENT QUALITY/COMPLIANCE DIRECTOR

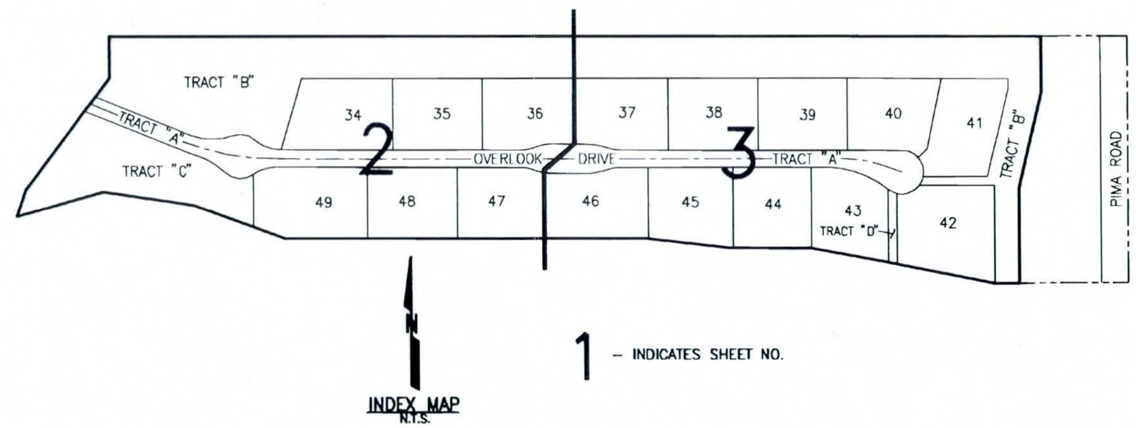
I HEREBY CERTIFY THAT ALL ENGINEERING CONDITIONS AND REQUIREMENTS OF THE CITY CODE HAVE BEEN COMPLIED WITH.

BY: [signature] DATE: 7/11/01
PROJECT REVIEW MANAGER

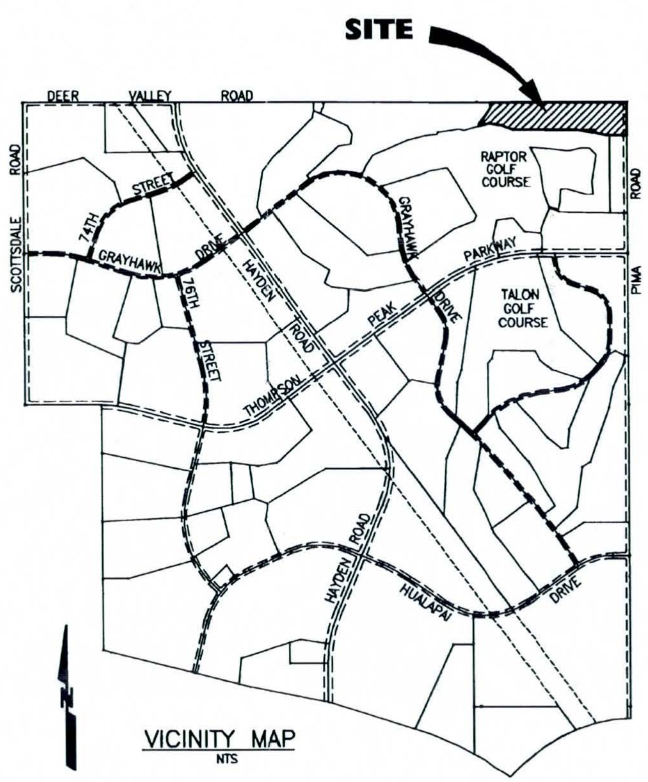
FILE NAME: K:\D\D\272\98\98fp-s1
DATE PLOTTED: 06-19-01

FINAL PLAT
GRAYHAWK
PARCEL 2g(a) EAST

A SUBDIVISION OF A PORTION OF TRACTS 2g(a) AND 7, FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED, CORE NORTH AS RECORDED IN BOOK 395, PAGE 21, M.C.R., AND SITUATED IN THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 4 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA



INDEX MAP
N.T.S.



VICINITY MAP
NTS

GENERAL NOTES

1. THIS SUBDIVISION IS LOCATED WITHIN THE CITY OF SCOTTSDALE WATER SERVICE AREA AND HAS BEEN DESIGNATED AS HAVING AN ASSURED WATER SUPPLY.
2. CONSTRUCTION WITHIN PUBLIC UTILITY EASEMENTS, EXCEPT BY PUBLIC AGENCIES AND UTILITY COMPANIES, SHALL BE LIMITED TO WOOD, WIRE, OR REMOVABLE SECTION TYPE FENCING AND MUST BE IN CONFORMANCE WITH THE APPLICABLE CC&R'S AND DESIGN GUIDELINES.
3. ELECTRIC LINES ARE TO BE CONSTRUCTED UNDERGROUND AS REQUIRED BY ARIZONA CORPORATION COMMISSION GENERAL ORDER U-48.
4. THOSE AREAS DESIGNATED AS TRACTS "A", "B", "C" AND "D" TO BE CONVEYED AS COMMON AREA TO AN ASSOCIATION OF HOMEOWNERS AND SHALL NOT BE ACCEPTED FOR MAINTENANCE OR OWNERSHIP BY THE CITY WITHOUT THE EXPRESSED ACTION OF THE CITY COUNCIL. BEFORE ANY IMPROVEMENT IS ACCEPTED, IT SHALL MEET CITY STANDARDS. FAILURE TO MAINTAIN THE DESIGNATED COMMON AREAS COULD RESULT IN A CIVIL ACTION BROUGHT BY THE CITY FOR COSTS INCURRED BY THE CITY FOR SAID MAINTENANCE.
5. N.A.O.S. SHALL BE PERMANENTLY MAINTAINED AS NATURAL AREA.
6. THE PARCEL IS ZONED R1-35 PCD ESL. HOMES SHALL BE LIMITED TO A MAXIMUM HEIGHT OF 24 FEET, MEASURED FROM THE LOWEST NATURAL GRADE ON THE LOT.
7. THE EXTERIOR OF THE PERIMETER WALL SHALL BE MAINTAINED BY AN ASSOCIATION OF HOMEOWNERS. ALL WALLS SHALL BE CONSISTENT WITH THE APPROVED MASTER ENVIRONMENTAL DESIGN CONCEPT PLAN.
8. ALL EASEMENTS SHALL BE MAINTAINED BY AN ASSOCIATION OF HOMEOWNERS.

LEGEND

(line)	SUBDIVISION BOUNDARY
(line)	PROPERTY LINE
— - —	CENTERLINE
⊙	CENTERLINE MONUMENT (TO BE SET)
△	SECTION CORNER (FOUND AS NOTED)
○	SUBDIVISION CORNER (TO BE SET W/ 1/2" REBAR, RLS CAP NO. 19857)
D.E.	DRAINAGE EASEMENT
P.U.E.	PUBLIC UTILITY EASEMENT
W.L.E.	WATERLINE EASEMENT
R.O.W.	RIGHT OF WAY
P.M.U.T.	PUBLIC MULTI-USE TRAIL
N.A.O.S.	NATURAL AREA OPEN SPACE
T.A.E.	TRAIL ACCESS EASEMENT
S.E.	SIDEWALK EASEMENT (PRIVATE)

BASIS OF BEARING

BEARING DATA SHOWN HEREON IS BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 4 NORTH, RANGE 4 EAST, AS SHOWN ON FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED, CORE NORTH, BOOK 395 OF MAPS, PAGE 21, M.C.R. RECORDED AS S 89°56'44" E.

AIRPORT PROXIMITY NOTICE

THE MOST SOUTHERLY CORNER OF THIS SUBDIVISION BEARS APPROXIMATELY 14 DEGREE 40 MINUTES NORTHEAST 22,125 FEET OR 4.19 MILES FROM THE CENTER OF SCOTTSDALE AIRPORT RUNWAY, WHICH IS LOCATED BETWEEN FRANK LLOYD WRIGHT BLVD. ON THE NORTH, PIMA ROAD ON THE EAST, THUNDERBIRD ROAD ON THE SOUTH AND SCOTTSDALE ROAD ON THE WEST. THE AIRPORT IS A GENERAL AVIATION RELIEVER/COMMERICAL SERVICE AIRPORT FOR THE SCOTTSDALE – NORTH PHOENIX AREA.

CERTIFICATION

THIS IS TO CERTIFY THAT THE SURVEY AND SUBDIVISION OF THE PREMISES DESCRIBED AND PLATTED HEREON WERE MADE UNDER MY DIRECTION DURING THE MONTH OF MARCH, 2000; AND THAT THE SURVEY IS TRUE AND COMPLETE AS SHOWN, AND THAT MONUMENTS SHOWN ACTUALLY EXIST OR WILL BE SET AS SHOWN AND THAT THEIR POSITIONS ARE CORRECTLY SHOWN AND THAT SAID MONUMENTS ARE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

[signature] 6-19-01
RICHARD D. TABOR DATE
REGISTERED LAND SURVEYOR #19857

REGISTERED LAND SURVEYOR
CERTIFICATE NO. 19857
RICHARD D. TABOR

BOOK 572 PAGE 05
OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
2001-0816929
09/04/2001 04:38
RAQUEL

GILBERTSON ASSOCIATES Inc.
consulting civil engineers & land surveyors
15974 North 77th Street . Scottsdale, Arizona 85260-1761 480\607\2244

FINAL PLAT

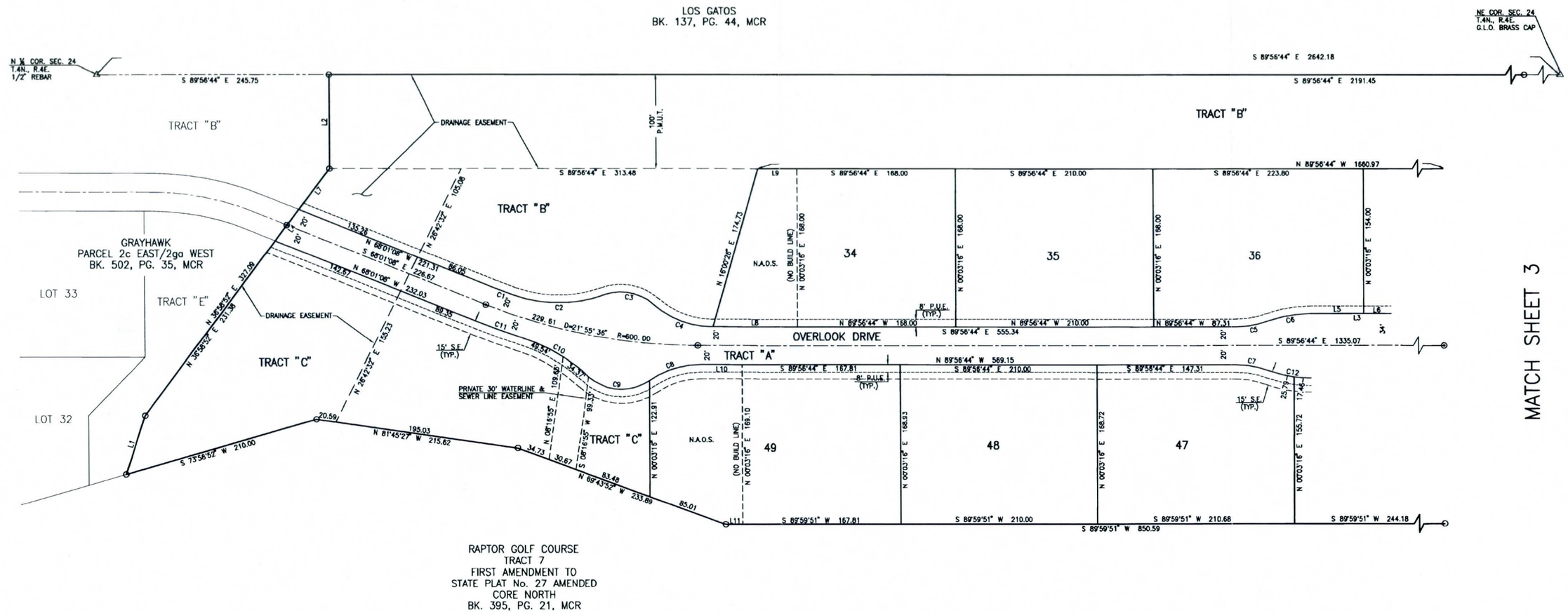
GRAYHAWK
PARCEL 2g(a) EAST

Designed by JIM ROBERTSON	Drawn by DAVID LUCAS

Date JUNE 19, 2001	Job No. 27298	Sheet 1 of 3

27-PP-99 2204-00

572-05



RAPTOR GOLF COURSE
TRACT 7
FIRST AMENDMENT TO
STATE PLAT No. 27 AMENDED
CORE NORTH
BK. 395, PG. 21, MCR

LINE	BEARING	DISTANCE
L1	N 18°13'48" E	65.53
L2	N 00°03'16" E	100.00
L3	S 89°56'44" E	85.00
L4	N 36°58'52" E	41.41
L5	N 89°56'44" W	55.72
L6	N 89°56'44" W	29.29
L7	N 36°58'52" E	54.29
L8	N 89°56'44" W	90.02
L9	S 89°56'44" E	42.00
L10	S 89°56'44" E	44.03
L11	S 89°59'51" W	17.92

CURVE	ARC	DELTA	RADIUS
C1	22.82	02°15'16"	580.00
C2	99.09	39°25'33"	144.00
C3	55.28	61°30'20"	51.50
C4	68.50	41°45'06"	94.00
C5	39.13	19°40'00"	114.00
C6	43.25	19°40'00"	126.00
C7	39.13	19°40'00"	114.00
C8	57.12	34°49'03"	94.00
C9	69.40	77°12'20"	51.50
C10	83.91	24°46'57"	194.00
C11	46.76	04°19'16"	620.00
C12	43.25	19°40'00"	126.00

BOOK 572 PAGE 05
OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
2001-0816929
09/04/2001 04:38

SCALE: 1" = 50'
0' 50' 100' 150'

GILBERTSON ASSOCIATES inc.
consulting civil engineers & land surveyors
15974 North 77th Street . Scottsdale, Arizona 85260-1761 480/607/2344

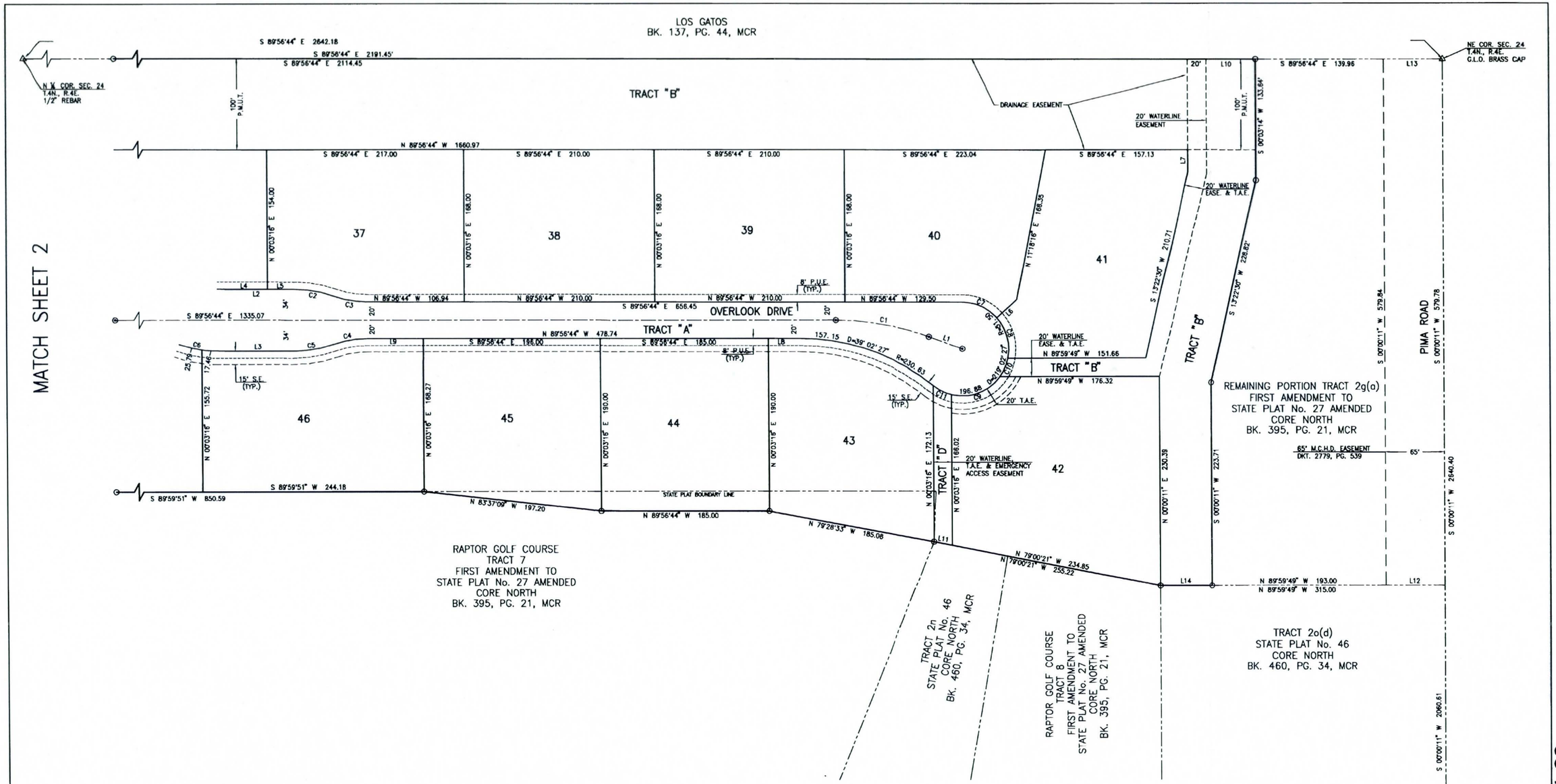
FINAL PLAT

GRAYHAWK
PARCEL 2g(a) EAST

Designed by JIM ROBERTSON	Drawn by DAVID LUCAS	
Date JUNE 19, 2001	Job No. 27298	Sheet 2 of 3

27-PP-99 2204-00

572-05



LINE	BEARING	DISTANCE
L1	S 69°56'44" E	39.20
L2	S 89°56'44" E	85.00
L3	N 89°56'44" W	85.00
L4	N 89°56'44" W	55.72
L5	N 89°56'44" W	29.29
L6	S 48°11'33" W	30.00
L7	S 00°03'14" W	24.65
L8	S 89°56'44" E	36.73
L9	S 89°56'44" E	61.01
L10	S 89°56'44" E	57.00
L11	N 79°00'21" W	20.37
L12	N 89°59'49" W	65.00
L13	S 89°56'44" E	65.00
L14	N 89°59'49" W	57.00

CURVE	ARC	DELTA	RADIUS
C1	104.72	20°00'00"	300.00
C2	43.25	19°40'00"	126.00
C3	39.13	19°40'00"	114.00
C4	39.13	19°40'00"	114.00
C5	43.25	19°40'00"	126.00
C6	43.25	19°40'00"	126.00
C7	43.27	48°08'16"	51.50
C8	48.02	53°25'35"	51.50
C9	61.02	67°53'33"	51.50
C10	22.04	24°31'11"	51.50
C11	22.53	25°03'51"	51.50

BOOK 572 PAGE 05
OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
2001-0816929
09/04/2001 04:38

SCALE: 1" = 50'
0' 50' 100' 150'

GILBERTSON ASSOCIATES inc.
consulting civil engineers & land surveyors
15974 North 77th Street, Scottsdale, Arizona 85260-1761 480/607\2244

FINAL PLAT

GRAYHAWK
PARCEL 2g(a) EAST

Designed by JIM ROBERTSON	Drawn by DAVID LUCAS	
Date JUNE 19, 2001	Job No. 27298	Sheet 3 of 3

27-PP-99 2204-00

572.05

FINAL PLAT
GRAYHAWK
PARCEL 2c EAST/2g(a) WEST

A SUBDIVISION OF A PORTION OF TRACTS 2c, 2g(a), 6 AND 7, FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED, CORE NORTH AS RECORDED IN BOOK 395, PAGE 21, M.C.R. AND SITUATED IN SECTIONS 23 & 24, TOWNSHIP 4 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

DEDICATION

STATE OF ARIZONA)
)ss.
COUNTY OF MARICOPA)

KNOWN ALL MEN BY THESE PRESENTS: THAT GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION, AS OWNER, HAS SUBDIVIDED UNDER THE NAME OF "GRAYHAWK, PARCEL 2c EAST/2g(a) WEST", THOSE PORTIONS OF TRACTS 2c, 2g(a), 6 AND 7, FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED, CORE NORTH, AS RECORDED IN BOOK 395 OF MAPS, PAGE 21, RECORDS OF MARICOPA COUNTY AND SITUATED IN SECTIONS 23 & 24, TOWNSHIP 4 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA, AS SHOWN PLATTED HEREON AND HEREBY PUBLISHES THIS PLAT AS AND FOR THE PLAT SAID "GRAYHAWK PARCEL 2c EAST/2g(a) WEST" AND HEREBY DECLARES THAT SAID PLAT SETS FORTH THE LOCATION AND GIVES THE DIMENSIONS OF THE LOTS, STREETS, TRACTS AND EASEMENTS CONSTITUTING SAME AND THAT EACH LOT, TRACT, AND STREET SHALL BE KNOWN BY THE NUMBER, LETTER OR NAME GIVEN TO EACH ON SAID PLAT. THE EASEMENTS AS SHOWN HEREON ARE DEDICATED TO THE CITY FOR THE USE AS SHOWN OR NOTED.

TRACT "A" IS DEDICATED AS PRIVATE STREETS FOR THE PRIVATE USE AND CONVENIENCE (INCLUDING INGRESS AND EGRESS) OF PROPERTY OWNERS SERVED BY THE RETREAT VILLAGE ASSOCIATION AT GRAYHAWK. A NON-EXCLUSIVE EASEMENT OVER TRACT "A" IS DEDICATED TO THE CITY FOR EMERGENCY SERVICE AND REFUSE COLLECTION VEHICLE ACCESS, DRAINAGE, PUBLIC UTILITIES AND LANDSCAPING PURPOSES.

A PUBLIC UTILITY EASEMENT (P.U.E.) IS HEREBY DEDICATED TO THE CITY AS INDICATED ON THE PLAT, FOR THE PURPOSES OF INSTALLATION, OPERATION, MAINTENANCE, REPAIR, REMOVAL, RELOCATION AND ACCESS AS IS NECESSARY TO PROVIDE PUBLIC UTILITIES.

EASEMENTS FOR DRAINAGE OVER A PORTION OF TRACTS "B" AND "C" AND ALL OF TRACTS "E" AND "F", AS SHOWN ON THE PLAT, ARE HEREBY DEDICATED TO THE CITY OF SCOTTSDALE.

EASEMENTS FOR NATURAL AREA OPEN SPACE ("N.A.O.S.") OVER PORTIONS OF TRACTS "B", "C" AND "E" ARE HEREBY DEDICATED TO THE CITY OF SCOTTSDALE UPON, OVER AND ACROSS THOSE AREAS AS SHOWN. N.A.O.S. EASEMENTS ARE FOR THE PURPOSE OF PERMANENTLY PRESERVING SUCH LANDS IN ITS NATURAL DESERT STATE. THE N.A.O.S. EASEMENT SHALL NOT BE USED FOR ANY PURPOSE INCONSISTENT WITH THE PRESERVATION OF SAID LAND IN ITS NATURAL STATE AND NO GRADING, GRUBBING, EXCAVATING, OR CONSTRUCTION OF ANY STRUCTURE OR DEVELOPMENT OF ANY KIND SHALL BE PERMITTED ON OR WITHIN SAID EASEMENT EXCEPT AS ALLOWED UNDER CITY OF SCOTTSDALE ORDINANCES. MAINTENANCE OF THE N.A.O.S. EASEMENT SHALL BE THE RESPONSIBILITY OF AN ASSOCIATION OF HOMEOWNERS.

TRACTS "A", "B", "C", "D", "E", "F" AND "G" SHALL BE OWNED AND MAINTAINED BY AN ASSOCIATION OF HOMEOWNERS.

OWNER WARRANTS AND REPRESENTS TO THE CITY OF SCOTTSDALE TO BE THE SOLE OWNER OF THE PROPERTY COVERED HEREBY AND THAT ANY HOMEOWNERS ASSOCIATION, LENDER, EASEMENT HOLDER OR OTHER PERSON OR ENTITY HAVING ANY INTEREST IN SAID PROPERTY HAS CONSENTED TO AND JOINED IN THIS PLAT, AS EVIDENCED BY INSTRUMENTS RECORDED WITH THE MARICOPA COUNTY RECORDER'S OFFICE OR WHICH OWNER WILL RECORD, NOT LATER THAN THE DATE ON WHICH THE PLAT IS RECORDED.

IN WITNESS WHEREOF: GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION HAS HEREUNTO CAUSED ITS NAME TO BE SIGNED AND THE SAME TO BE ATTESTED BY THE UNDERSIGNED OFFICER THEREUNTO DULY AUTHORIZED THIS 6th DAY OF May 1999.

GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION, AS OWNER.

BY: [signature]

ITS: Vice President

ACKNOWLEDGMENT

STATE OF ARIZONA)
) SS.
COUNTY OF MARICOPA)

ON THIS THE 6th DAY OF May, 1999, BEFORE ME, THE UNDERSIGNED OFFICER APPEARED, Brian Baehr WHO ACKNOWLEDGED HIMSELF TO BE Vice President, OF GRAYHAWK RESIDENTIAL INC., AN ARIZONA CORPORATION, AS OWNER, AND ACKNOWLEDGED THAT HE, AS SUCH OFFICER, BEING AUTHORIZED SO TO DO, EXECUTED THE FOREGOING INSTRUMENT FOR THE PURPOSES THEREIN CONTAINED.

IN WITNESS WHEREOF: I HEREUNTO SET MY HAND AND OFFICIAL SEAL.

BY: Pamela R. Brown
NOTARY PUBLIC

PAMELA R. BROWN
Notary Public Arizona
Maricopa County
My Comm. Expires Mar 19, 2002

MY COMMISSION EXPIRES: March 19, 2002

RATIFICATION

KNOW ALL MEN BY THESE PRESENTS:

AS BENEFICIARY UNDER THAT CERTAIN DEED OF TRUST AND FIXTURE FILING RECORDED ON SEPTEMBER 10, 1998, AS INSTRUMENT NO. 98-0807806 OF THE RECORDS OF MARICOPA COUNTY, ARIZONA, THE UNDERSIGNED HAS AN INTEREST IN AND HEREBY ACKNOWLEDGES, JOINS IN AND SUBORDINATES ITS INTEREST TO THE RECORDATION OF THE FINAL PLAT OF GRAYHAWK PARCEL 2c EAST/2g(a) WEST AND ALL MATTERS SHOWN THEREON.

CALIFORNIA BANK & TRUST (FORMERLY KNOWN AS GROSSMONT BANK)
A CALIFORNIA BANKING CORPORATION

Dated: 6 May 1999

BY: [signature]

ITS: VICE PRESIDENT

ACKNOWLEDGMENT

STATE OF ARIZONA)
) SS.
COUNTY OF MARICOPA)

ON THIS THE 6th DAY OF MAY, 1999, BEFORE ME, THE UNDERSIGNED OFFICER APPEARED, PHIL DOUGLAS FRAZIER, JR. WHO ACKNOWLEDGED HIMSELF TO BE VICE PRESIDENT, OF CALIFORNIA BANK & TRUST, A CALIFORNIA BANKING CORPORATION, AS OWNER, AND ACKNOWLEDGED THAT HE, AS SUCH OFFICER, BEING AUTHORIZED SO TO DO, EXECUTED THE FOREGOING INSTRUMENT FOR THE PURPOSES THEREIN CONTAINED.

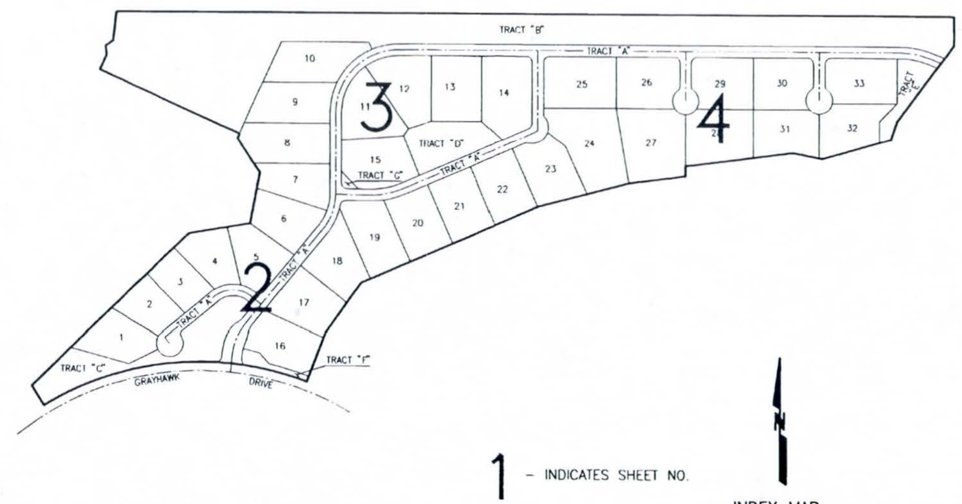
IN WITNESS WHEREOF: I HEREUNTO SET MY HAND AND OFFICIAL SEAL.

BY: Shawna L. Newman
NOTARY PUBLIC

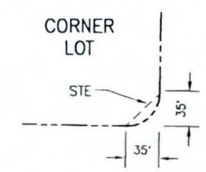
OFFICIAL SEAL
SHAWNA L. NEWMAN
NOTARY PUBLIC - ARIZONA
MARICOPA COUNTY
My Comm. Expires April 14, 2002

MY COMMISSION EXPIRES: 4-14-2002

FILE NAME: A:\C\DWG\272\88\88FP1
DATE PLOTTED: 4-2-99



INDEX MAP
NTS

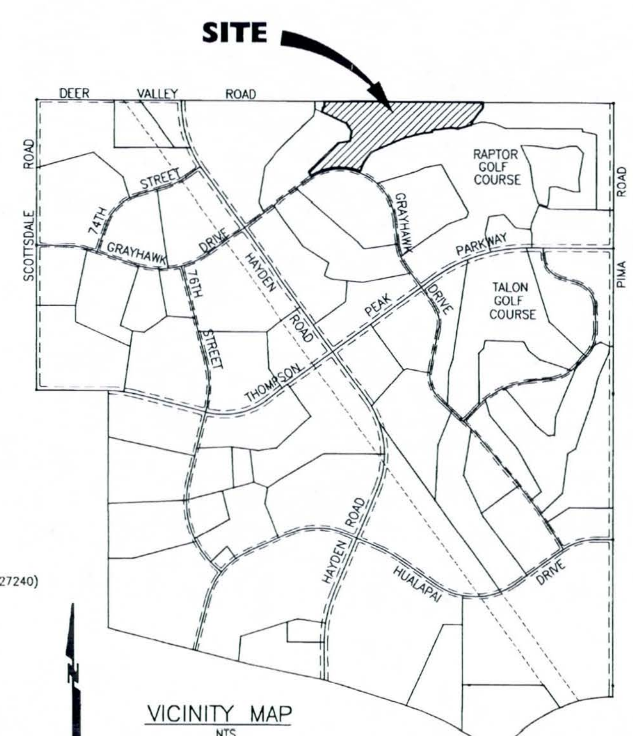


SIGHT TRIANGLE EASEMENT
NTS

SIGHT TRIANGLE EASEMENT TO BE KEPT CLEAR OF SIGNS, LANDSCAPING OR ANY VISUAL OBSTRUCTIONS GREATER THAN 6 INCHES IN WIDTH OR DIAMETER BETWEEN THE HEIGHTS OF 2-7 FEET.

LEGEND

────	SUBDIVISION BOUNDARY
────	PROPERTY LINE
— - —	CENTERLINE
⊙	CENTERLINE MONUMENT (TO BE SET)
△	SECTION CORNER (FOUND AS NOTED)
○	SUBDIVISION CORNER (TO BE SET W/ 1/2" REBAR, RLS CAP NO. 27240)
D.E.	DRAINAGE EASEMENT
P.U.E.	PUBLIC UTILITIES EASEMENT
V.N.A.E.	VEHICULAR NON-ACCESS EASEMENT
W.L.E.	WATERLINE EASEMENT
R.O.W.	RIGHT OF WAY
S.T.E.	SIGHT TRIANGLE EASEMENT
S.E.	SIDEWALK EASEMENT (PRIVATE)
L.S.E.	LANDSCAPE EASEMENT



VICINITY MAP
NTS

502-35

GENERAL NOTES

1. THIS SUBDIVISION IS LOCATED WITHIN THE CITY OF SCOTTSDALE WATER SERVICE AREA AND HAS BEEN DESIGNATED AS HAVING AN ASSURED WATER SUPPLY.
2. CONSTRUCTION WITHIN PUBLIC UTILITY EASEMENTS, EXCEPT BY PUBLIC AGENCIES AND UTILITY COMPANIES, SHALL BE LIMITED TO WOOD, WIRE, OR REMOVABLE SECTION TYPE FENCING AND MUST BE IN CONFORMANCE WITH THE APPLICABLE CC&R'S AND DESIGN GUIDELINES.
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4. THOSE AREAS DESIGNATED AS TRACTS "A", "B", "C", "D", "E", "F" AND "G" TO BE CONVEYED AS COMMON AREA TO AN ASSOCIATION OF HOMEOWNERS AND SHALL NOT BE ACCEPTED FOR MAINTENANCE OR OWNERSHIP BY THE CITY WITHOUT THE EXPRESSED ACTION OF THE CITY COUNCIL. BEFORE ANY IMPROVEMENT IS ACCEPTED, IT SHALL MEET CITY STANDARDS. FAILURE TO MAINTAIN THE DESIGNATED COMMON AREAS COULD RESULT IN A CIVIL ACTION BROUGHT BY THE CITY FOR COSTS INCURRED BY THE CITY FOR SAID MAINTENANCE.
5. NAOS SHALL BE PERMANENTLY MAINTAINED AS NATURAL AREA.
6. THE PARCEL IS ZONED R1-18 ESL (LOTS 1-10) AND R1-35 ESL (LOTS 11-33). WITHIN 500' OF THE NORTH SECTION LINE(DEER VALLEY ROAD), HOMES SHALL BE LIMITED TO A MAXIMUM HEIGHT OF 24 FEET, MEASURED FROM THE LOWEST NATURAL GRADE ON THE LOT.
7. THE EXTERIOR OF THE PERIMETER WALL SHALL BE MAINTAINED BY AN ASSOCIATION OF HOMEOWNERS. ALL WALLS SHALL BE CONSISTENT WITH THE APPROVED MASTER ENVIRONMENTAL DESIGN CONCEPT PLAN.
8. ALL EASEMENTS SHALL BE MAINTAINED BY AN ASSOCIATION OF HOMEOWNERS.

APPROVALS

APPROVED BY THE COUNCIL OF THE CITY OF SCOTTSDALE, ARIZONA, THIS 2nd ~~DAY~~ OF March, 1999

BY: Sam Kathryn Campana
MAYOR

ATTEST: Sonia Robertson
CLERK

I HEREBY CERTIFY THAT THIS PLAT SUBSTANTIALLY CONFORMS TO THE APPROVED PRELIMINARY PLAT.

BY: [signature] DATE: 5/10/99
PROJECT REVIEW DIRECTOR

I HEREBY CERTIFY THAT ALL ENGINEERING CONDITIONS AND REQUIREMENTS OF THE CITY CODE HAVE BEEN COMPLIED WITH.

BY: [signature] DATE: 5/10/99
PROJECT REVIEW MANAGER

BASIS OF BEARING

BEARING DATA SHOWN HEREON IS BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 4 NORTH, RANGE 4 EAST, AS SHOWN ON FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED, CORE NORTH, BOOK 395 OF MAPS, PAGE 21, M.C.R. RECORDED AS S 89°56'52" E.

AIRPORT PROXIMITY NOTICE

THE MOST SOUTHERLY CORNER OF THIS SUBDIVISION BEARS APPROXIMATELY 1 DEGREE 03 MINUTES NORTHEAST 20,636 FEET OR 3.91 MILES FROM THE CENTER OF SCOTTSDALE AIRPORT RUNWAY, WHICH IS LOCATED BETWEEN FRANK LLOYD WRIGHT BLVD. ON THE NORTH, PIMA ROAD ON THE EAST, THUNDERBIRD ROAD ON THE SOUTH AND SCOTTSDALE ROAD ON THE WEST. THE AIRPORT IS A GENERAL AVIATION RELIEVER/COMMERICAL SERVICE AIRPORT FOR THE SCOTTSDALE - NORTH PHOENIX AREA.

CERTIFICATION

THIS IS TO CERTIFY THAT THE SURVEY AND SUBDIVISION OF THE PREMISES DESCRIBED AND PLATTED HEREON WERE MADE UNDER MY DIRECTION DURING THE MONTH OF SEPTEMBER, 1998; AND THAT THE SURVEY IS TRUE AND COMPLETE AS SHOWN, AND THAT MONUMENTS SHOWN ACTUALLY EXIST OR WILL BE SET AS SHOWN AND THAT THEIR POSITIONS ARE CORRECTLY SHOWN AND THAT SAID MONUMENTS ARE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

Brad Gruver
J. BRAD GRUVER
REGISTERED LAND SURVEYOR #27240

REGISTERED LAND SURVEYOR
CERTIFICATE NO. 27240
J. BRAD GRUVER
Date Signed
ARIZONA, U.S.A.

5-6-99
DATE

BOOK 502 PAGE 35
OFFICIAL RECORDS OF MARICOPA COUNTY RECORDER
HELEN PURCELL

99-0482440
05/20/99 04:05

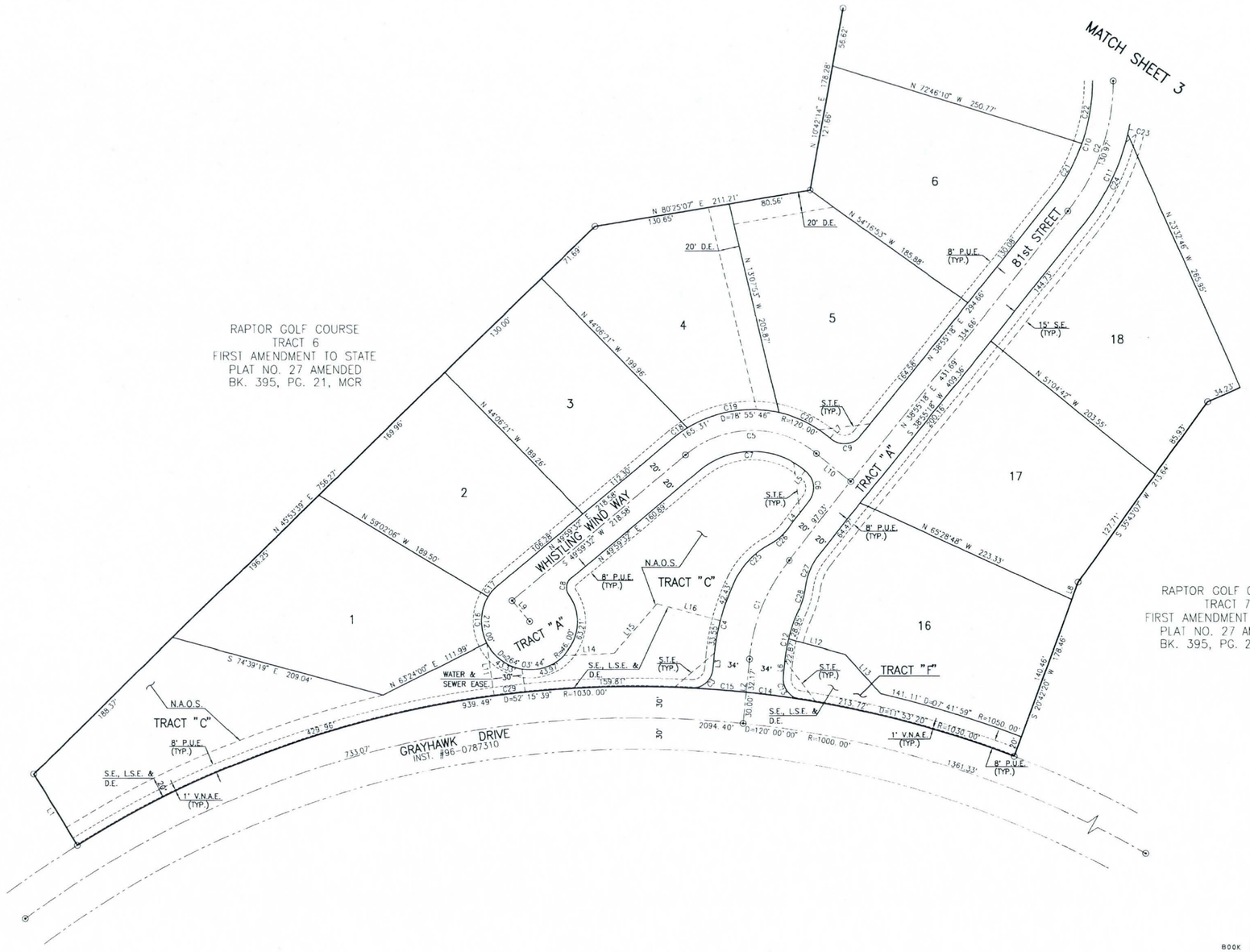
GILBERTSON ASSOCIATES inc.
consulting civil engineers & land surveyors
15974 North 77th Street, Scottsdale, Arizona 85260-1761 602\607\2244

FINAL PLAT

GRAYHAWK
PARCEL 2c EAST/2g(a) WEST

Date APRIL 2, 1999	Job No. 27288	Sheet 1 of 4

19-PP-98 5711-98



LINE	BEARING	DISTANCE
L1	N 31°33'18" W	79.58
L2	N 05°52'08" E	62.17
L3	N 05°52'08" E	13.56
L4	N 38°55'18" E	33.91
L5	N 51°04'42" W	2.82
L6	S 05°52'08" W	13.56
L7	S 51°04'42" E	2.82
L8	S 20°42'20" W	18.00
L9	S 40°00'28" E	26.00
L10	N 51°04'42" W	42.82
L11	N 07°38'16" W	51.04
L12	N 75°08'54" W	58.00
L13	N 41°47'46" W	50.56
L14	N 87°32'05" E	48.36
L15	N 41°08'48" E	62.97
L16	S 75°08'54" E	63.00

CURVE	ARC	DELTA	RADIUS
C1	103.84	33°03'09"	180.00
C2	135.68	38°52'10"	200.00
C3	30.39	87°03'07"	20.00
C4	75.99	20°20'39"	214.00
C5	137.76	78°55'46"	100.00
C6	31.42	90°00'00"	20.00
C7	110.21	78°55'46"	80.00
C8	17.61	84°03'44"	12.00
C9	31.42	90°00'00"	20.00
C10	122.11	38°52'10"	180.00
C11	107.23	27°55'38"	220.00
C12	51.84	20°20'38"	146.00
C13	30.39	87°03'07"	20.00
C14	52.99	02°56'53"	1030.00
C15	52.99	02°56'53"	1030.00
C16	46.21	57°33'36"	46.00
C17	15.28	19°01'38"	46.00
C18	18.20	08°41'23"	120.00
C19	91.32	43°36'15"	120.00
C20	55.79	26°38'08"	120.00
C21	60.56	19°16'38"	180.00
C22	61.55	19°35'31"	180.00
C23	9.72	02°31'54"	220.00
C24	97.51	25°23'44"	220.00
C25	46.65	35°10'06"	76.00
C26	25.09	22°27'35"	64.00
C27	34.13	30°33'13"	64.00
C28	23.67	17°50'43"	76.00
C29	30.00	01°40'09"	1030.00

REGISTERED LAND SURVEYOR
CERTIFICATE NO. 27240
J. BRAD GRUVER
Exp. 5-6-99
ARIZONA, U.S.A.

Brad Gruver

SCALE: 1" = 50'

0' 50' 100' 150'

BOOK 502 PAGE 35
OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
99-0482440
05/20/99 04:05
HPHE

502-35

GILBERTSON ASSOCIATES inc.
consulting civil engineers & land surveyors
15974 North 77th Street . Scottsdale, Arizona 85260-1761 602\607\2244

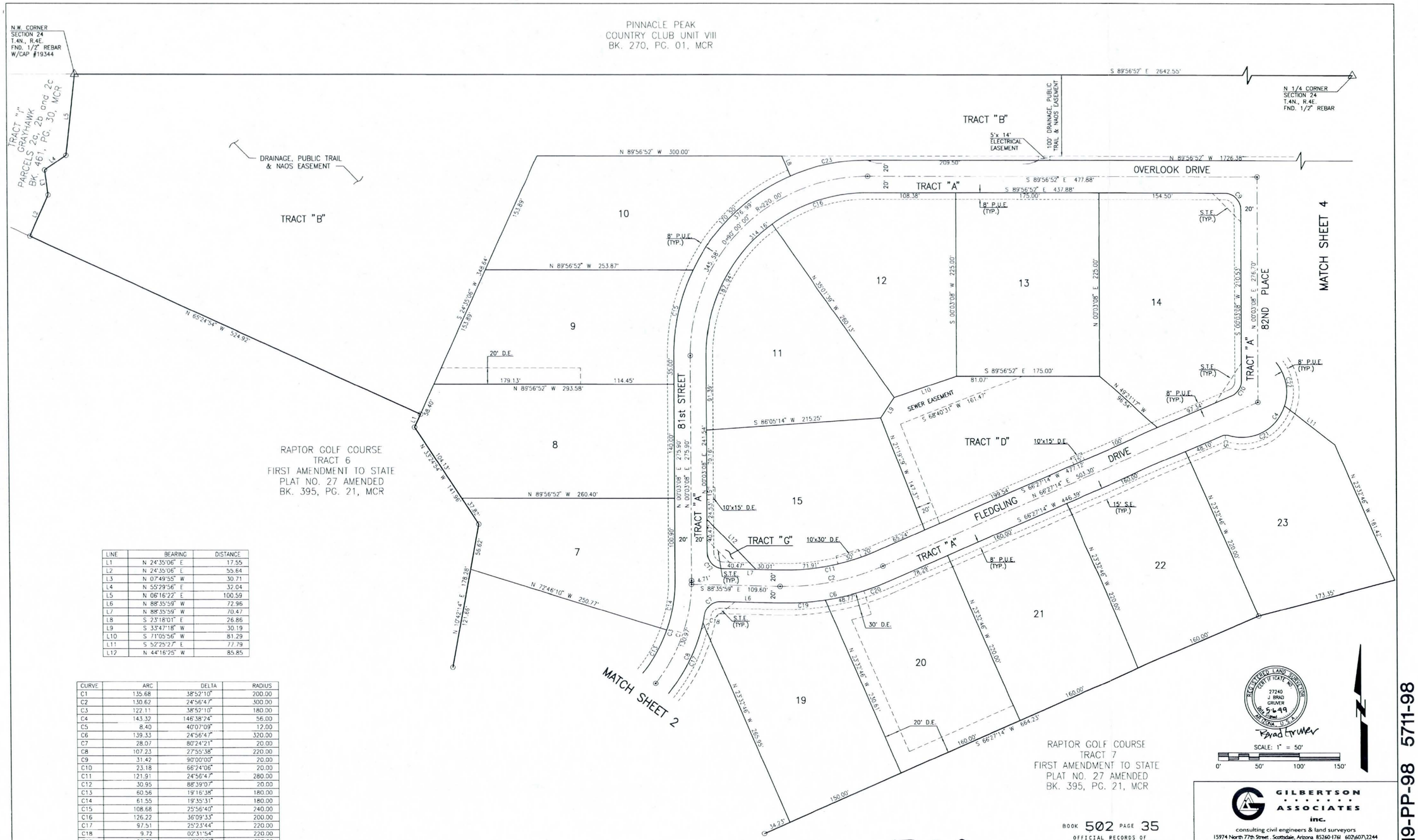
FINAL PLAT

GRAYHAWK
PARCEL 2c EAST/2g(a) WEST

Date APRIL 2, 1999	Job No. 27288	Sheet 2 of 4

19-PP-98 5711-98

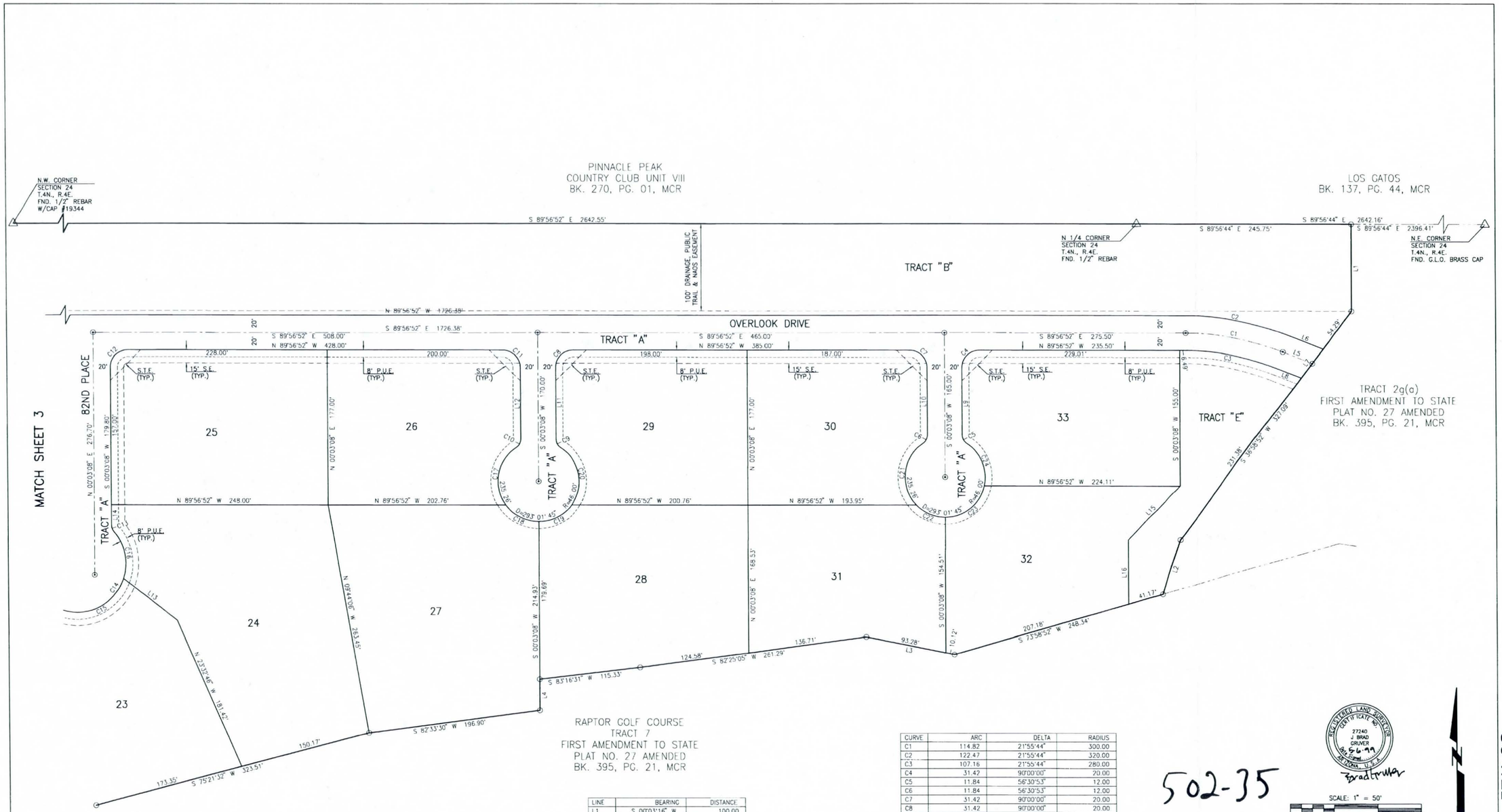
FILE NAME: 4:\0.DWG\27\27288.DWG
DATE PLOTTED: 4-7-99



LINE	BEARING	DISTANCE
L1	N 24°35'06" E	17.55
L2	N 24°35'06" E	55.64
L3	N 07°49'55" W	30.71
L4	N 55°29'56" E	32.04
L5	N 06°16'22" E	100.59
L6	N 88°35'59" W	72.96
L7	N 88°35'59" W	70.47
L8	S 23°18'01" E	26.86
L9	S 33°47'18" W	30.19
L10	S 71°05'56" W	81.29
L11	S 52°25'27" E	77.79
L12	N 44°16'25" W	85.85

CURVE	ARC	DELTA	RADIUS
C1	135.68	38°52'10"	200.00
C2	130.62	24°56'47"	300.00
C3	122.11	38°52'10"	180.00
C4	143.32	146°38'24"	56.00
C5	8.40	40°07'09"	12.00
C6	139.33	24°56'47"	320.00
C7	28.07	80°24'21"	20.00
C8	107.23	27°55'38"	220.00
C9	31.42	90°00'00"	20.00
C10	23.18	66°24'06"	20.00
C11	121.91	24°56'47"	280.00
C12	30.95	88°39'07"	20.00
C13	60.56	19°16'38"	180.00
C14	61.55	19°35'31"	180.00
C15	108.68	25°56'40"	240.00
C16	126.22	36°09'33"	200.00
C17	97.51	25°23'44"	220.00
C18	9.72	02°31'54"	220.00
C19	56.70	10°09'08"	320.00
C20	33.86	06°03'46"	320.00
C21	86.36	88°21'12"	56.00
C22	56.97	58°17'12"	56.00
C23	97.82	23°21'09"	240.00

FILE NAME 4-LTR-PKC-272-FB1.BMP F3
DATE PLOTTED 4-5-99



RAPTOR GOLF COURSE
TRACT 7
FIRST AMENDMENT TO STATE
PLAT NO. 27 AMENDED
BK. 395, PG. 21, MCR

LINE	BEARING	DISTANCE
L1	S 00°03'16" W	100.00
L2	S 18°13'48" W	65.53
L3	N 78°43'48" W	103.41
L4	S 00°03'08" W	35.25
L5	S 68°01'08" E	35.50
L6	S 68°01'08" E	40.86
L7	S 36°58'52" W	41.41
L8	N 68°01'08" W	30.14
L9	S 00°03'08" W	76.63
L10	N 00°03'08" E	76.63
L11	S 00°03'08" W	81.63
L12	N 00°03'08" E	81.63
L13	S 52°25'27" E	77.79
L14	N 00°03'08" E	22.80
L15	S 44°21'19" W	85.90
L16	S 00°03'08" W	73.65

CURVE	ARC	DELTA	RADIUS
C1	114.82	21°55'44"	300.00
C2	122.47	21°55'44"	320.00
C3	107.16	21°55'44"	280.00
C4	31.42	90°00'00"	20.00
C5	11.84	56°30'53"	12.00
C6	11.84	56°30'53"	12.00
C7	31.42	90°00'00"	20.00
C8	31.42	90°00'00"	20.00
C9	11.84	56°30'53"	12.00
C10	11.84	56°30'53"	12.00
C11	31.42	90°00'00"	20.00
C12	31.42	90°00'00"	20.00
C13	8.40	40°07'09"	12.00
C14	143.32	146°38'24"	56.00
C15	86.36	88°21'11"	56.00
C16	56.97	58°17'17"	56.00
C17	74.23	92°27'21"	46.00
C18	43.40	54°03'31"	46.00
C19	43.40	54°03'31"	46.00
C20	74.23	92°27'21"	46.00
C21	80.76	100°35'38"	46.00
C22	36.87	45°55'15"	46.00
C23	62.18	77°26'39"	46.00
C24	55.45	69°04'14"	46.00

502-35

BOOK 502 PAGE 35
OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
99-0482440
05/20/99 04:05

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
27240
J. BRAD
GRUVER
5-6-99
ARIZONA, U.S.A.

SCALE: 1" = 50'
0' 50' 100' 150'

GILBERTSON
ASSOCIATES
inc.
consulting civil engineers & land surveyors
15974 North 77th Street, Scottsdale, Arizona 85260-1761 602/607-2244

FINAL PLAT

GRAYHAWK
PARCEL 2c EAST/2g(a) WEST

Date APRIL 2, 1999	Job No. 27288	Sheet 4 of 4

19-PP-98 5711-98

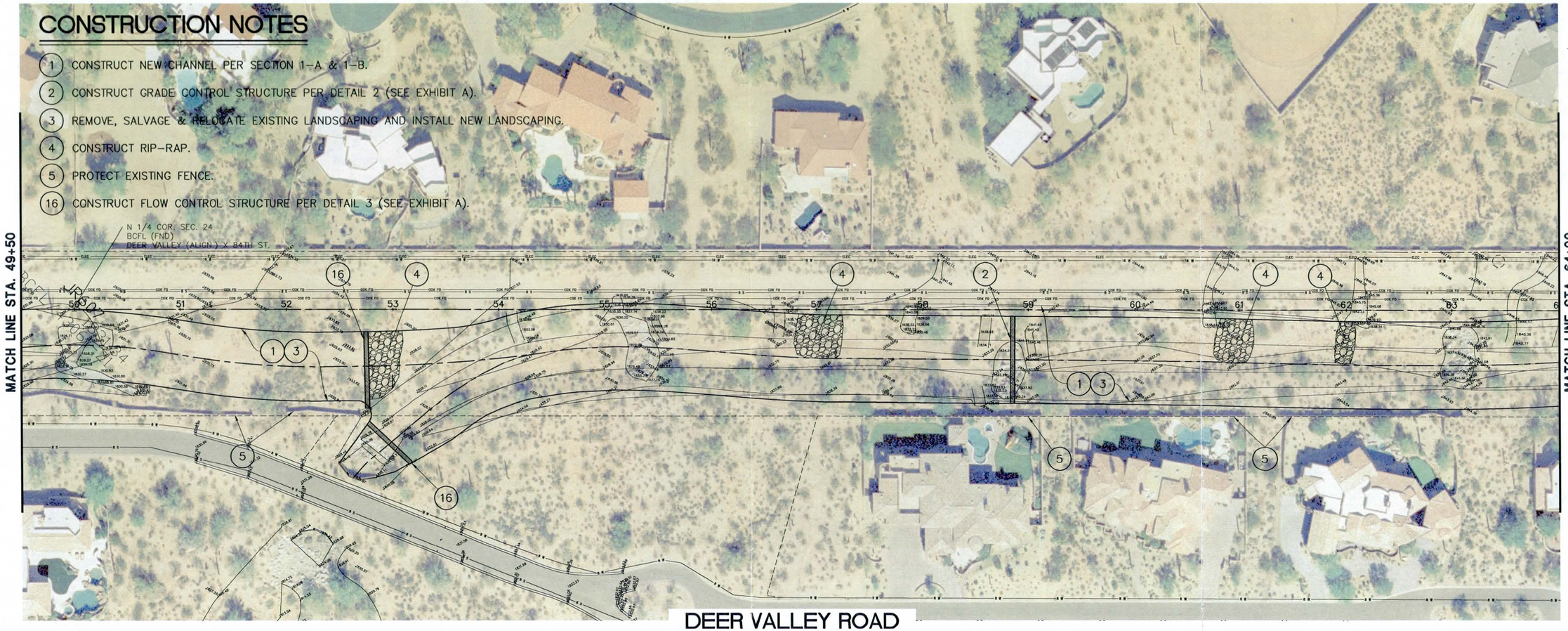
FILE NAME: K:\DWG\27288FP4
DATE PLOTTED: 4-12-99

APPENDIX B: PLAN AND PROFILES FOR ALTERNATIVES

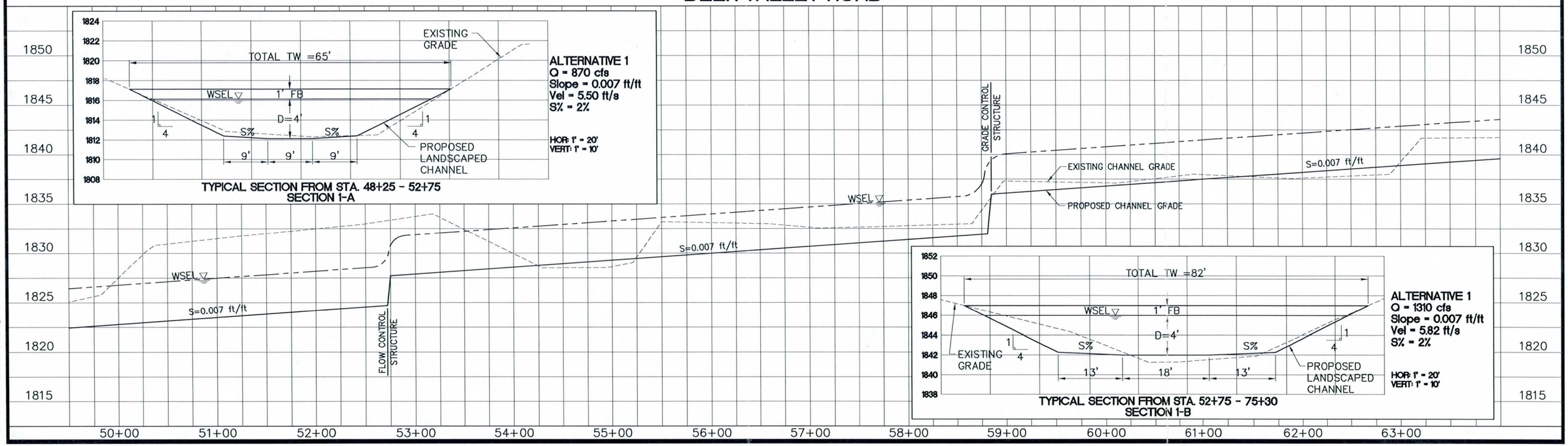
Note: See **Appendix C** for landscape cross section. For instance, Section 1-A refers to Alternative 1 and the letter A is designated as a cross section. Also, the hydraulic properties of the cross section can be found in **Appendix G**.

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 1-A & 1-B.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
16. CONSTRUCT FLOW CONTROL STRUCTURE PER DETAIL 3 (SEE EXHIBIT A).



TYPICAL SECTION FROM STA. 48+25 - 52+75
SECTION 1-A



TYPICAL SECTION FROM STA. 52+75 - 75+30
SECTION 1-B

Deer Valley Road Channel

Alternative 1

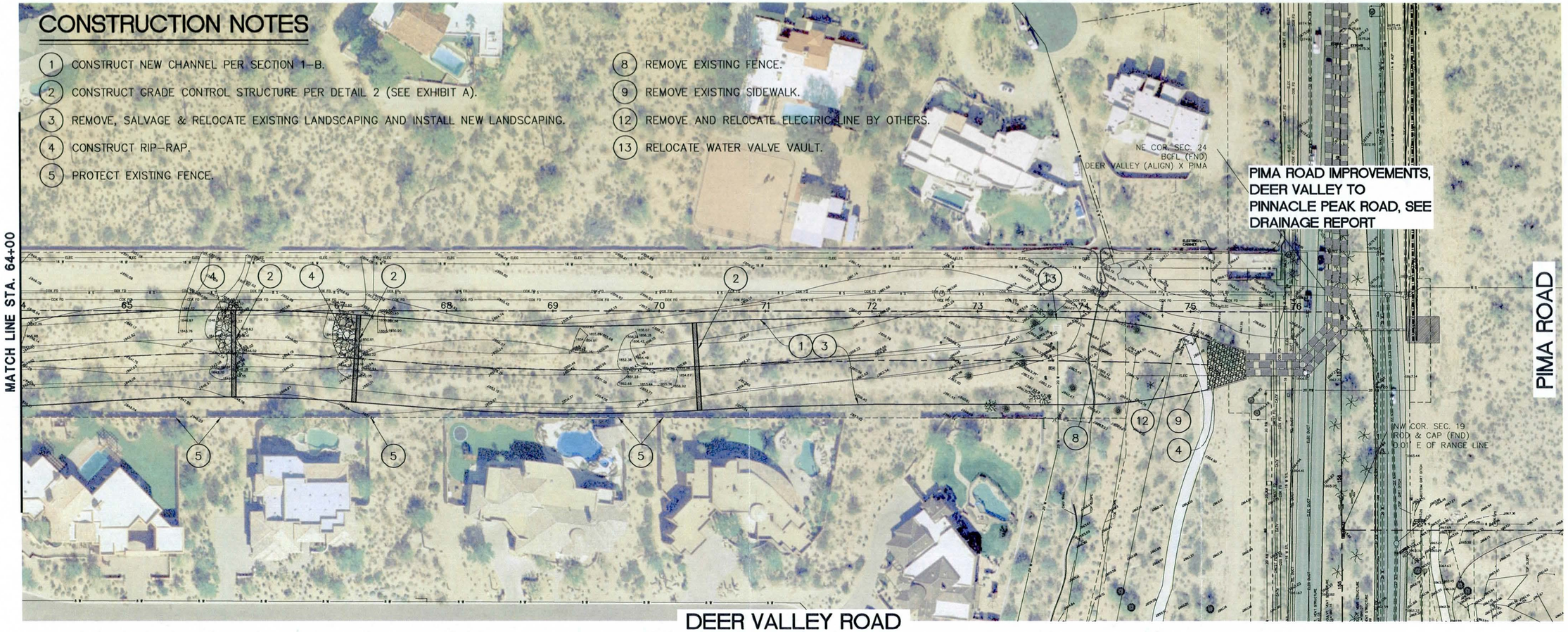
SCALE HOR-1"=100' VERT-1"=10'

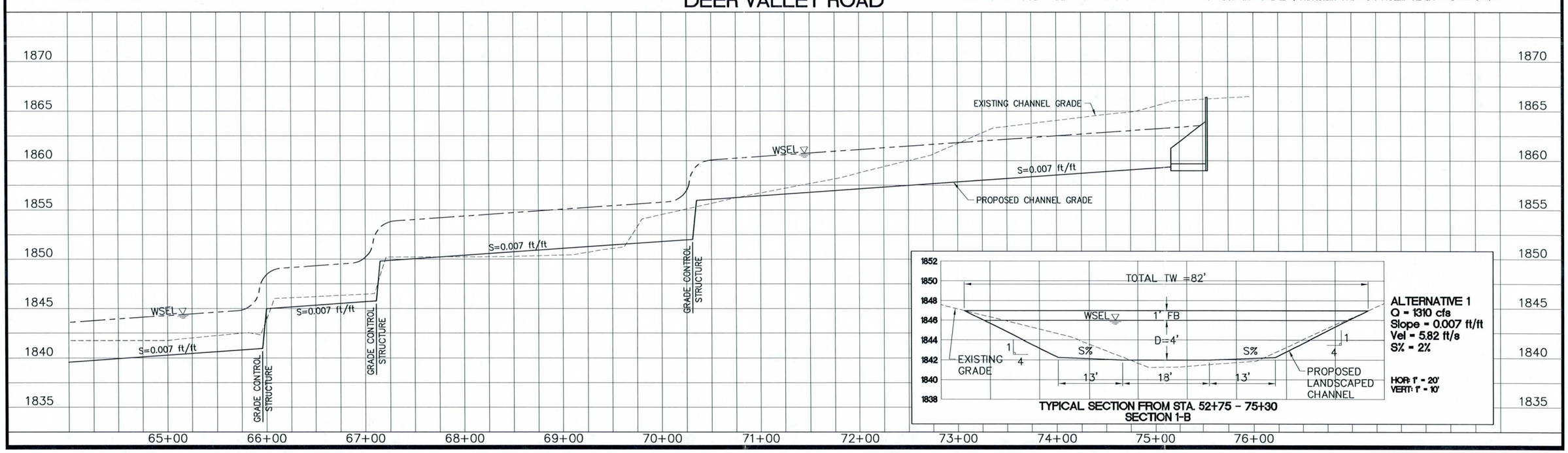
SHT. 3 of 4

FILE: P:\400\41006ia\drainage\DV_PA\DWG\Alt1_PP03_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 1-B.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
8. REMOVE EXISTING FENCE.
9. REMOVE EXISTING SIDEWALK.
12. REMOVE AND RELOCATE ELECTRIC LINE BY OTHERS.
13. RELOCATE WATER VALVE VAULT.





Deer Valley Road Channel

Alternative 1

SCALE HOR-1"=100' VERT-1"=10'

SHT. 4 of 4

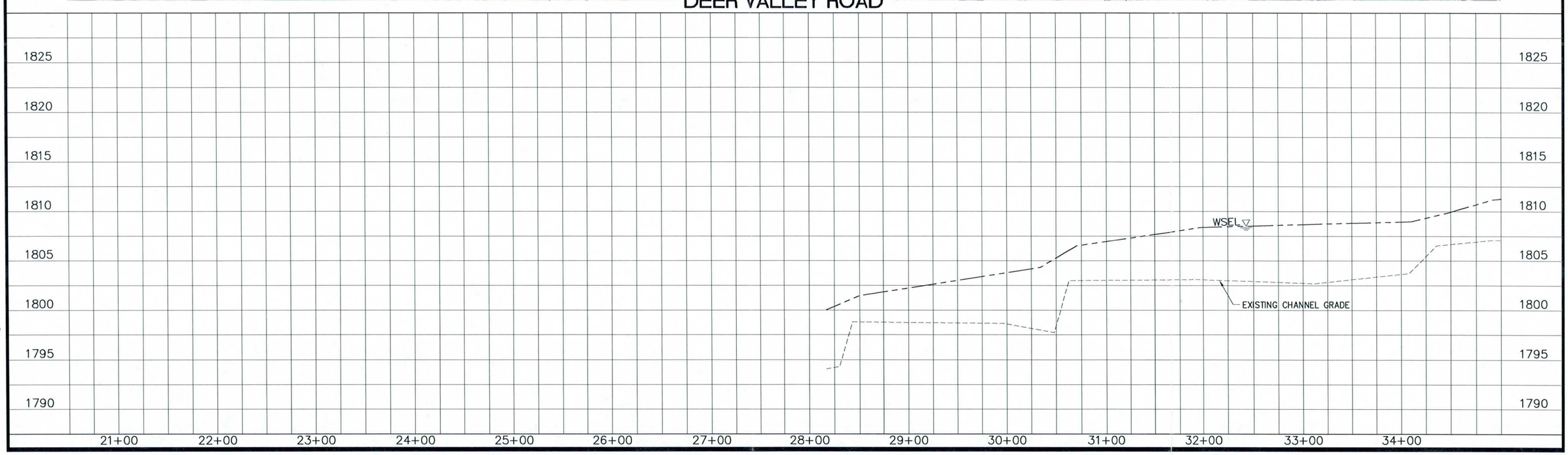
FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt1_PP04_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

(6) IMPROVE RIP-RAP AREAS.

(14) PROTECT EXISTING CHANNEL.

MATCH LINE STA. 35+00



Deer Valley Road Channel

Alternative 1

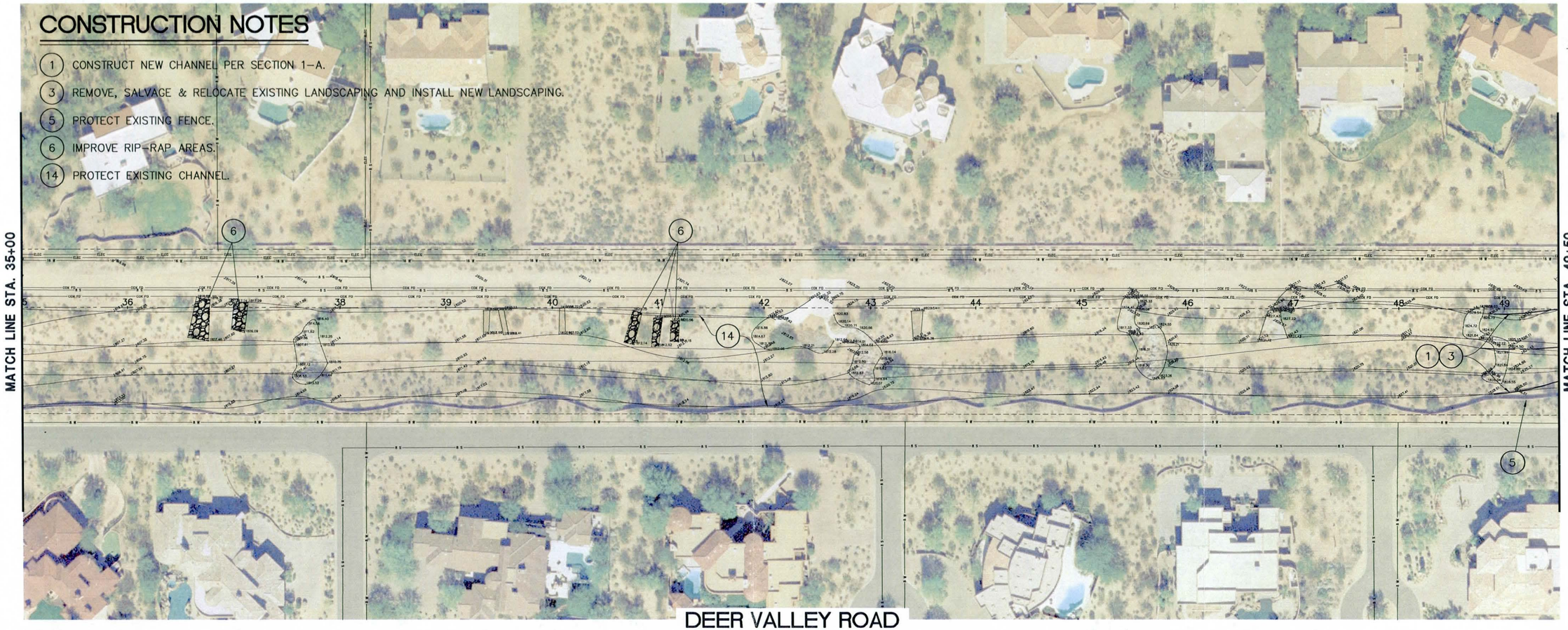
SCALE HOR-1"=100' VERT-1"=10'

SHT. 1 of 4

FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt1_PP01_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

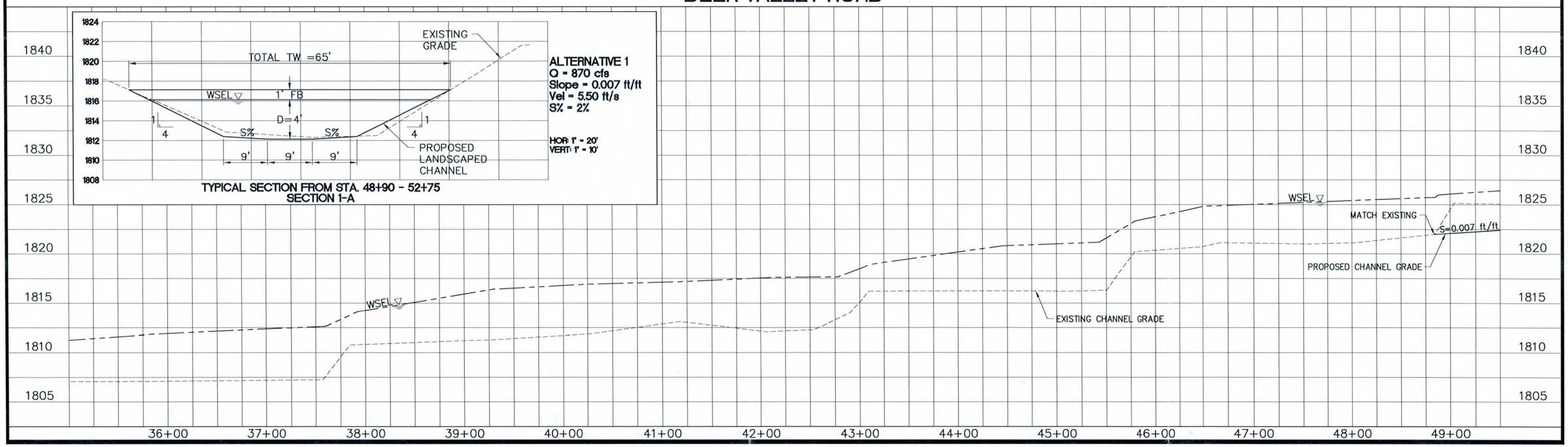
1. CONSTRUCT NEW CHANNEL PER SECTION 1-A.
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
5. PROTECT EXISTING FENCE.
6. IMPROVE RIP-RAP AREAS.
14. PROTECT EXISTING CHANNEL.



TYPICAL SECTION FROM STA. 48+90 - 52+75
SECTION 1-A

ALTERNATIVE 1
Q = 870 cfs
Slope = 0.007 ft/ft
Vel = 5.50 ft/s
S% = 2%

HOR: 1" = 20'
VERT: 1" = 10'



N

SHT. 2 of 4

SCALE HOR-1"=100' VERT-1"=10'

Alternative 1

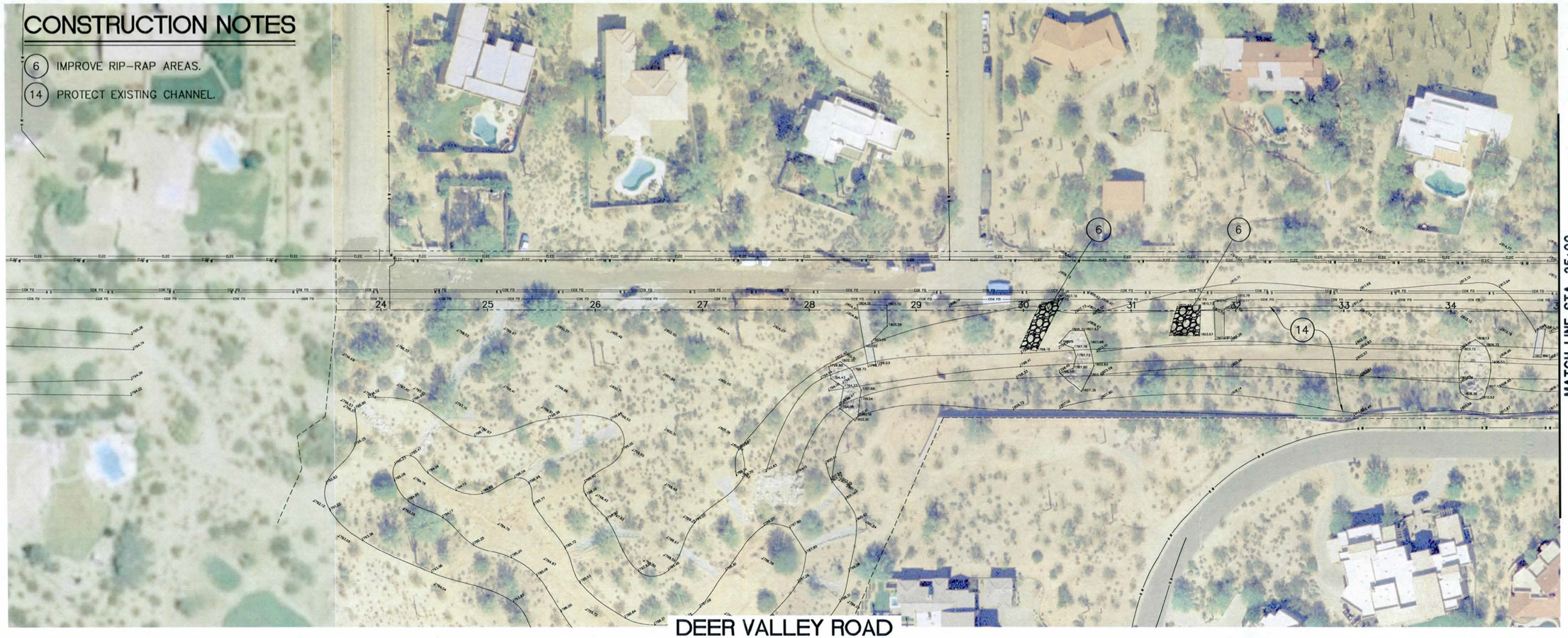
Deer Valley Road Channel

FILE: P:\400\41006\a\drainage\DV_PA\DWG\Alt1_PP02_DV.dwg DATE: Aug 31, 2009

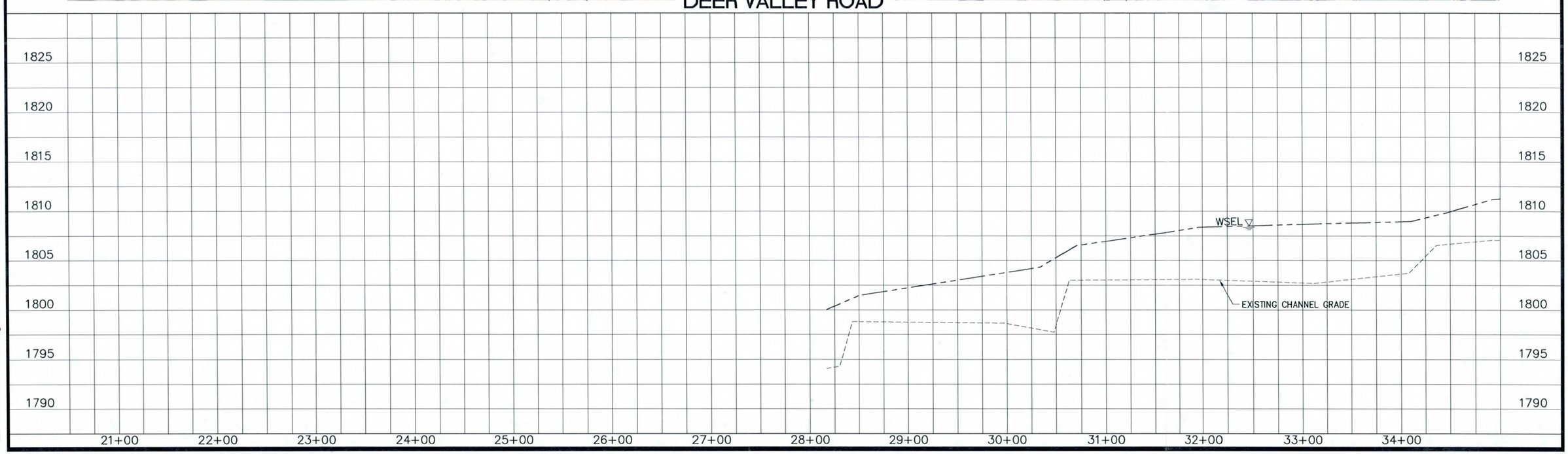
CONSTRUCTION NOTES

(6) IMPROVE RIP-RAP AREAS.

(14) PROTECT EXISTING CHANNEL.



MATCH LINE STA. 35+00



Deer Valley Road Channel

Alternative 2

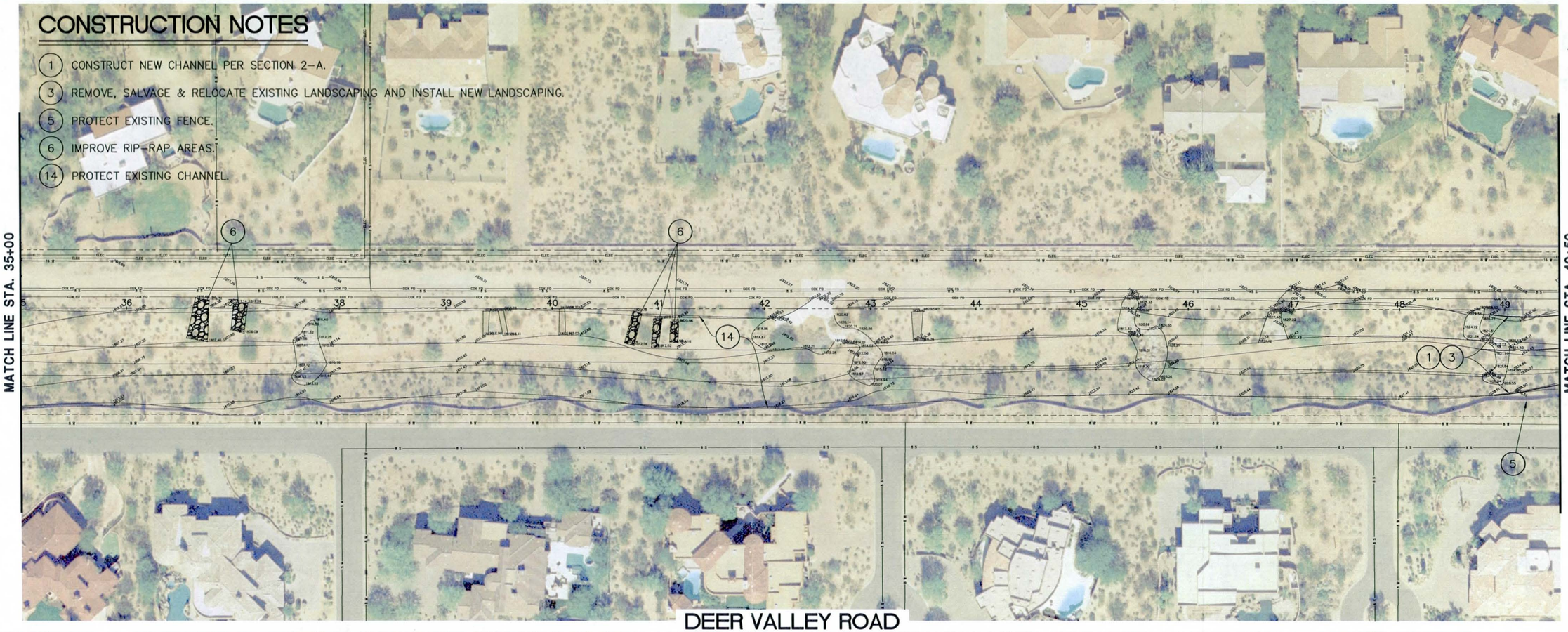
SCALE HOR-1"=100' VERT-1"=10'

SHT. 1 of 4

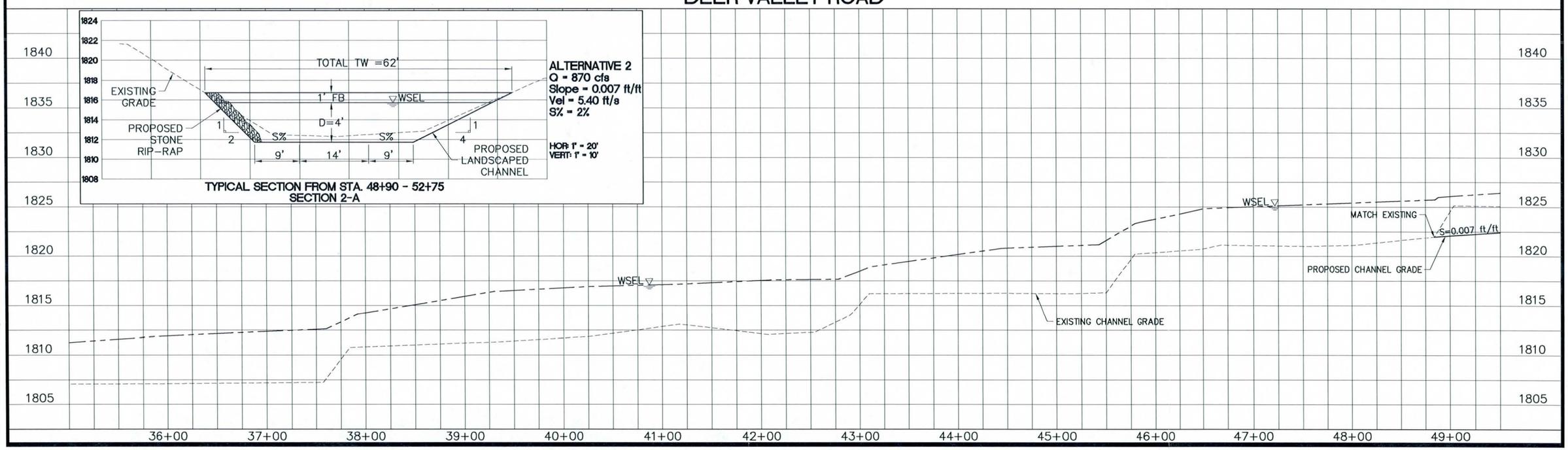
FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt2_PP01_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 2-A.
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
5. PROTECT EXISTING FENCE.
6. IMPROVE RIP-RAP AREAS.
14. PROTECT EXISTING CHANNEL.



TYPICAL SECTION FROM STA. 48+90 - 52+75
SECTION 2-A



Deer Valley Road Channel

Alternative 2

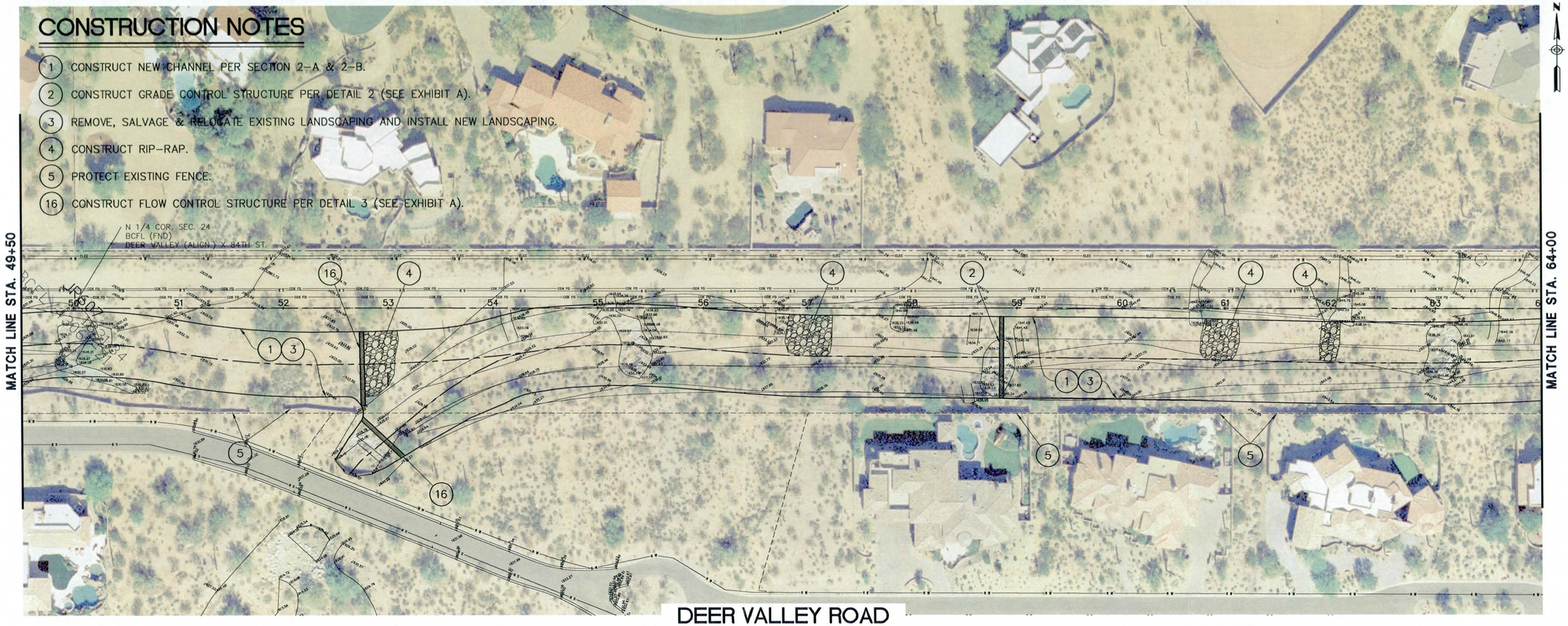
SCALE HOR-1"=100' VERT-1"=10

SHT. 2 of 4

FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt2_PP02_DV.dwg DATE: Aug 31, 2009

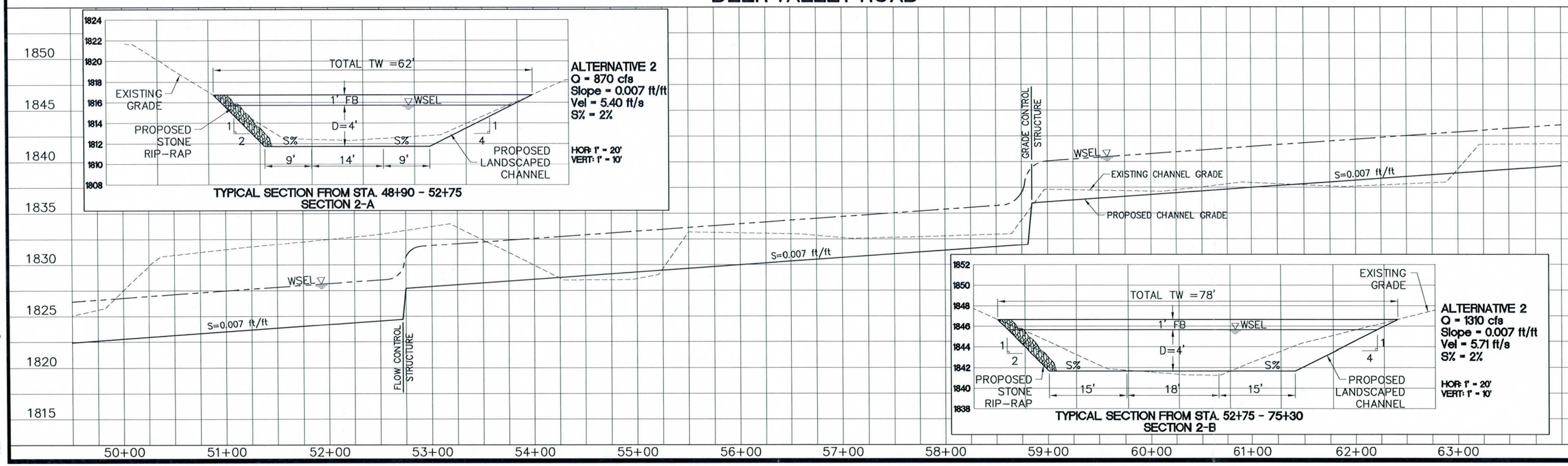
CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 2-A & 2-B.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
16. CONSTRUCT FLOW CONTROL STRUCTURE PER DETAIL 3 (SEE EXHIBIT A).



ALTERNATIVE 2
Q = 870 cfs
Slope = 0.007 ft/ft
Vel = 5.40 ft/s
S% = 2%

TYPICAL SECTION FROM STA. 48+90 - 52+75
SECTION 2-A



ALTERNATIVE 2
Q = 1310 cfs
Slope = 0.007 ft/ft
Vel = 5.71 ft/s
S% = 2%

TYPICAL SECTION FROM STA. 52+75 - 75+30
SECTION 2-B

Deer Valley Road Channel

Alternative 2

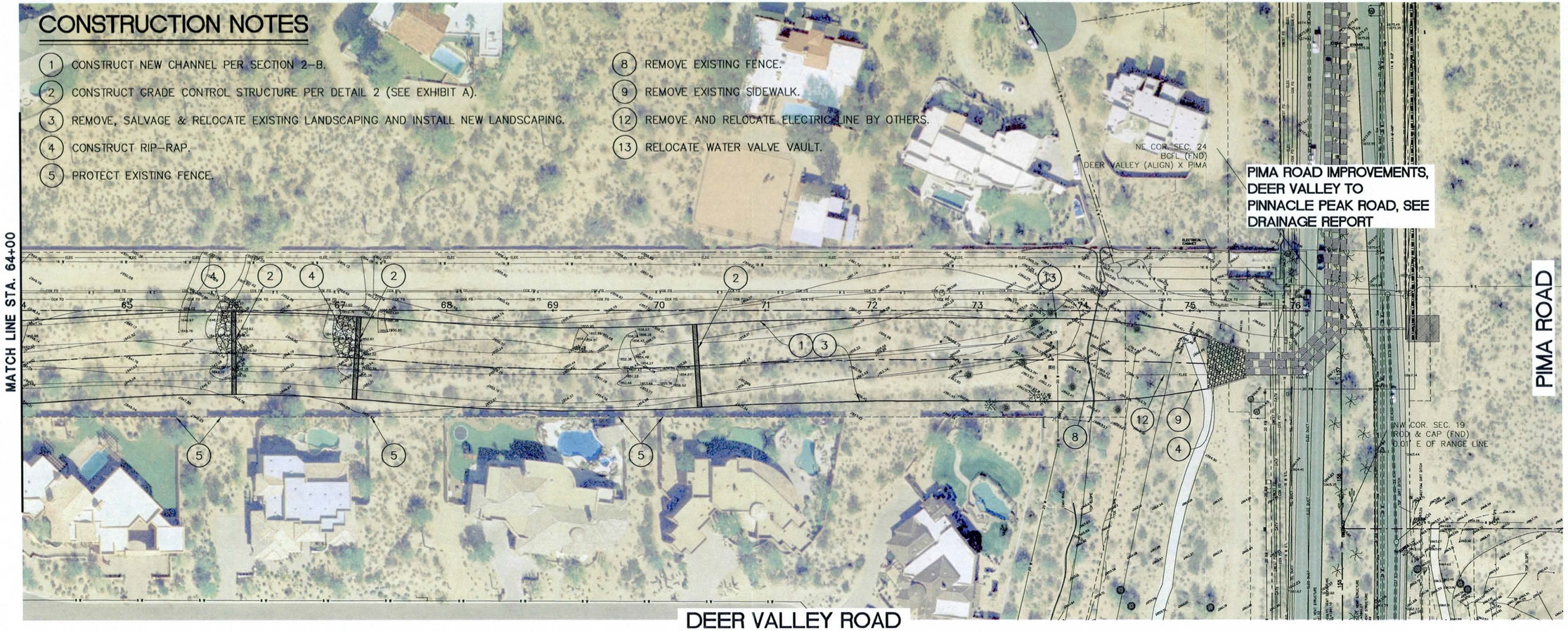
SCALE: HOR. 1"=100' VERT. 1"=10'

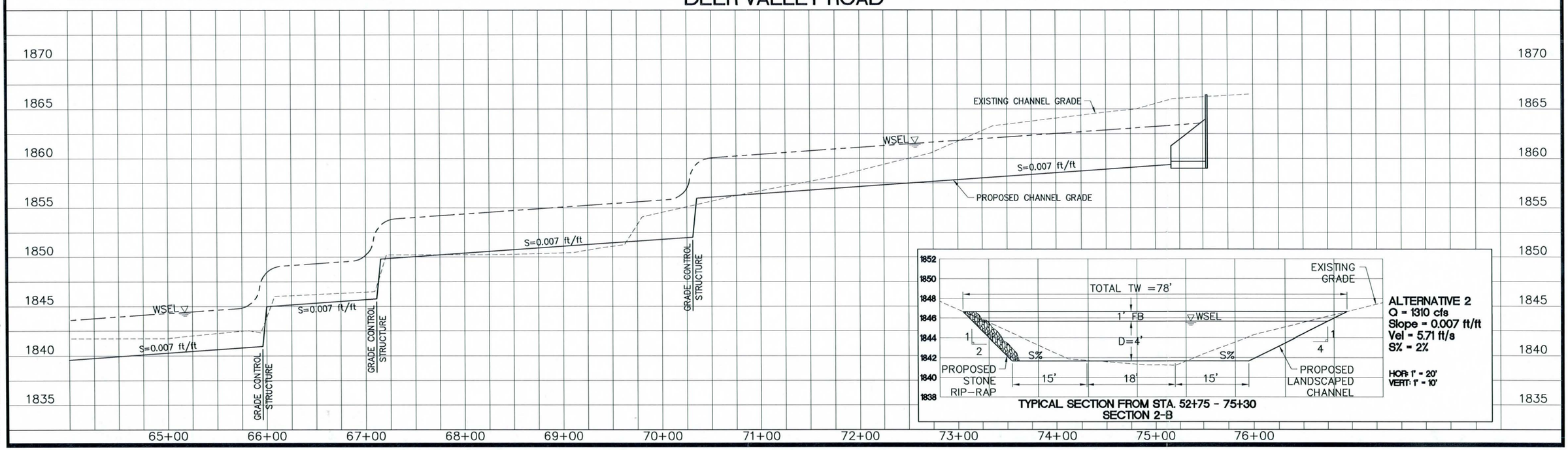
SHT. 3 of 4

FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt2_PP03_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 2-B.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
8. REMOVE EXISTING FENCE.
9. REMOVE EXISTING SIDEWALK.
12. REMOVE AND RELOCATE ELECTRIC LINE BY OTHERS.
13. RELOCATE WATER VALVE VAULT.





Alternative 2

Deer Valley Road Channel

SCALE HOR-1"=100' VERT-1"=10

SHT. 4 of 4

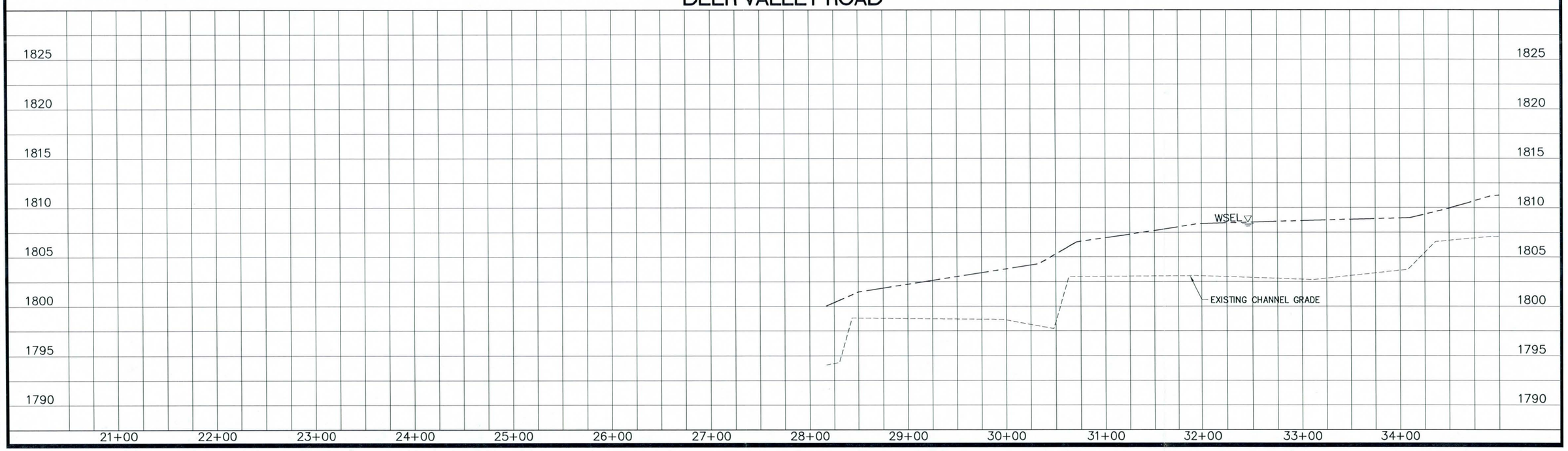
FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt2_PP04_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

(6) IMPROVE RIP-RAP AREAS.

(14) PROTECT EXISTING CHANNEL.

MATCH LINE STA. 35+00



Deer Valley Road Channel

Alternative 3

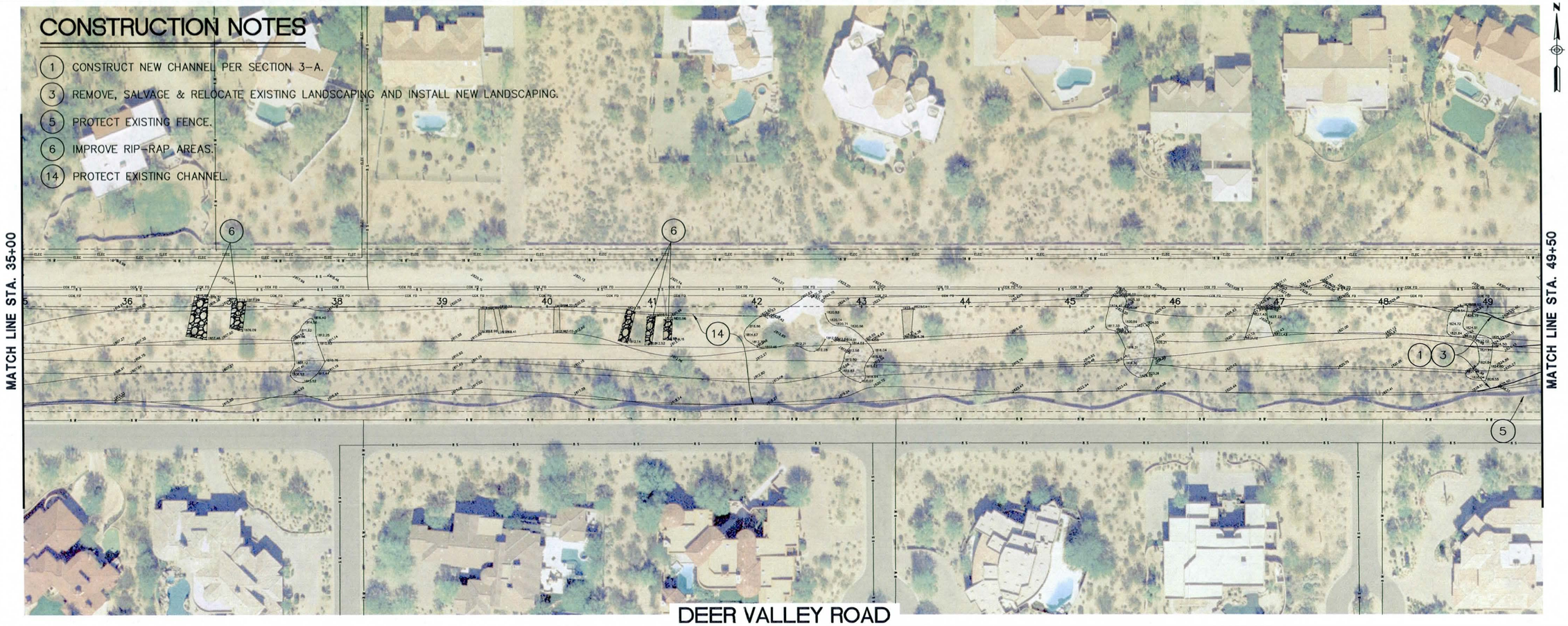
SCALE HOR-1"=100' VERT-1"=10'

SHT. 1 of 4

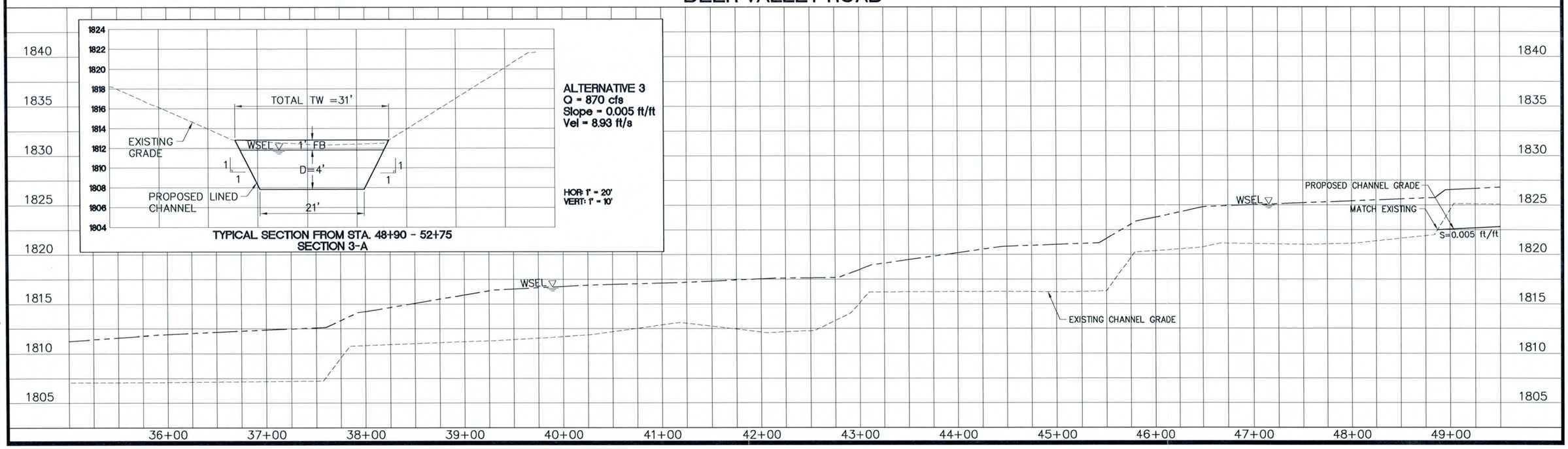
FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt3_PP01_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 3-A.
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
5. PROTECT EXISTING FENCE.
6. IMPROVE RIP-RAP AREAS.
14. PROTECT EXISTING CHANNEL.



TYPICAL SECTION FROM STA. 48+90 - 52+75
SECTION 3-A



Alternative 3

Deer Valley Road Channel

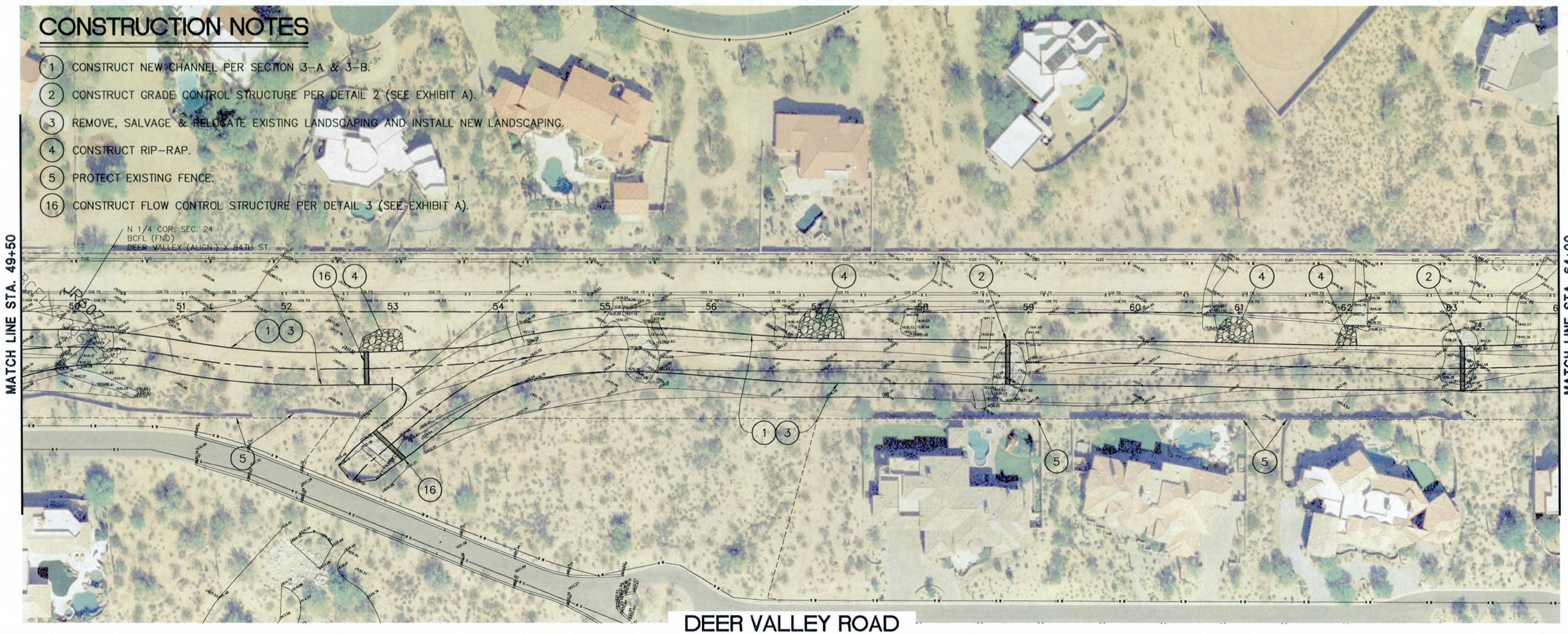
SCALE HOR-1"=100' VERT-1"=10'

SHT. 2 of 4

FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt3_PP02_DV.dwg DATE: Aug 31, 2009

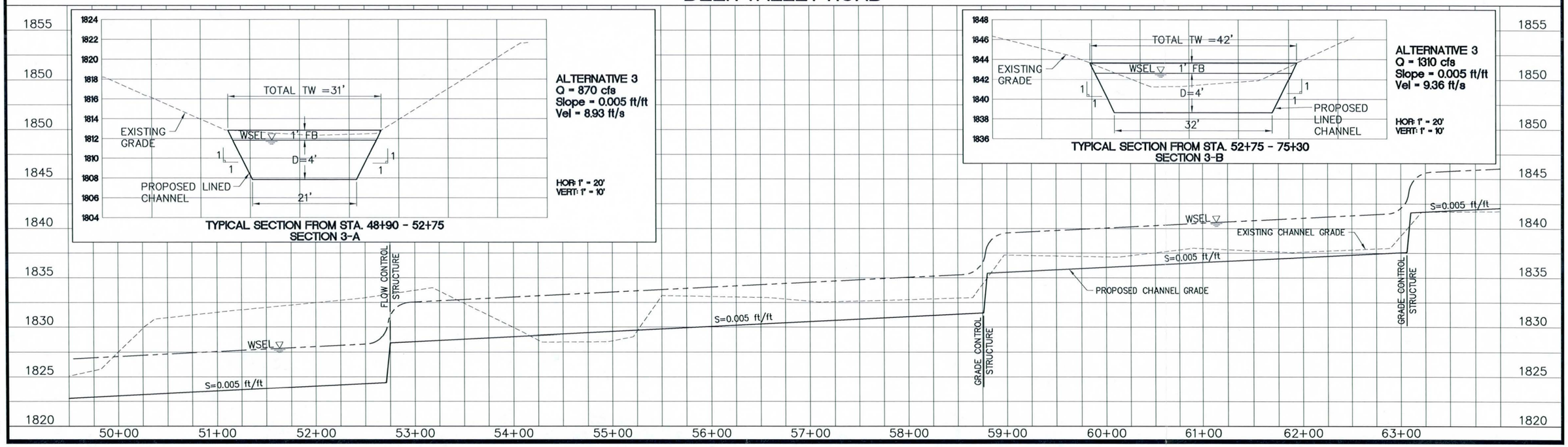
CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 3-A & 3-B.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
16. CONSTRUCT FLOW CONTROL STRUCTURE PER DETAIL 3 (SEE EXHIBIT A).



TYPICAL SECTION FROM STA. 48+90 - 52+75
SECTION 3-A

TYPICAL SECTION FROM STA. 52+75 - 75+30
SECTION 3-B



Deer Valley Road Channel

Alternative 3

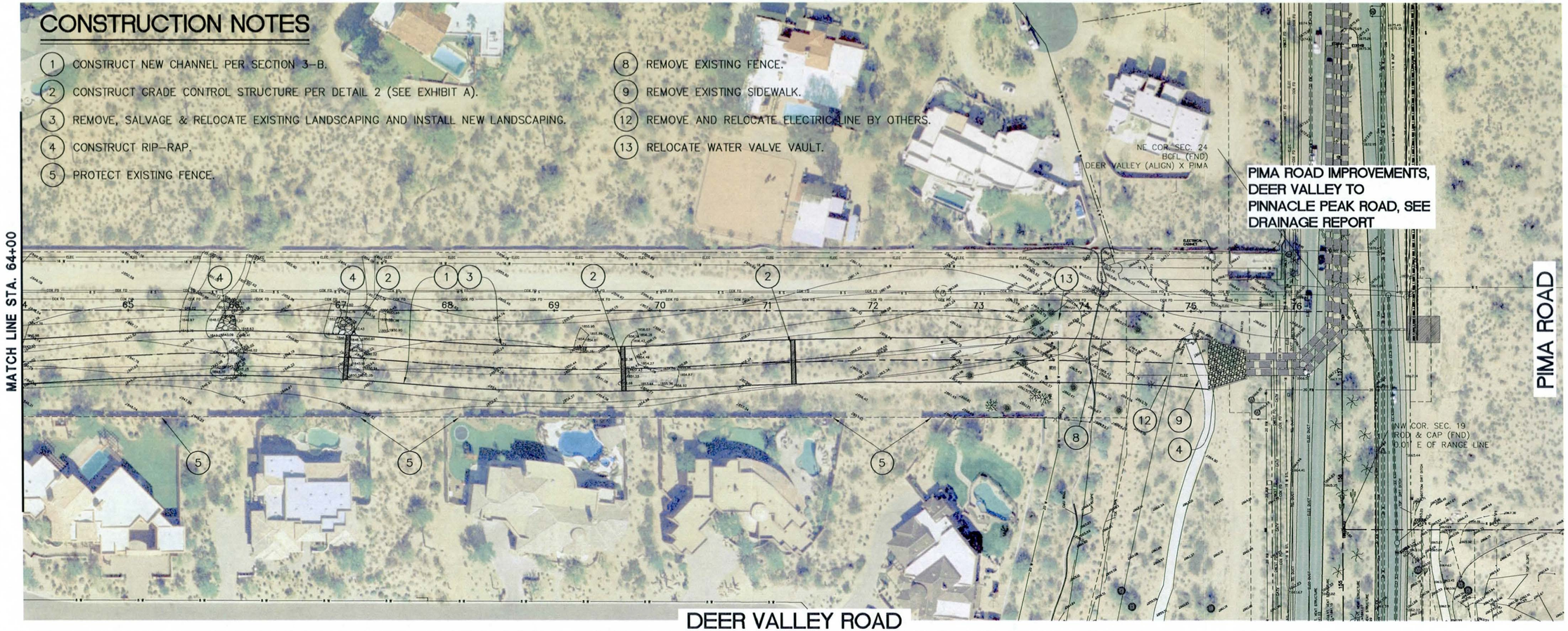
SCALE HOR.-1"=100' VERT.-1"=10'

SHT. 3 of 4

FILE: P:\400\41006\a\drainage\DV_PA\DWG\Alt3_PP03_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

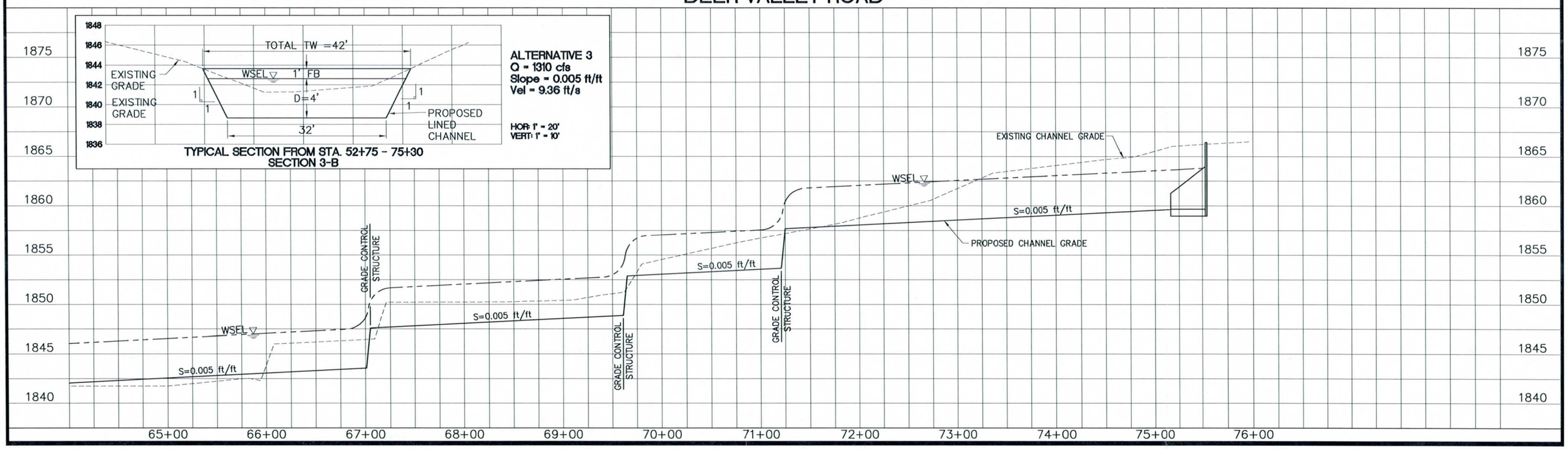
1. CONSTRUCT NEW CHANNEL PER SECTION 3-B.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
8. REMOVE EXISTING FENCE.
9. REMOVE EXISTING SIDEWALK.
12. REMOVE AND RELOCATE ELECTRIC LINE BY OTHERS.
13. RELOCATE WATER VALVE VAULT.



TYPICAL SECTION FROM STA. 52+75 - 75+30
SECTION 3-B

ALTERNATIVE 3
Q = 1310 cfs
Slope = 0.005 ft/ft
Vel = 9.36 ft/s

HOR: 1" = 20'
VERT: 1" = 10'



Deer Valley Road Channel

Alternative 3

SCALE HOR-1"=100' VERT-1"=10'

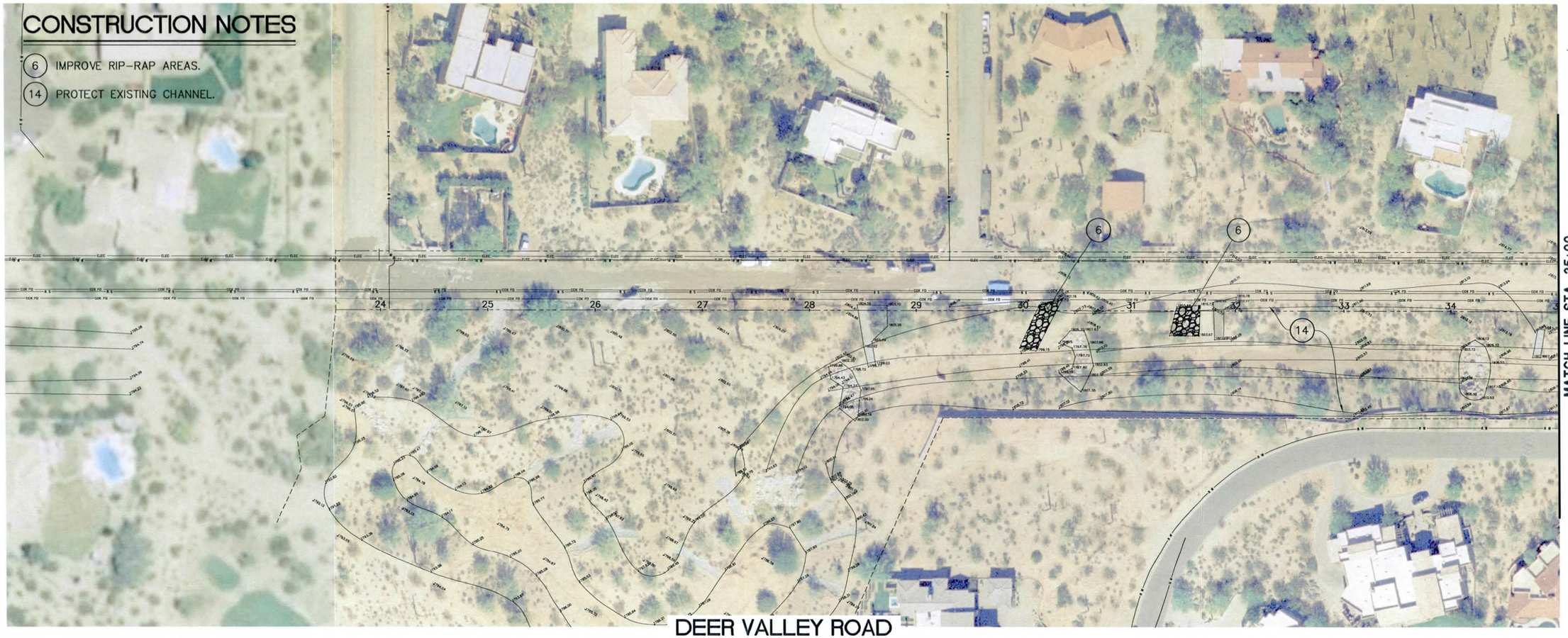
SHT. 4 of 4

FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt3_PP04_DV.dwg DATE: Aug 31, 2009

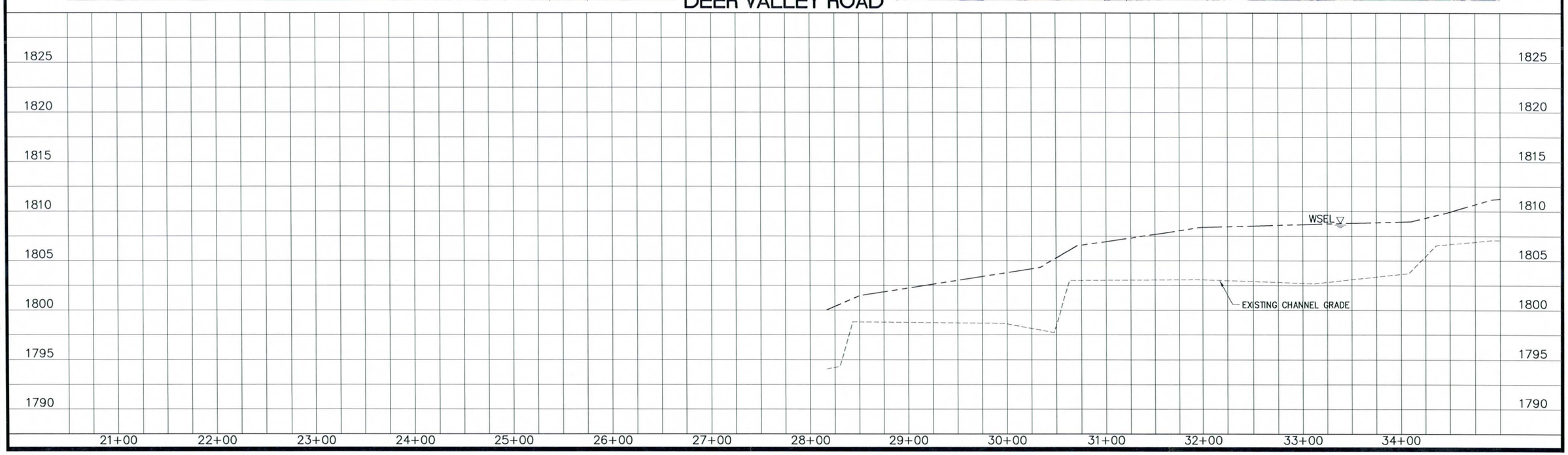
CONSTRUCTION NOTES

(6) IMPROVE RIP-RAP AREAS.

(14) PROTECT EXISTING CHANNEL.



MATCH LINE STA. 35+00



Alternative 4

Deer Valley Road Channel

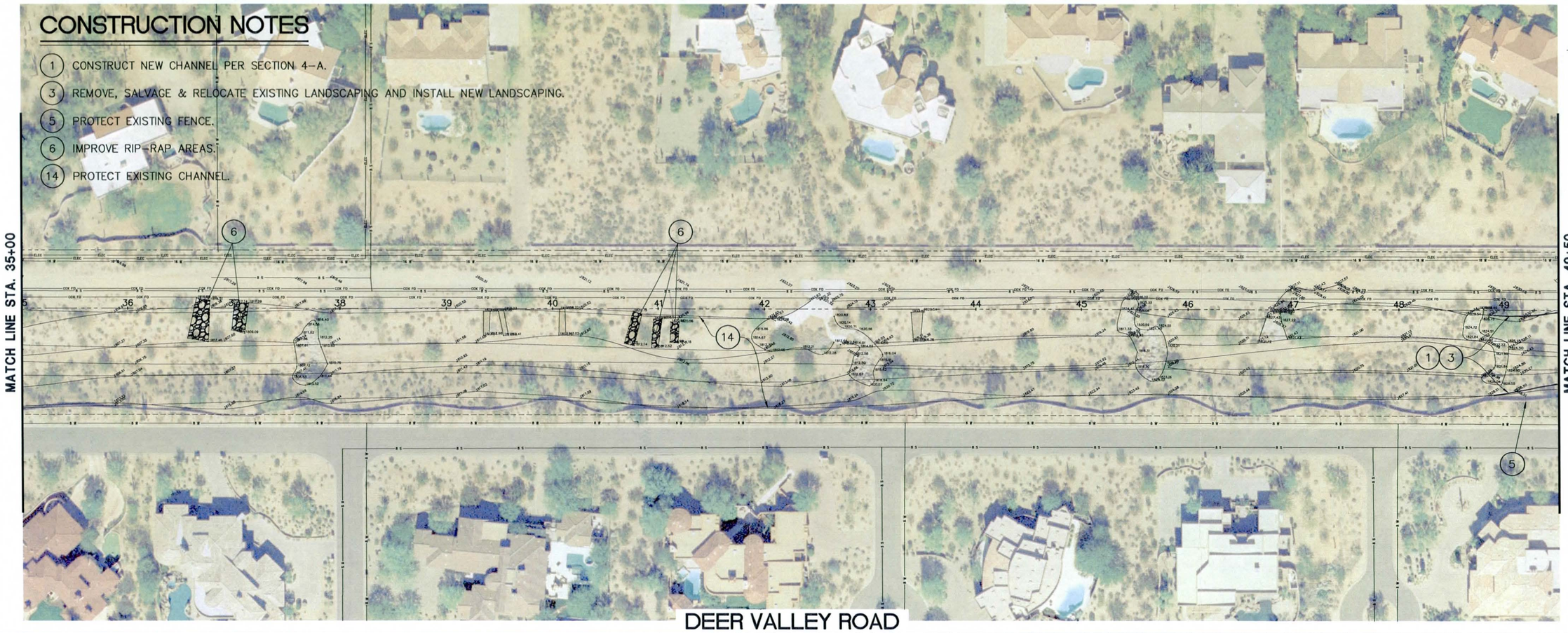
SCALE HOR-1"=100' VERT-1"=10'

SHT. 1 of 4

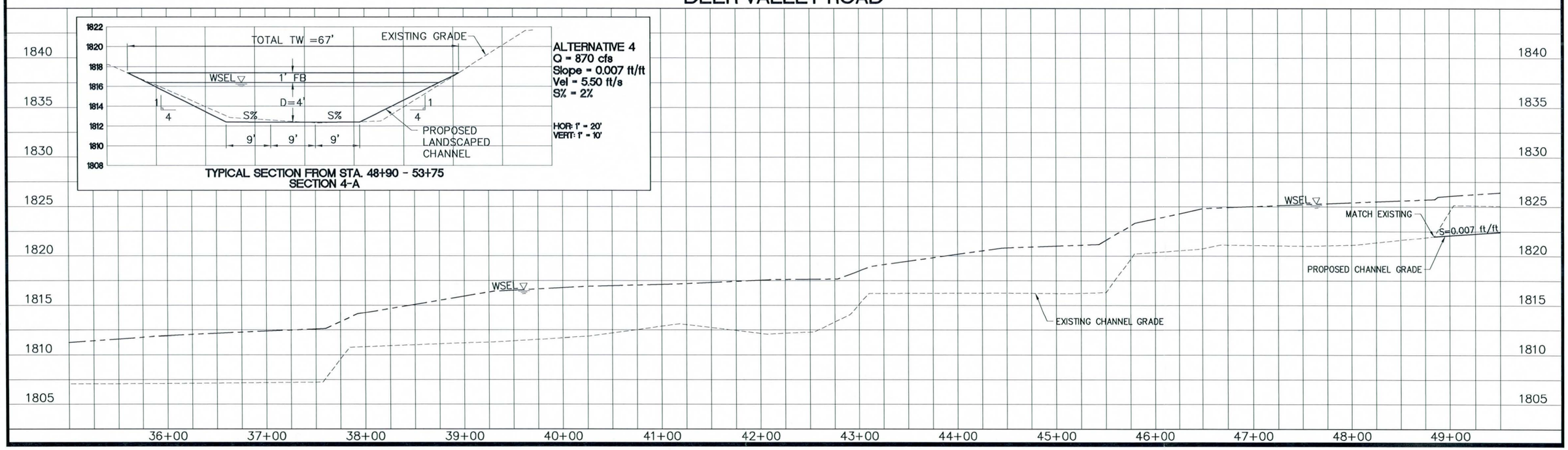
FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt4_PP01_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 4-A.
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
5. PROTECT EXISTING FENCE.
6. IMPROVE RIP-RAP AREAS.
14. PROTECT EXISTING CHANNEL.



TYPICAL SECTION FROM STA. 48+90 - 53+75
SECTION 4-A



Deer Valley Road Channel

Alternative 4

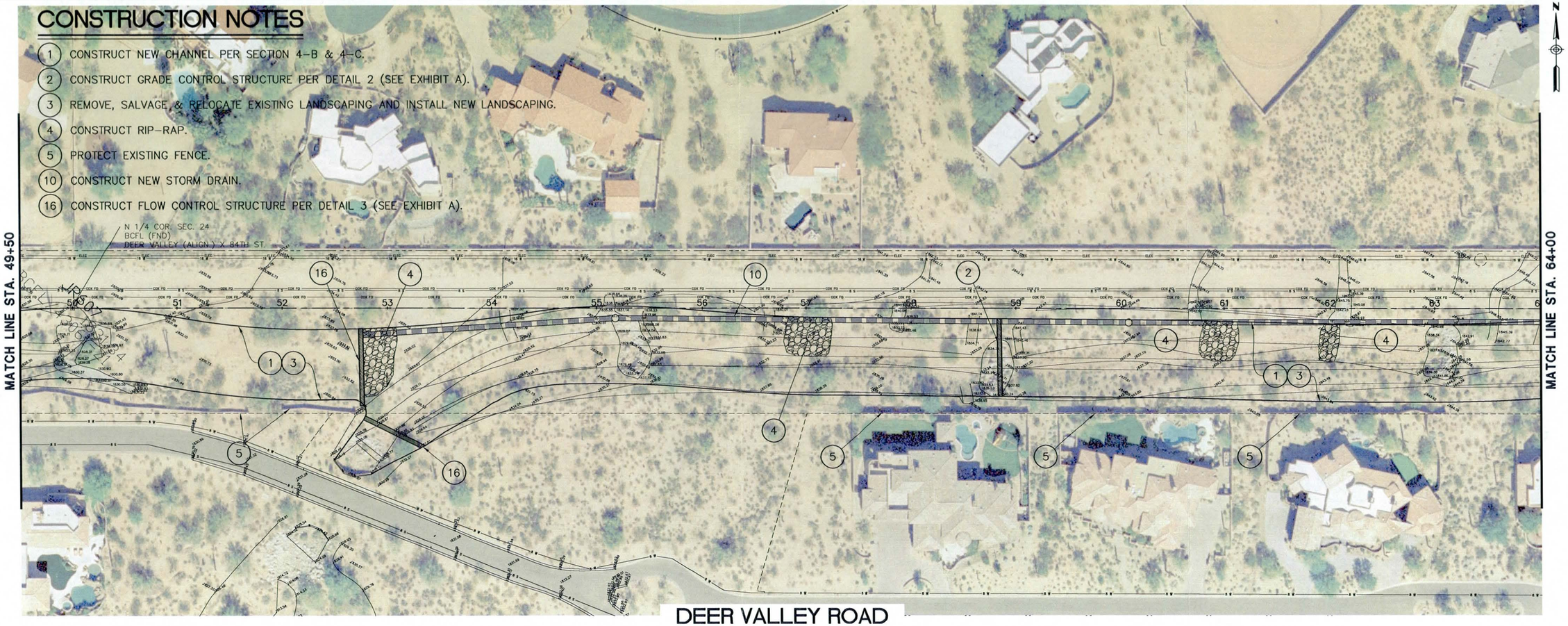
SCALE HOR-1"=100' VERT-1"=10'

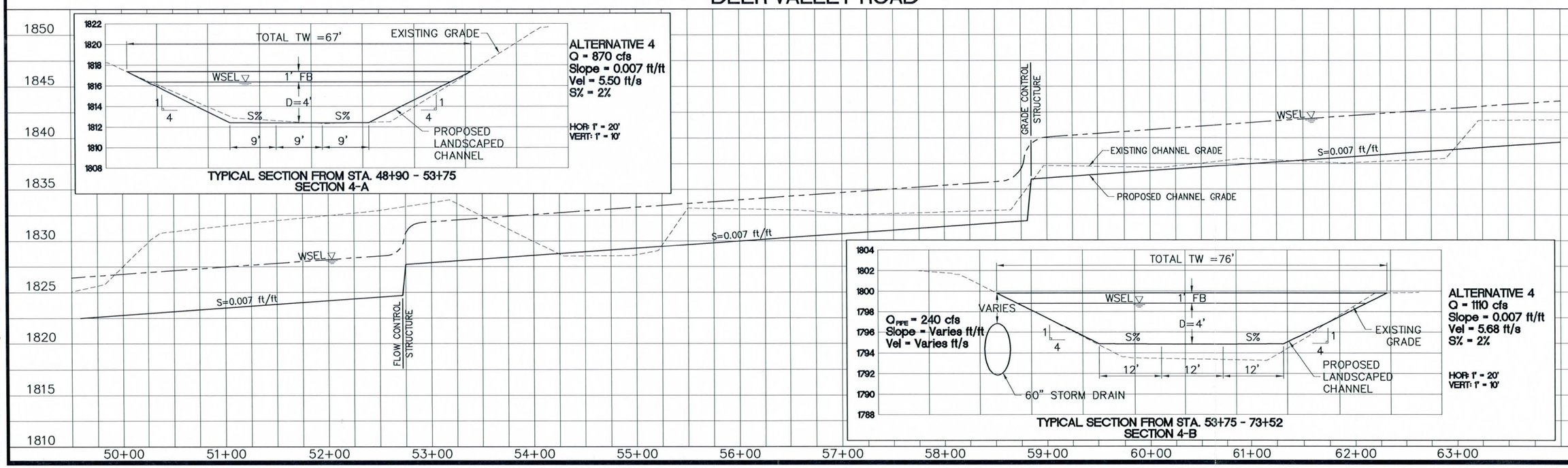
SHT. 2 of 4

FILE: P:\400\41006la\drainage\DV_PA\DWG\Alt4_PP02_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION 4-B & 4-C.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
10. CONSTRUCT NEW STORM DRAIN.
16. CONSTRUCT FLOW CONTROL STRUCTURE PER DETAIL 3 (SEE EXHIBIT A).





Deer Valley Road Channel

Alternative 4

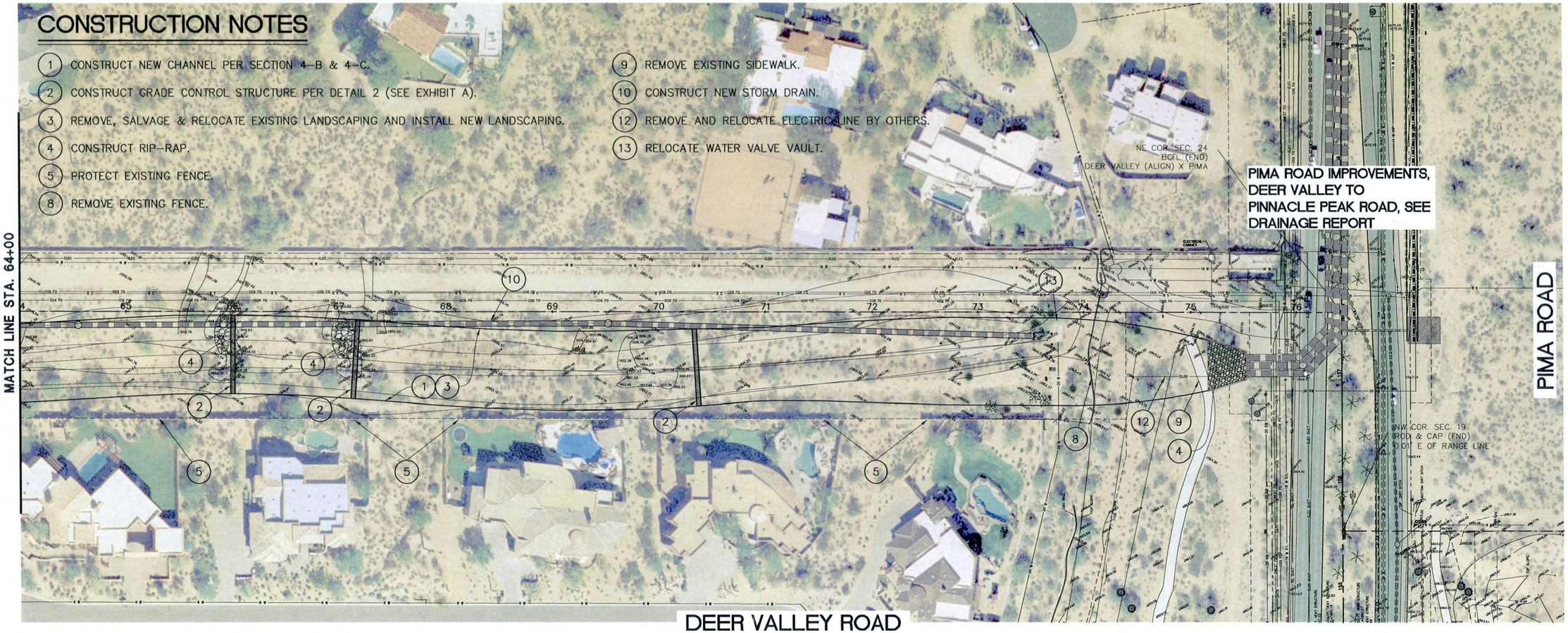
SCALE: HOR-1"=100' VERT-1"=10'

SHT. 3 of 4

FILE: P:\400\410061a\drainage\DV_PA\DWG\Alt-4_PP03_DV.dwg DATE: Aug 31, 2009

CONSTRUCTION NOTES

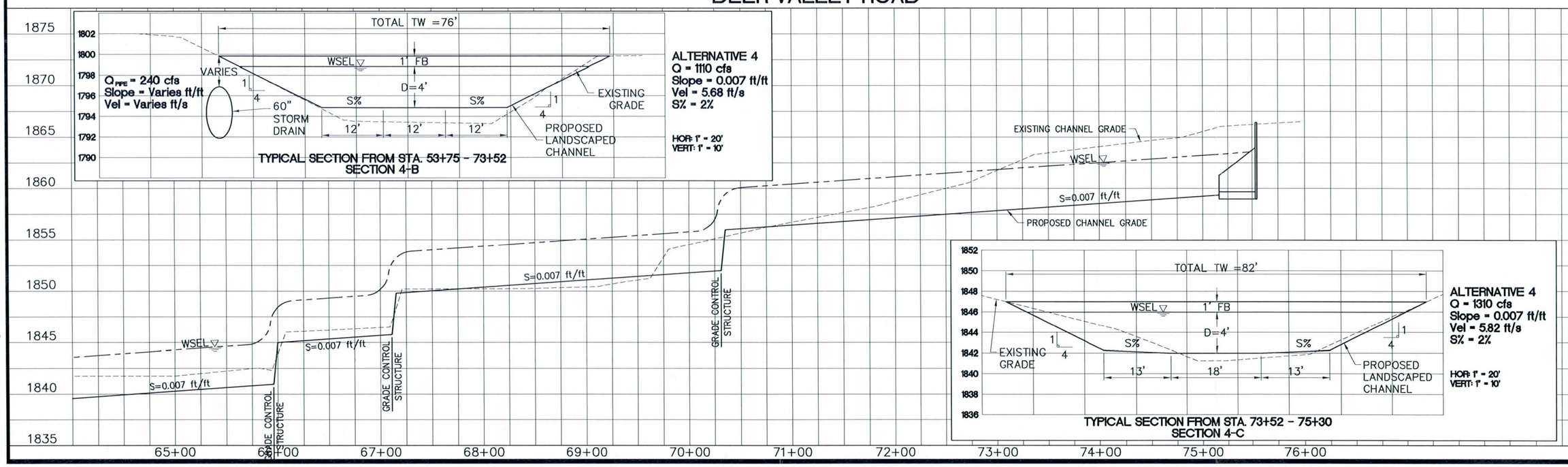
1. CONSTRUCT NEW CHANNEL PER SECTION 4-B & 4-C.
2. CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL 2 (SEE EXHIBIT A).
3. REMOVE, SALVAGE & RELOCATE EXISTING LANDSCAPING AND INSTALL NEW LANDSCAPING.
4. CONSTRUCT RIP-RAP.
5. PROTECT EXISTING FENCE.
8. REMOVE EXISTING FENCE.
9. REMOVE EXISTING SIDEWALK.
10. CONSTRUCT NEW STORM DRAIN.
12. REMOVE AND RELOCATE ELECTRIC LINE BY OTHERS.
13. RELOCATE WATER VALVE VAULT.



TYPICAL SECTION FROM STA. 53+75 - 73+52
SECTION 4-B

ALTERNATIVE 4
Q = 1110 cfs
Slope = 0.007 ft/ft
Vel = 5.68 ft/s
S% = 2%

HOR: 1" = 20'
VERT: 1" = 10'



TYPICAL SECTION FROM STA. 73+52 - 75+30
SECTION 4-C

ALTERNATIVE 4
Q = 1310 cfs
Slope = 0.007 ft/ft
Vel = 5.82 ft/s
S% = 2%

HOR: 1" = 20'
VERT: 1" = 10'

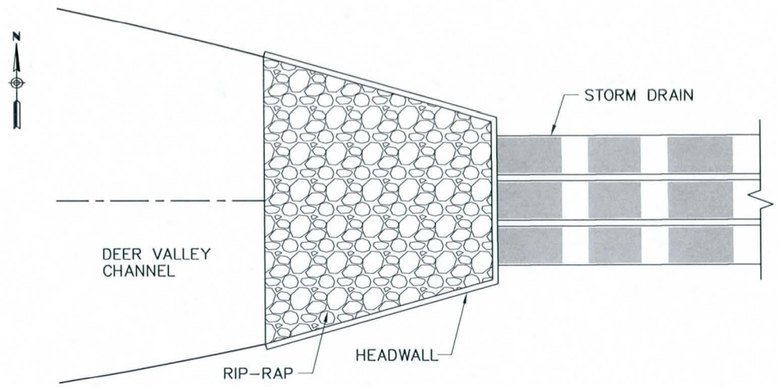
SCALE
HOR-1"=100'
VERT-1"=10'

SHT. 4 of 4

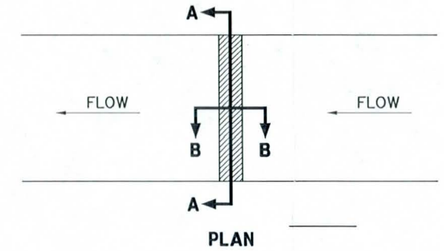
Alternative 4

Deer Valley Road Channel

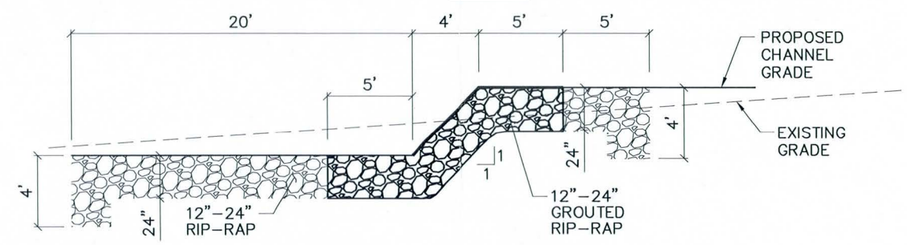
FILE: P:\400\41006\a\drainage\DV_PA\DWG\Alt4_PP04_DV.dwg DATE: Aug 31, 2009



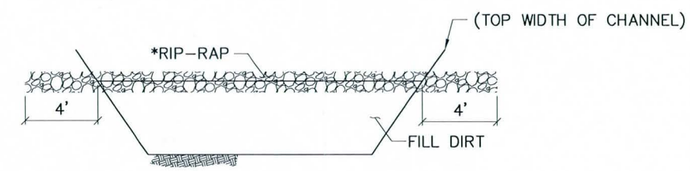
DETAIL NO. 1
STORM DRAIN OUTFALL @ DEER VALLEY ROAD AND PIMA ROAD



PLAN



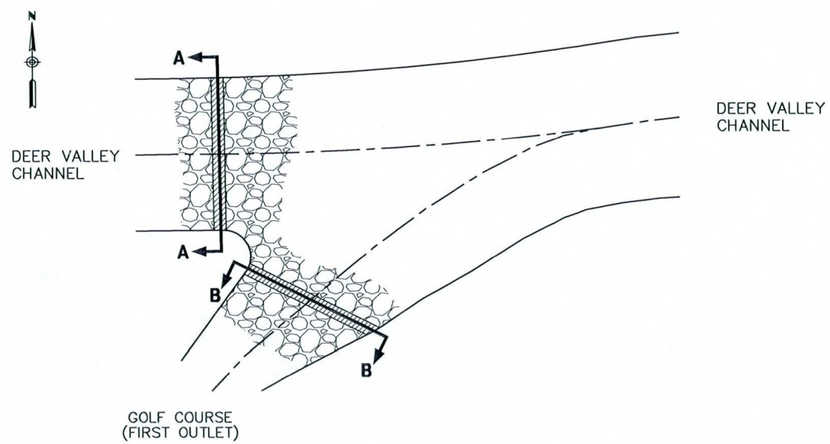
SECTION A-A

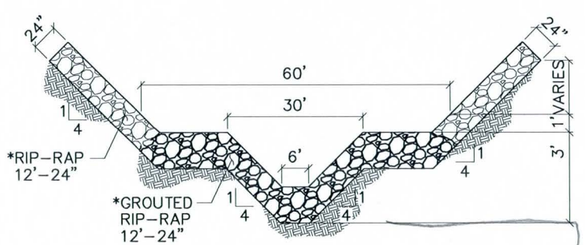


SECTION B-B

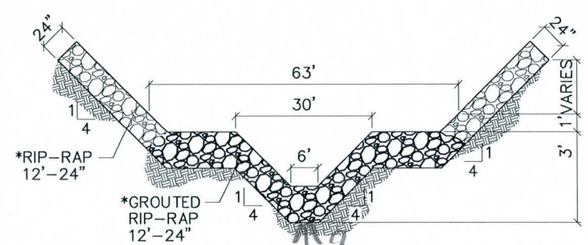
*NOTE: FOR DEER VALLEY RD CHANNEL ALTERNATIVE 3, REPLACE RIP-RAP WITH COLORED GUNITE LINING.

DETAIL NO. 2
TYPICAL GRADE CONTROL STRUCTURE





SECTION A-A



SECTION B-B

*NOTE: FOR DEER VALLEY RD CHANNEL ALTERNATIVE 3, REPLACE RIP-RAP WITH COLORED GUNITE LINING.

DETAIL NO. 3
FLOW CONTROL STRUCTURE @ ≈ 2300 FEET WEST OF PIMA ROAD

Exhibit A

Details

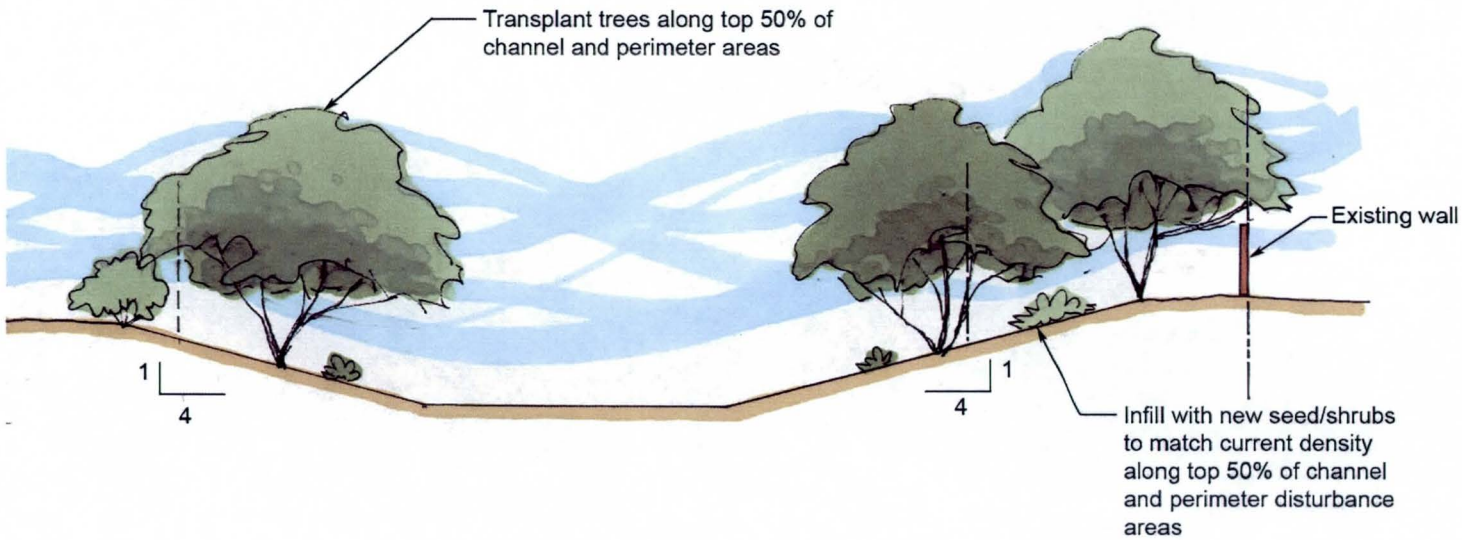
SCALE NTS

SHT. of

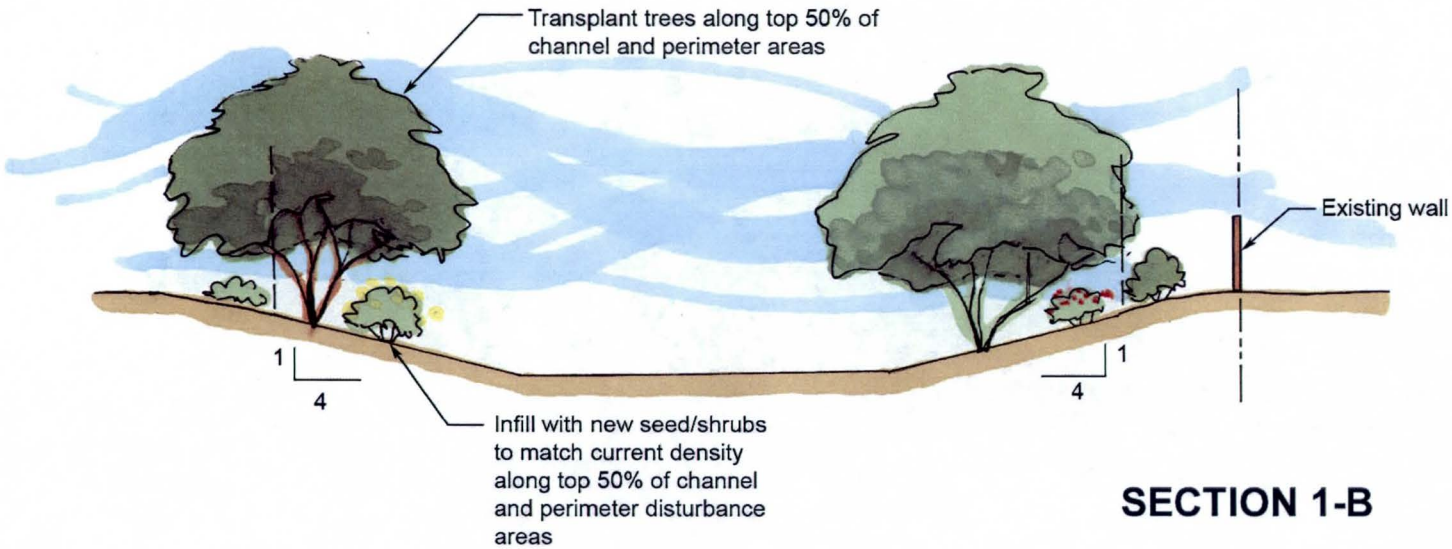
FILE: P:\400\410061a\drainage\DV_PA\DWG\Detail_Sheet.dwg DATE: Aug 31, 2009

APPENDIX C: LANDSCAPE CROSS SECTIONS

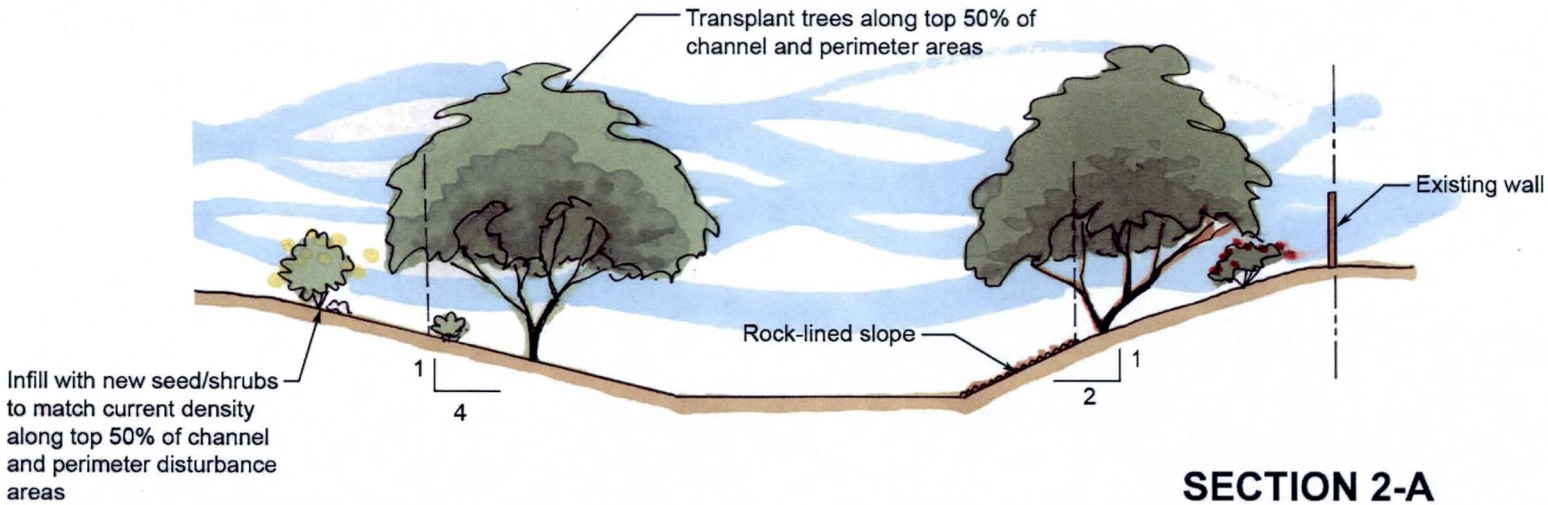
Note: See **Appendix B** for cross section geometry and location. For instance, Section 1-A refers to Alternative 1 and the letter A is designated as a cross section. Also, the hydraulic properties of the cross section can be found in **Appendix G**.


Transplant trees along top 50% of channel and perimeter areas
Existing wall
1
4
1
4
Infill with new seed/shrubs to match current density along top 50% of channel and perimeter disturbance areas

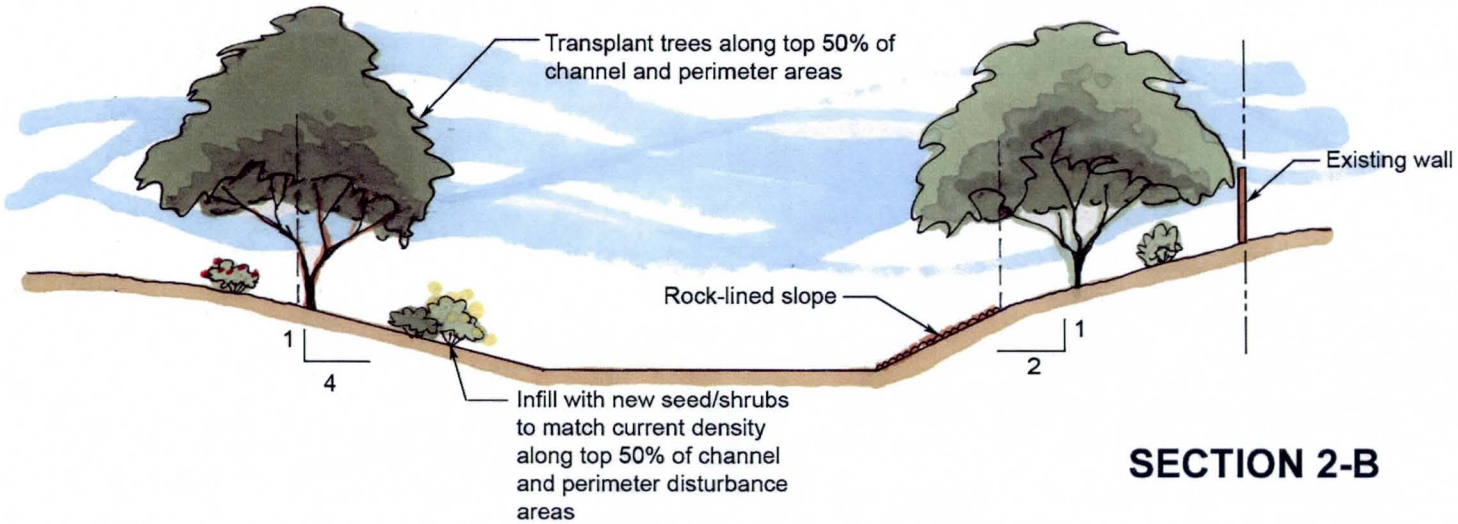
SECTION 1-A


Transplant trees along top 50% of channel and perimeter areas
Existing wall
1
4
1
4
Infill with new seed/shrubs to match current density along top 50% of channel and perimeter disturbance areas

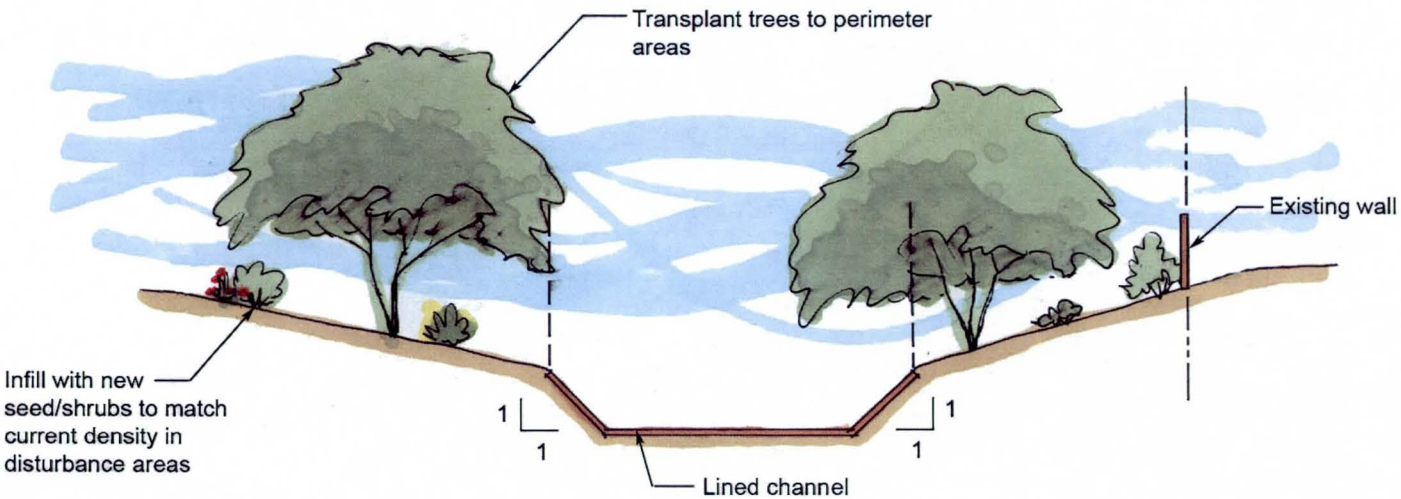
SECTION 1-B


Transplant trees along top 50% of channel and perimeter areas
Existing wall
Rock-lined slope
Infill with new seed/shrubs to match current density along top 50% of channel and perimeter disturbance areas
1
4
1
2

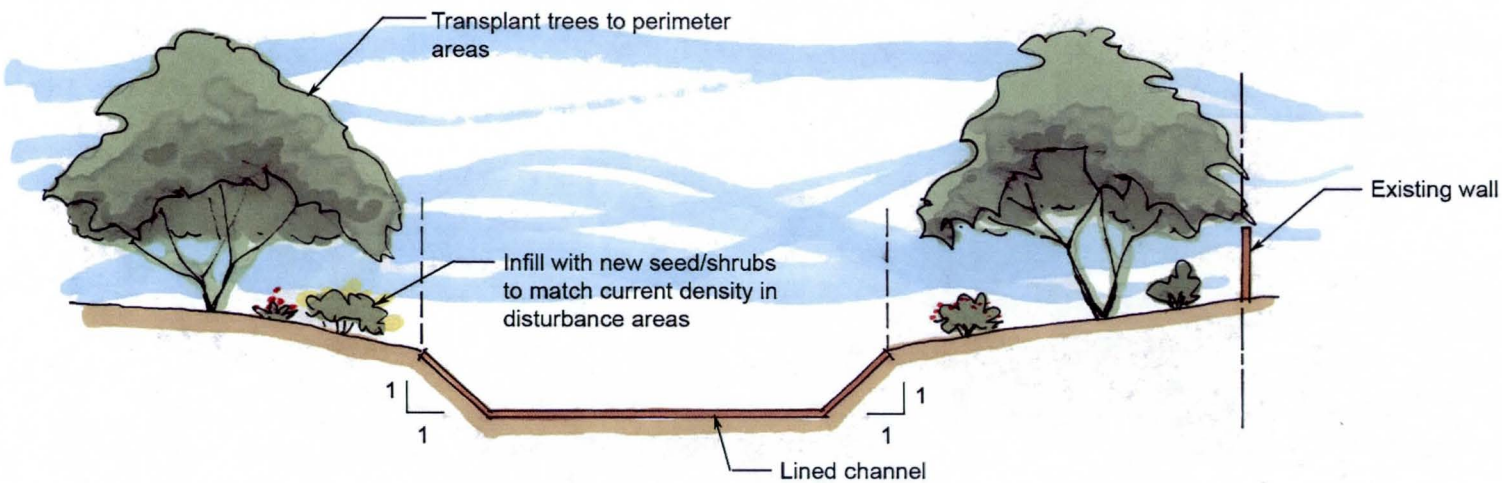
SECTION 2-A


Transplant trees along top 50% of channel and perimeter areas
Existing wall
Rock-lined slope
1
4
1
2
Infill with new seed/shrubs to match current density along top 50% of channel and perimeter disturbance areas

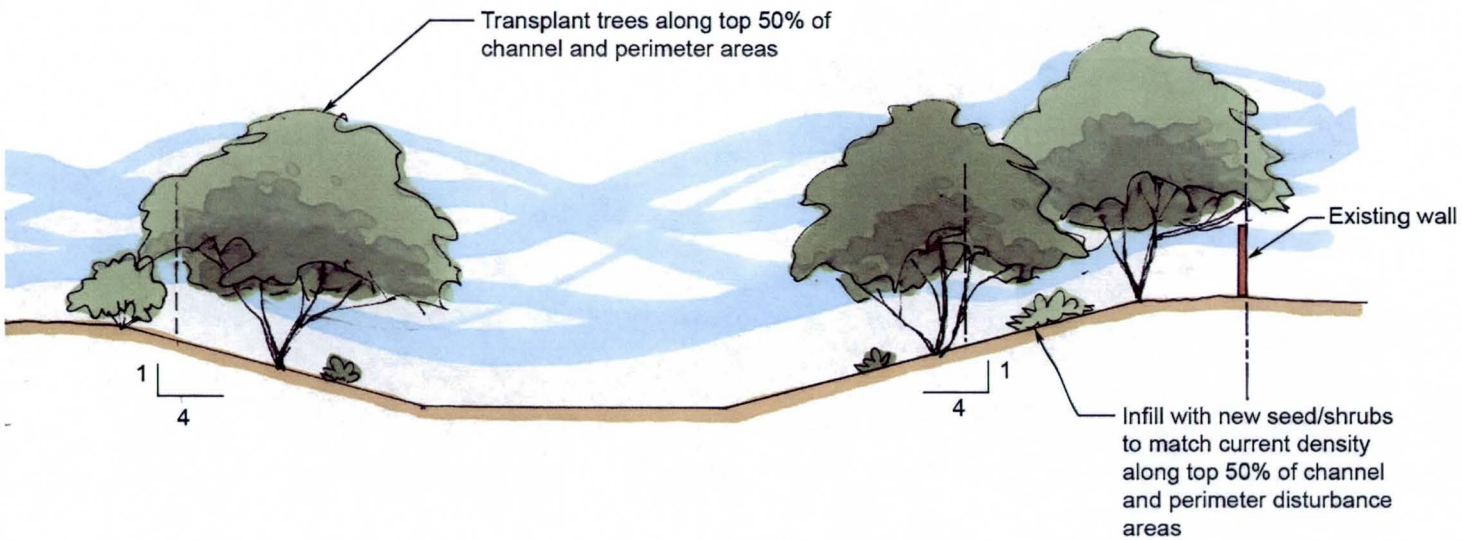
SECTION 2-B


Transplant trees to perimeter areas
Existing wall
Infill with new seed/shrubs to match current density in disturbance areas
1
1
1
1
Lined channel

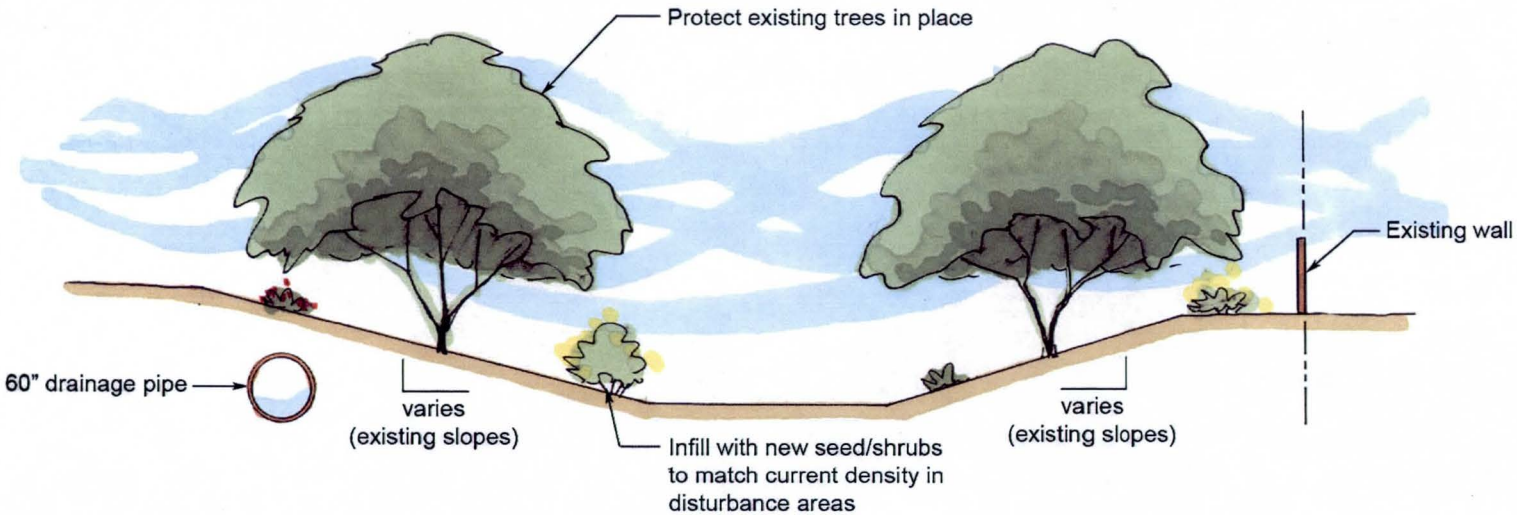
SECTION 3-A


Transplant trees to perimeter areas
Existing wall
Infill with new seed/shrubs to match current density in disturbance areas
1
1
1
1
Lined channel

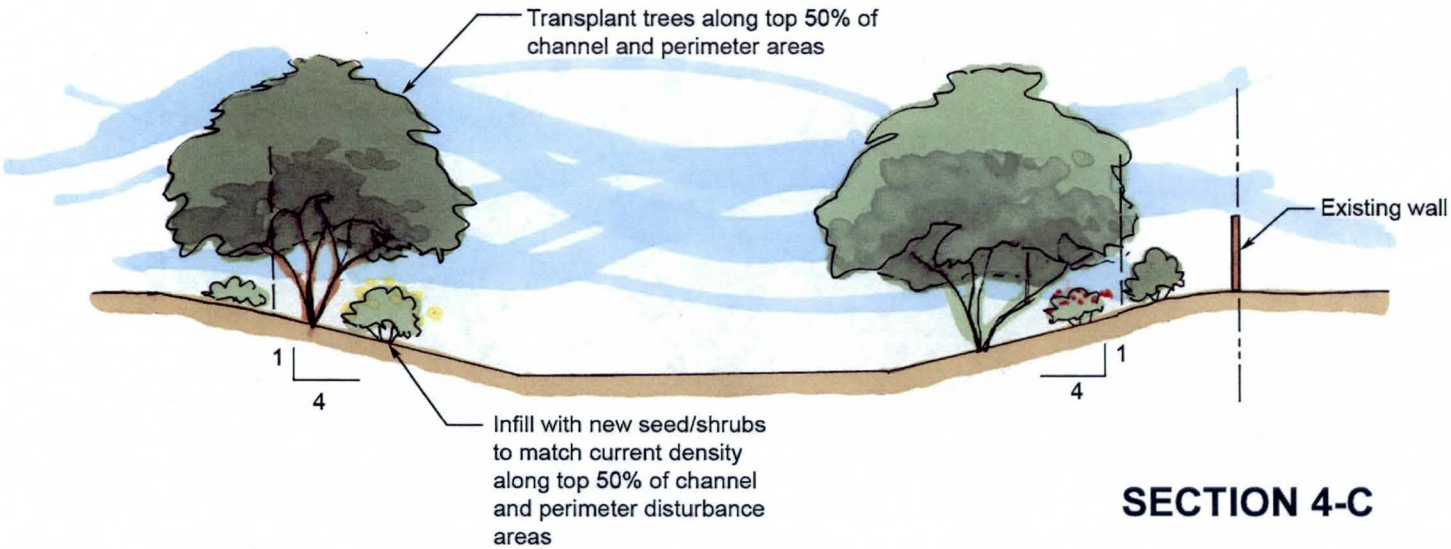
SECTION 3-B


Transplant trees along top 50% of channel and perimeter areas
Existing wall
1
4
1
4
Infill with new seed/shrubs to match current density along top 50% of channel and perimeter disturbance areas

SECTION 4-A


Protect existing trees in place
Existing wall
60" drainage pipe
varies
(existing slopes)
Infill with new seed/shrubs
to match current density in
disturbance areas
varies
(existing slopes)

SECTION 4-B


Transplant trees along top 50% of channel and perimeter areas
Existing wall
1
4
1
4
Infill with new seed/shrubs to match current density along top 50% of channel and perimeter disturbance areas

SECTION 4-C

APPENDIX D: SURVEY INFORMATION

Andrea Betts

From: Daniel Francetic
Sent: Thursday, May 28, 2009 11:27 AM
To: Andrea Betts
Subject: FW: Scottsdale Grid Info

THE HORIZONTAL CONTROL SYSTEM

The basis of the horizontal control system for the City of Scottsdale is the Land Survey performed by Hunsaker and Associates (H&A) as published on January 17, 1991. H&A values were achieved through the use of the Global Positioning System (GPS). H&A data in their report included latitude and longitude values along with respective state plane coordinate values.

The City's Land Survey Unit converted the H&A state plane coordinate values into a modified coordinate system for the purpose of establishing a horizontal basis for the City's Geographic Information System (GIS) . The method used in creating the modified coordinate system is unique but produced values compatible with the varying surface of the earth. The modified coordinate system will be hereinafter referred to as the "City Grid".

Station 7192 of the H&A report is the initial point of the City Grid. Station 7192 was also a primary control station of the H&A network. The state plane coordinate of this station has the same numerical value as the City Grid bearing the same station number. All other state plane values will be different when compared to City Grid values. The bearing and distance value determined by inversing between any two City Grid coordinates will be equal to actual field measurements on the surface. Station 7192 is a 1919 Government Land Office (GLO) brass cap on a 2 inch iron pipe 0.88 feet above the surface representing the Northeast corner of Section Nineteen (19), Township Four(4) North, Range Five(5) East of the Gila and Salt River Meridian, Maricopa County, Arizona, Latitude 33° 41' 01.02932" North, Longitude 111° 52' 26.82154" West and being also the intersection of Deer Valley Road and 96th Street.

A scale factor of 0.999801686 (ASF) was determined as the common scale factor. The common scale factor represents the average of all H&A station scale factors for stations within the city. The common scale factor was applied to each state plane coordinate station inversed from the initial point. This method yielded reasonable accuracy when comparing any station to station dimension for surface values.

The GIS has as its origin the City Grid as established through the above described process. The City Grid coordinates are a part of this document and are to be used when doing work within the City of Scottsdale having to do with land measurement and when data is presented to the city for its consideration.

Example:
COS ground distance = ASP Grid Distance ÷ ASF
5000.992 = 5000.000 ÷ 0.999801686

To ASP Distance = COS ground distance x ASF
5000.000 = 5000.992 x 0.999801686

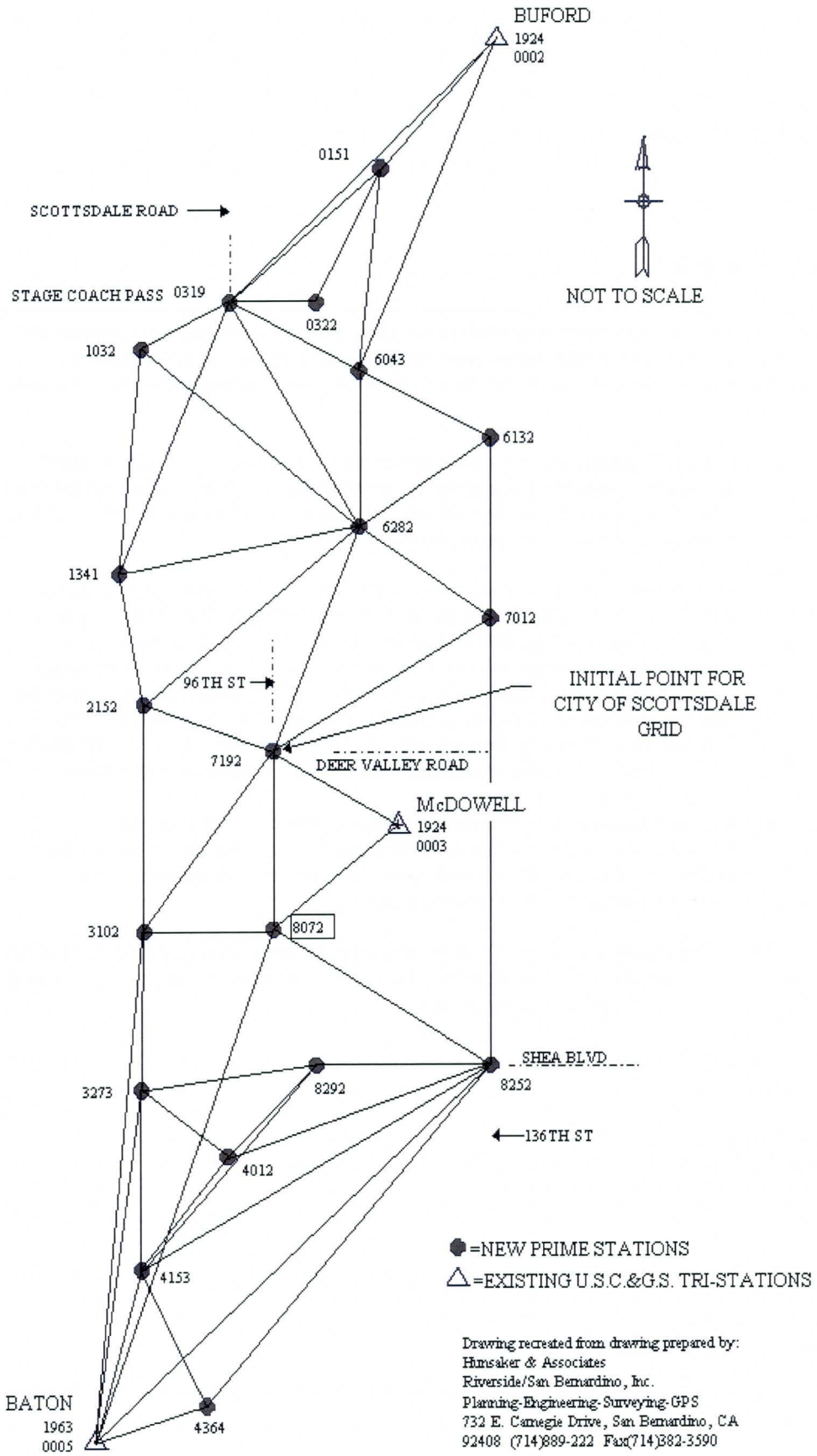
ASP refers to Arizona State Plane.

COS refers to City of Scottsdale.

ASF refers to Average Scale Factor for COS.

CITY OF SCOTTSDALE PRIME NETWORK

View larger image



Drawing recreated from drawing prepared by:
Hunsaker & Associates
Riverside/San Bernardino, Inc.
Planning-Engineering-Surveying-GPS
732 E. Carnegie Drive, San Bernardino, CA
92408 (714)889-222 Fax(714)882-3590

40500	976473.9	701549	1788.956	TP PC/START 04-18-09
40501	976446.6	701558.7	1781.854	TO PC
40502	976391.1	701564.1	1782.062	TO1 PC
40503	976373.3	701564	1787.274	TP1 PC
40504	976375.3	701847.2	1791.297	TP1
40505	976397.6	701849	1785.054	TO1
40506	976443	701848	1785.361	TO
40507	976467.2	701854	1792.168	TP
40508	976460.4	702150.5	1793.968	TP
40509	976438.9	702149.7	1789.639	TO
40510	976397.5	702148.7	1789.191	TO1
40511	976388.5	702150.3	1791.539	TP1
40512	976387.9	702447.4	1794.217	TP1-7 PT
40513	976402.8	702448.1	1794.387	TO1-7 PT
40514	976430.7	702449.9	1794.736	TO-7 PT
40515	976444.9	702448.7	1795.276	TP-7 PT
40516	976382.9	702642.9	1796.571	X
40517	976374.6	702655.8	1795.803	TP PC
40518	976341.4	702655.5	1795.254	TP
40519	976305.7	702628.9	1792.834	TP
40520	976289.4	702616.6	1792.123	X
40521	976280.6	702632.3	1791.222	TP
40522	976252.8	702661.9	1793.358	TP
40523	976222.8	702726.3	1793.559	TP
40524	976195.3	702802.9	1793.868	TP
40525	976155.8	702827	1792.951	TP
40526	976122	702858.9	1794.471	TP
40527	976086.8	702918.4	1795.261	TP
40528	976082.8	702949.6	1796.166	TP
40529	976092	702992.8	1796.349	TP
40530	976117.8	703029	1796.566	TP
40531	976159.9	703077	1798.545	TP
40532	976195.7	703107.6	1798.308	TP
40533	976224	703116.1	1799.278	TP
40534	976270.7	703123.2	1800.617	TP
40535	976290.8	703113.5	1801.158	TP
40536	976309.4	703099.7	1801.637	TP
40537	976324.5	703095.4	1800.614	TP-7 PT
40538	976339.4	703015.6	1800.571	TP PC
40539	976342	703007	1800.751	X
40540	976316.5	703013.5	1799.923	X
40541	976310.5	703017.3	1799.695	TP
40542	976269.7	702972	1799.067	TP
40543	976274.6	702961.8	1799.225	X
40544	976238.7	702942.9	1798.585	X
40545	976225	702947.5	1799.452	TP
40546	976223.6	702919.7	1797.824	TP
40547	976233.5	702924.3	1798.003	X
40548	976272.2	702890.3	1796.9	TP
40549	976277.2	702895	1797.62	X
40550	976294.5	702880.3	1798.422	X
40551	976294.3	702871	1798.046	TP

40552	976306.6	702870.1	1798.396	TP
40553	976336.7	702905.2	1799.05	TP
40554	976336.7	702914.3	1799.595	X
40555	976369.7	702901.7	1799.528	X
40556	976364.8	702894.8	1798.937	TP
40557	976366	702837	1798.957	TP
40558	976376.4	702829.9	1799.506	X
40559	976358	702772	1797.973	X
40560	976349.7	702767.9	1798.099	TP
40561	976393.9	702710.6	1797.353	X
40562	976381.8	702710	1796.985	TP
40563	976385.8	702668.5	1796.521	TP-7 PT
40564	976390.7	702664.3	1796.528	X
40565	976256.7	702639.3	1793.651	X
40566	976211.7	702728.6	1794.039	X
40567	976164.5	702791.4	1794.6	X
40568	976118.5	702854.2	1794.526	X
40569	976092.6	702900.6	1794.944	X
40570	976075	702940.7	1796.307	X
40571	976085.3	702993	1797.016	X
40572	976130.7	703053.3	1798.402	X
40573	976195	703114.6	1799.294	X
40574	976269.7	703131.7	1801.238	X
40575	976308.8	703107	1801.963	X
40576	976264.3	703061.3	1787.804	TO PC
40577	976266.6	703037.2	1786.273	TO
40578	976224.5	703001.1	1786.813	TO
40579	976190.8	702976.8	1787.091	TO
40580	976177.5	702959	1786.748	TO
40581	976174.1	702934.3	1786.214	TO
40582	976180.5	702906.9	1785.836	TO
40583	976213.2	702865	1785.534	TO
40584	976245.3	702851.3	1785.721	TO
40585	976285.6	702822.6	1785.769	TO
40586	976305.6	702818.2	1786.99	TO
40587	976310.9	702804.7	1786.041	TO
40588	976296.5	702774.2	1784.815	TO
40589	976299.3	702749.7	1784.129	TO
40590	976315.4	702723.5	1784.588	TO
40591	976331.8	702707.3	1785.465	TO
40592	976323.6	702692.7	1785.227	TO
40593	976308.1	702692.1	1785.082	TO
40594	976289.4	702704.6	1784.553	TO
40595	976274.1	702737.1	1784.172	TO
40596	976248.7	702765.7	1785.251	TO
40597	976236.7	702800.9	1785.201	TO
40598	976219.5	702825	1785.083	TO
40599	976186.2	702847.1	1786.001	TO
40600	976161.1	702864.8	1786.14	TO
40601	976132.8	702890.6	1786.761	TO
40602	976121.7	702915.3	1787.016	TO
40603	976122	702960.2	1786.655	TO

40604	976145.4	702999.6	1786.632	TO
40605	976176.7	703036.2	1787.092	TO
40606	976213.7	703068.8	1787.289	TO
40607	976240.6	703076.4	1787.795	TO PT CLO
40608	976235.6	703034.8	1786.579	X
40609	976184.3	702999.6	1786.524	X
40610	976152.5	702950.2	1786.39	X
40611	976161.6	702907.2	1785.606	X
40612	976188.1	702869.9	1785.723	X
40613	976235.1	702831.3	1784.967	X
40614	976267.8	702788.5	1784.752	X
40615	976310.4	702710	1784.775	X
40616	976281.7	702699.8	1783.254	X/INV 12IN ID PLA PIE
40617	976362.1	705549.2	1832.244	TP
40618	976324.7	705526.4	1828.484	TP-7
40619	976320.4	705529.1	1827.623	DHW OH.7
40620	976310.2	705537.1	1830.01	DHW
40621	976309.2	705537.8	1829.965	DHW-7
40622	976309	705537.7	1830.456	DHW OH1
40623	976304.8	705548.4	1830.4	DHW-7
40624	976304.9	705548.6	1829.985	DHW OH7
40625	976307.2	705564.4	1827.639	DHW-7
40626	976295.5	705571.1	1830.99	TP
40627	976317	705592.8	1832.271	TP-7
40628	976342.6	705589	1828.461	TO
40629	976322.3	705575.5	1828.765	TO
40630	976342.8	705550.1	1828.776	TO
40631	976353.6	705571	1828.867	TO-7
40632	976307.5	705564.5	1826.108	TO
40633	976317.8	705571.7	1825.182	TO
40634	976336.2	705550.8	1825.059	TO
40635	976320.2	705530.1	1826.157	TO-7
40636	976307.2	705543	1825.071	X/CONC BOX CULVERTS
40637	976311	705499.7	1830.994	EP
40638	976300.3	705494.1	1831.256	AP
40639	976289.3	705489.4	1830.967	EP1
40640	976236.4	705620.8	1831.227	EP1-7
40641	976247.9	705624.2	1831.407	AP
40642	976259.1	705628.6	1831.207	EP-7
40643	976244.1	705523.1	1826.926	DHW OH.7
40644	976252.2	705516.9	1829.332	DHW
40645	976253.3	705516.3	1829.33	DHW-7
40646	976253.4	705516.5	1829.732	DHW OH1
40647	976257.7	705505.6	1829.876	DHW-7
40648	976257.6	705505.6	1829.369	DHW OH.7
40649	976257.5	705505.1	1829.404	DHW
40650	976255.6	705492.1	1827.125	DHW-7
40651	976255.3	705511	1824.42	X/CONC
40652	976243.9	705522.9	1825.681	TO
40653	976222.6	705510.8	1824.092	TO
40654	976247.7	705483.9	1824.321	TO
40655	976255.3	705492.2	1825.539	TO-7

40656	976260.5	705474.8	1828.808	TP PC
40657	976239.6	705535.8	1829.199	X
40658	976206.7	705474.6	1814.715	TO PC
40659	976201.6	705484.7	1814.079	TO
40660	976190.6	705492.2	1814.326	TO
40661	976166.3	705488.1	1813.716	TO
40662	976125.2	705469.7	1812.882	TO
40663	976094	705430.6	1812.795	TO
40664	976074.2	705391.3	1812.98	TO
40665	976063.5	705352.2	1812.521	TO
40666	976063.3	705331.8	1813.676	TO
40667	976053.3	705333	1813.823	X/INV 12ID PLA PIPE
40668	976076.3	705329.2	1813.242	TO
40669	976080	705365.1	1812.081	TO
40670	976094.7	705384.2	1812.207	TO
40671	976111.2	705414.4	1812.611	TO
40672	976140.3	705443.7	1812.774	TO
40673	976175.3	705473	1813.539	TO CLO PT
40674	976194.2	705414.6	1826.4	TP
40675	976202.2	705403.3	1827.329	X
40676	976166.8	705381.8	1826.234	X
40677	976155.2	705384.5	1826.562	TP
40678	976151.9	705349.7	1825.685	TP
40679	976159.5	705346.4	1825.931	X
40680	976137.3	705325	1824.409	TP
40681	976146.7	705316.4	1825.333	X
40682	976105.8	705285.5	1824.217	TP
40683	976110.4	705276.9	1823.38	X
40684	976073.5	705277.6	1823.455	TP
40685	976071.3	705265.9	1823.291	X
40686	976030.6	705295.6	1821.647	TP
40687	976022.2	705286.8	1822.42	X
40688	975879	705266.5	1806.685	X/INV 12ID PLA PIPE
40689	976023.4	705342.3	1821.814	TP
40690	976019.7	705345	1821.932	X
40691	976046.4	705400.5	1822.21	TP
40692	976039.5	705401.7	1822.244	X
40693	976053	705441.7	1823.279	TP
40694	976046.6	705443.8	1822.977	X
40695	976070.7	705493.5	1825.651	TP
40696	976066.2	705499.5	1825.629	X
40697	976104.9	705532.3	1827.145	TP
40698	976097.6	705540.1	1827.143	X
40699	976152.8	705575.1	1828.725	X
40700	976154.6	705567.9	1828.373	TP
40701	976195.5	705555.9	1829.755	TP
40702	976222.7	705543.9	1830.369	X
40703	976221.9	705527.8	1829.41	TP
40704	976238.8	705534.3	1828.952	TP-7 PT
50000	974493	707589.6	1816.242	X/START 04 18 09
50001	974492.3	707589.9	1816.441	X/SW
50002	974525	707569	1818.125	X

50003	974528.9	707573.5	1818.485	X
50004	974529.1	707568.4	1818.057	TP PC TP1 PC
50005	974532	707568.6	1817.757	DFL PC
50006	974531.6	707571	1818.479	TP
50007	974532.5	707566.7	1818.406	TP1
50008	974548.7	707559.2	1819.701	X
50009	974559.9	707555.2	1819.59	X/S SIDE OF CART PATH
50010	974553.4	707570.8	1819.584	TP1
50011	974548.9	707574.8	1817.26	DFL
50012	974546.6	707575.7	1818.616	TP
50013	974551.4	707586	1817.342	DFL
50014	974550.3	707585.4	1819.079	TP
50015	974551.5	707586.5	1819.012	TP1
50016	974548.8	707590.6	1819.109	TP1-7 PT TP-7 PT
50017	974549.2	707589.9	1817.829	DFL-7 PT
50018	974542.5	707587.9	1819.323	X
50019	974528.9	707598.7	1818.991	X
50020	974530.6	707597.6	1819.001	TP PC TP1 PC
50021	974536.1	707600.1	1819.676	TP
50022	974534.6	707594	1819.229	TP1
50023	974535.2	707595.6	1817.288	TO1
50024	974536.4	707597.5	1817.41	TO
50025	974549.6	707598.6	1816.88	TO1
50026	974548.9	707600.1	1816.879	TO
50027	974551	707598	1819.537	TP1
50028	974559.2	707595.9	1819.521	X
50029	974575	707590.1	1822.578	X
50030	974547.3	707601.8	1819.497	TP
50031	974536.4	707610.4	1819.516	X
50032	974520.7	707620.4	1819.072	X
50033	974521.2	707680.8	1818.459	X/SW CORNER
50034	974538.7	707667.9	1820.609	X
50035	974564.9	707640.9	1820.405	X
50036	974580.5	707632	1820.722	X
50037	974582.5	707628.3	1819.775	TP
50038	974582.4	707627.6	1818.057	TO
50039	974583.3	707627	1818.076	TO1
50040	974583.9	707626.2	1820.514	TP1
50041	974590.6	707621.4	1822.65	X
50042	974604.1	707616.6	1824.075	X
50043	974616.9	707604.9	1821.437	X/CART PATH
50044	974623.1	707630.8	1824.69	X
50045	974608.5	707646.8	1821.751	X
50046	974606.7	707649.1	1821.166	TP1
50047	974606.2	707649.4	1819.062	TO1
50048	974605.4	707650.9	1818.973	TO
50049	974604.8	707652.1	1821.191	TP
50050	974598.4	707662.1	1821.295	X
50051	974576.7	707688.8	1822.611	X
50052	974546.6	707695.7	1822.585	X
50053	974605.9	707667.1	1821.929	X
50054	974617.7	707659	1822.05	TP

50055	974619.3	707656.3	1820.14	TO-7 PT TO1-7 PT
50056	974625.3	707657.7	1822.466	TP-7 PT TP1-7 PT
50057	974626.1	707657.6	1822.623	DFL PC
50058	974648.2	707652.9	1824.544	DFL
50059	974662	707650.7	1825.237	DFL-7 PT
50060	974665.7	707641.7	1825.098	X
50061	974644.2	707663.5	1825.846	X
50062	974624.3	707676.8	1827.089	X
50063	974622.9	707695.7	1831.543	X
50064	974642.4	707689.3	1830.714	X
50065	974667.5	707678.8	1829.884	X
50066	974690	707658.7	1828.035	X
50067	974747	707857.4	1827.141	X/TC + START N BOND TOPO
50068	974745.5	707847.9	1829.039	X
50069	974743.4	707816.1	1828.187	X
50070	974737.5	707794.9	1827.704	X/SW
50071	974735.6	707785	1827.641	X/SW
50072	974732	707759.1	1826.686	X
50073	974726.9	707714.4	1825.467	X
50074	974721.8	707688.4	1824.567	DFL PC
50075	974720	707682	1824.805	TO PC
50076	974713.9	707659	1829.513	TP PC
50077	975047.4	707643.6	1836.594	TP
50078	975049	707661.9	1834.035	X
50079	975050.2	707670.9	1832.133	TO
50080	975048.3	707701.4	1831.047	DFL
50081	975044.4	707740.4	1831.876	X
50082	975040	707765.5	1832.627	X/SW
50083	975039.1	707775.3	1832.661	X/SW
50084	975047.8	707813.3	1833.907	X
50085	975047.8	707852.7	1835.377	X
50086	975047.3	707868	1834.485	X/TC
50087	975350.9	707868	1841.72	X/TC
50088	975350.9	707866.4	1841.517	X
50089	975347.6	707839.4	1841.09	X
50090	975343.7	707802.9	1840.647	X
50091	975340.9	707781.3	1839.373	X
50092	975341.1	707770.5	1840.688	X
50093	975340.5	707752.3	1839.881	X/SW
50094	975340.7	707741.5	1839.834	X/SW
50095	975340.2	707716.3	1838.367	X
50096	975347.8	707678.4	1837.621	DFL
50097	975342.1	707663.3	1837.859	TO
50098	975346.4	707627.6	1841.627	X
50099	975341.5	707607.2	1848.456	TP
50100	975648.2	707595.4	1855.221	TP
50101	975653	707621.4	1849.627	X
50102	975645.9	707638.1	1846.121	TO
50103	975644.8	707669.2	1844.969	DFL
50104	975639.6	707709.1	1845.855	X
50105	975648.9	707732	1846.744	X/SW
50106	975646.9	707741.9	1846.83	X/SW

50107	975642.4	707770.6	1847.378	X
50108	975647.6	707790.4	1846.638	X
50109	975646.1	707804.5	1847.21	X
50110	975649.1	707839.7	1847.771	X
50111	975648.6	707868.1	1848.835	X/TC
50112	975947.4	707868.1	1856.08	X/TC
50113	975947	707833.9	1855.246	X
50114	975948.6	707797.9	1854.521	X
50115	975947.3	707758	1854.046	X
50116	975945.6	707748.5	1853.359	X/SW
50117	975945.7	707738	1853.284	X/SW
50118	975947.1	707711.1	1854.04	X
50119	975950.8	707685.3	1853.61	X
50120	975947.1	707671.2	1852.204	DFL
50121	975948	707667.7	1852.981	X
50122	975950	707659.8	1853.313	TO
50123	975946.7	707622	1858.556	TP
50124	975947.7	707615.1	1858.146	X/WL
50125	976251.2	707669.7	1866.032	X/WL
50126	976249.9	707675.3	1865.691	TP
50140	976482.6	707789.6	1868.035	X/START W BOND TOPO
50141	976466.9	707779.7	1867.235	X
50142	976442	707781.3	1866.714	X/SW END
50143	976437.2	707772.5	1866.487	X/SW END
50144	976423.3	707765.4	1865.406	DFL-7 PT
50145	976421.3	707729	1864.501	TO-7 PT
50146	976427.6	707695	1869.536	TP
50147	976465.2	707704.8	1866.754	TP-7 PT
50148	976493.9	707716.5	1866.33	X
50149	976519.6	707696.8	1865.88	X/WL CORN
50150	976481.6	707685.3	1865.026	X
50151	976454.3	707670.2	1864.752	X
50152	976417	707683.7	1867.87	TP1 PC
50153	976422	707644.1	1866.469	TP1
50154	976436.6	707645.9	1864.017	TO1 PC
50155	976446.4	707630.2	1862.87	DFL PC
50156	976452.5	707623.7	1862.87	TO PC
50157	976468.3	707631.3	1864.367	X
50158	976479.8	707647.5	1865.438	TP PC
50159	976499	707643.1	1865.177	X
50160	976472.9	707663.6	1864.539	X
50161	976469.3	707691.8	1866.044	X
50162	976483.9	707690	1865.451	X
50163	976508.6	707695.3	1865.705	X
50164	976480	707488.3	1861.662	TP
50165	976458.9	707488	1860.579	TO
50166	976442	707487.7	1859.993	X
50167	976423.4	707484.4	1858.658	DFL
50168	976420.4	707484.6	1858.881	TO1
50169	976401.4	707486.4	1863.337	TP1
50170	976376.2	707189.5	1854.372	TP1
50171	976403.2	707190.8	1850.82	TO1

50172	976408	707191.5	1850.437	DFL
50173	976423.6	707196	1850.636	TO
50174	976451.5	707189.5	1855.795	TP
50175	976459.4	706885.9	1851.392	TP
50176	976436.9	706884.6	1846.369	TO
50177	976423.7	706883.2	1845.599	DFL
50178	976411.1	706881.1	1845.982	TO1
50179	976396.7	706877	1848.728	TP1
50180	976390.1	706591.5	1844.274	TP1
50181	976406.7	706596	1841.235	TO1
50182	976412.1	706597.1	1841.281	DFL
50183	976428.2	706603.6	1841.982	TO
50184	976447.7	706598.9	1846.281	TP
50185	976465.5	706288.7	1844.49	TP
50186	976434	706289.2	1837.935	TO
50187	976416.3	706294.3	1837.103	DFL
50188	976405.7	706296.3	1837.385	TO1
50189	976378.4	706289.6	1842.998	TP1
50190	976384.1	705989.3	1838.387	TP1
50191	976408.2	705984.3	1832.908	TO1
50192	976418.7	705989.5	1832.563	DFL
50193	976436.4	705982.5	1833.134	TO
50194	976468.8	705981.5	1840.839	TP
50197	976433.6	705708.1	1828.737	TO
50198	976422.4	705710.9	1828.519	DFL
50199	976399.9	705714.4	1828.749	TO1
50200	976373.2	705718.7	1835.271	TP1
50201	976331.9	705611.5	1832.609	TP1-7 PT
50202	976343.4	705595.3	1828.834	TO1-7 PT
50203	976347.5	705587	1827.855	DFL-7 PT
50204	976357.5	705570.4	1829.128	TO-7 PT
50205	976365.6	705550.9	1832.117	TP-7 PT
50206	976479.2	705389.1	1833.596	X
50207	976460.2	705381.8	1831.494	X
50208	976442	705379.6	1832.095	X
50209	976397.4	705375.7	1831.443	X
50210	976418.7	705309.1	1831.164	TP PC TP1 PC
50211	976467.4	705283.1	1831.452	P
50212	976434.8	705292.1	1827.802	TO PC TO1 PC
50213	976431.5	705262.7	1825.791	TO
50214	976421.5	705267.2	1825.288	DFL PC
50215	976413.9	705262.7	1825.42	TO1
50216	976388.1	705191	1828.502	TP1
50217	976404.6	705196.1	1825.272	TO1
50218	976423	705196.9	1824.434	DFL
50219	976434.8	705195.6	1825.107	TO
50220	976459	705199.2	1830.824	TP
50221	976468.1	705086.5	1829.464	TP
50222	976439.1	705083.4	1821.117	TO
50223	976435.7	705083.7	1820.968	DFL
50224	976407.6	705088.8	1821.006	TO1
50225	976381	705079.7	1827.414	TP1

50226	976384.7	704787.3	1822.935	TP1
50227	976408.7	704793.5	1816.459	TO1
50228	976413	704793.6	1815.923	DFL
50229	976440.3	704793.6	1816.236	TO
50230	976477.4	704791.5	1825.683	TP
50231	976473.2	704545	1822.747	TP-7 PT
50232	976474.3	704533.5	1821.315	RCP
50233	976473.2	704523.7	1822.632	TP PC
50234	976456.9	704489	1821.634	TP
50235	976427.1	704481	1812.457	TO
50236	976414.5	704480.5	1812.266	DFL
50237	976396.7	704478.3	1812.798	TO1
50238	976372.3	704490.2	1818.268	TP1/WL
50239	976382.1	704190.1	1817.056	TP1
50240	976405.5	704191	1811.424	TO1
50241	976416	704190.6	1810.915	DFL
50242	976433.5	704190	1811.545	TO
50243	976466.4	704189.4	1820.524	TP
50244	976462.1	703889.2	1816.045	TP
50245	976429.8	703888.6	1807.32	TO
50246	976413.8	703887.8	1806.75	DFL
50247	976402.9	703884.2	1807.039	TO1
50248	976374.9	703868.3	1813.496	TP1
50249	976368.9	703589.5	1810.851	TP1
50250	976404.4	703594.9	1803.029	TO
50251	976421.2	703592.3	1802.569	DFL
50252	976435.6	703592	1803.186	TO
50253	976470.9	703589.1	1811.802	TP
50254	976464.3	703329.6	1807.729	TP
50255	976470.1	703276.7	1807.58	TP
50256	976426.9	703278.8	1798.9	TO
50257	976414.5	703277.7	1798.408	DFL
50258	976403.6	703274.4	1798.334	TO1
50259	976374.6	703270.9	1805.724	TP1
50260	976368	703125.3	1802.514	TP1
50261	976378.4	703108.2	1793.781	TO1
50262	976391.7	703098.4	1794.08	DFL-7 PT
50263	976403.1	703091.4	1794.935	TO
50264	976420.9	703105.4	1802.472	TP
50265	976337.4	703013.6	1800.561	TP
50266	976312.9	703011.3	1799.82	TP-7 PT
50267	976316.6	703039.4	1793.826	TO-7 PT
50268	976306.9	703100.6	1801.718	TP1-7 PT
50269	976315.3	703067.9	1794.116	TO1-7 PT

POINT	NORTH	EAST	ELEV	DESCRIPTION
40705	976512.878	703993.775	1817.765	WV/START 07-23-09
40706	976512.865	703993.893	1815.585	WVN
40707	976508.828	703990.693	1817.261	PV AZ0 HD13
40708	976518.565	703970.405	1817.347	WM
40709	976520.388	703962.656	1818.717	TJR/??
40710	976472.402	703932.492	1816.687	PV AZ180 HD8
40711	976465.827	703911.944	1816.342	IV
40712	976467.092	703909.266	1816.550	IV
40713	976467.692	703901.131	1816.316	IV
40714	976466.681	703897.510	1815.925	SAG AZ180 HD2
40715	976380.772	703906.810	1813.955	IV
40716	976380.814	703914.280	1813.910	IV
40717	976402.845	703859.976	1806.752	PV AZ0 HD7
40718	976397.512	703823.757	1806.836	PV AZ270 HD10
40719	976474.953	703786.808	1814.678	TJR AZ90 HD2
40720	976473.471	703779.180	1814.478	PV AZ182 HD9
40721	976458.727	703767.065	1813.522	SAG AZ180 HD2
40722	976454.664	703745.593	1814.188	SAG AZ180 HD2
40723	976452.666	703724.697	1813.848	SAG AZ180 HD2
40724	976442.905	703721.124	1811.295	PV AZ90 HD8
40725	976466.964	703732.191	1813.901	IV
40726	976482.974	703673.677	1813.078	SMH
40727	976484.155	703673.577	1813.105	MHR
40728	976456.770	703668.257	1809.338	PV AZ90 HD12
40729	976448.301	703655.390	1806.541	PV AZ270 HD5
40730	976394.014	703627.886	1805.017	PV AZ270 HD10
40731	976472.510	703565.092	1811.218	PV AZ180 HD10
40732	976378.339	703571.423	1809.848	PV AZ270 HD15
40733	976450.864	703501.342	1806.155	PV AZ270 HD5
40734	976469.130	703487.587	1810.714	SAG AZ180 HD3
40735	976503.249	703424.282	1810.117	PV AZ90 HD10
40736	976464.861	703417.307	1810.127	IV
40737	976464.287	703414.813	1809.660	IV
40738	976463.555	703415.985	1809.575	PV AZ270 HD4
40739	976476.282	703366.039	1808.497	TJR
40740	976460.521	703371.075	1808.131	PV AZ270 HD12
40741	976430.730	703372.085	1803.175	PV AZ270 HD12
40742	976395.716	703386.608	1806.850	PV AZ90 HD12
40743	976376.829	703286.606	1806.059	SAG AZ0 HD3
40744	976409.268	703225.126	1798.192	PV AZ180 HD9
40745	976464.660	703327.594	1807.593	PV AZ270 HD11
40746	976448.690	703254.305	1804.946	PV AZ270 HD11
40747	976447.035	703194.320	1805.607	PV AZ270 HD4
40748	976449.956	703136.354	1803.917	PV AZ90 HD12
40749	976434.942	703018.799	1803.501	SAG AZ270 HD3
40750	976459.524	703015.389	1803.862	SAG AZ270 HD3
40751	976436.141	702980.807	1802.454	SAG AZ180 HD4
40752	976437.972	702974.577	1802.480	PV AZ180 HD6
40753	976397.537	703057.594	1798.898	PV AZ90 HD10
40754	976335.994	703115.414	1801.828	SAG AZ90 HD3
40755	976349.756	703137.385	1803.205	PV AZ0 HD8
40756	976262.605	703136.937	1801.149	SAG AZ270 HD3
50300	976484.069	707685.842	1865.127	X/START 07 16 09
50301	976434.980	707660.061	1864.793	WVT
50302	976434.709	707652.096	1864.757	WVT
50303	976454.681	707651.655	1864.732	WVT
50304	976454.845	707659.536	1864.765	WVT CLO
50305	976440.964	707661.561	1864.594	UWZ/VENT PIPE 6 INCH OD X 3.65
50306	976435.864	707652.877	1864.772	UWZ/VENT PIPE 6 INCH OD X 2
50307	976432.885	707650.237	1864.604	IV
50308	976442.813	707649.976	1864.220	IV
50309	976447.607	707650.180	1864.218	PV AZ0 HD12
50310	976431.582	707645.859	1865.113	X
50311	976421.648	707641.753	1866.388	X
50312	976420.924	707649.061	1866.116	IV
50313	976409.096	707651.726	1865.054	WM
50314	976409.917	707648.630	1864.299	BF
50315	976398.337	707668.673	1863.718	PV AZ180 HD10
50316	976399.401	707644.759	1863.053	IV
50317	976401.332	707644.619	1863.090	IV
50318	976358.534	707684.945	1866.209	FWI/4 FT
50319	976360.775	707665.356	1862.339	FWI-7
50320	976361.300	707665.415	1862.328	COL/5.2 FT
50321	976361.707	707661.590	1861.617	COL/CMU STUCO
50322	976361.729	707661.691	1861.598	COL AZ180 HD1.5
50323	976359.849	707665.357	1862.231	COL CLO COL CLOAZ180 HD1.5
50324	976360.961	707661.547	1861.450	GTN/FWI 5.2 FT
50325	976361.273	707658.543	1861.321	GTN-7
50326	976362.278	707658.419	1861.433	COL/5.85 FT CMU TUCCO
50327	976362.432	707656.530	1861.310	COL

50328	976362.418	707656.560	1861.274	COL AZ180 HD2.0
50329	976362.192	707658.572	1861.445	COL CLO AZ180 HD2.0
50330	976361.433	707656.256	1861.195	GTN/5 FT FWI
50331	976362.399	707642.716	1860.810	GTN-7
50332	976362.937	707642.643	1860.885	WR OH.75 AZ180 HD10/6.4 FT CMU STUCO
50333	976362.954	707642.642	1860.872	WR-7 WL OH-.75
50334	976363.249	707638.769	1860.919	WL OH-.75/5 FT CMU STUCO
50335	976513.808	707793.233	1868.086	X
50336	976511.100	707797.932	1868.428	ECB
50337	976516.989	707797.534	1868.597	ECB
50338	976517.332	707803.703	1868.830	ECB
50339	976511.380	707804.031	1868.709	ECB CLO
50340	976482.661	707792.863	1868.061	X
50341	976444.500	707786.713	1866.490	X
50342	976441.995	707781.256	1866.750	C PC C1
50343	976437.289	707772.386	1866.581	C1 PC
50344	976438.745	707765.777	1866.121	IV
50345	976397.862	707786.659	1866.379	C1
50346	976398.964	707796.690	1866.457	C
50347	976363.628	707802.318	1866.412	C
50348	976363.258	707792.197	1866.297	C1
50349	976328.833	707781.489	1864.928	C1-7 PT
50350	976324.860	707790.632	1864.898	C-7 PT
50351	976326.651	707794.358	1864.899	X
50352	976409.783	707799.066	1866.040	X
50353	976440.210	707794.759	1866.414	X
50354	976430.486	707728.167	1864.574	PV AZ0 HD15
50355	976379.038	707711.977	1864.050	PV AZ180 HD8
50356	976399.262	707744.341	1864.699	IW AZ180 HD12
50357	976358.441	707685.801	1867.141	WL1 OH-7.5 PC/3.3 FT CMU STUCO
50358	976357.828	707690.975	1867.231	X
50359	976357.370	707705.495	1864.542	X
50360	976376.963	707690.336	1866.773	WL1
50361	976408.712	707686.065	1868.334	WL1
50362	976408.036	707693.586	1868.422	X
50363	976404.425	707720.673	1864.784	X
50364	976428.926	707722.616	1864.807	X
50365	976427.396	707694.295	1869.497	X
50366	976432.447	707686.178	1868.297	WL1 OH-.75/3.35 FT
50367	976477.027	707695.390	1865.926	WL1
50368	976476.485	707699.329	1866.265	WL1
50369	976477.990	707702.131	1866.252	WL1
50370	976481.766	707703.221	1866.077	WL1
50371	976483.485	707703.405	1865.963	WL1-7 PT
50372	976481.070	707696.085	1865.470	WL1 OH-.75/3.6 FT CMU STUCO
50373	976489.472	707696.837	1865.698	WL1-7 GTW/2 INCH OD PIPE
50374	976508.482	707696.823	1865.722	GTW-7 WL1 OH.75/3.5 FT CMU STUCO
50375	976519.575	707696.751	1866.003	WL1-7
50376	976509.444	707641.669	1864.639	X
50377	976486.172	707639.881	1865.960	X
50378	976463.601	707633.684	1863.719	X
50379	976461.306	707634.212	1863.438	PV AZ180 HD8
50380	976437.514	707638.077	1862.781	X
50381	976420.581	707641.091	1866.400	X
50382	976396.449	707638.678	1862.367	X
50383	976386.508	707643.460	1862.022	MES AZ180 HD6
50384	976386.535	707647.582	1861.971	OCT AZ180 HD6
50385	976389.549	707634.105	1862.117	MES AZ180 HD6
50386	976363.190	707626.009	1860.768	WL
50387	976392.535	707625.484	1861.627	X
50388	976404.341	707622.066	1863.970	X
50389	976412.556	707615.314	1864.842	PV AZ90 HD10
50390	976413.881	707616.331	1864.898	X
50391	976424.639	707613.819	1862.805	X
50392	976432.801	707610.714	1862.112	X
50393	976461.165	707618.342	1863.186	X
50394	976483.037	707628.141	1866.567	X
50395	976501.510	707627.248	1865.623	X
50396	976511.533	707627.254	1865.280	X
50397	976516.472	707549.492	1864.659	X
50398	976502.647	707548.278	1863.552	X
50399	976479.523	707547.265	1863.764	SMH
50400	976480.625	707547.108	1863.727	MHR
50401	976465.489	707548.725	1863.243	X
50402	976438.050	707549.415	1862.895	X
50403	976433.627	707545.784	1862.376	IV
50404	976432.891	707552.337	1862.523	IV
50405	976419.030	707553.996	1860.562	X
50406	976407.695	707554.233	1863.124	X
50407	976399.778	707553.270	1863.900	X
50408	976385.890	707548.333	1861.452	X

50409	976363.188	707548.245	1860.311	WL/5.65 FT CMU STUCO
50410	976366.447	707548.198	1860.641	X
50411	976362.871	707525.874	1860.368	WL-7 FWI/5 FT
50412	976362.986	707456.510	1857.656	FWI-7 WL OH.75/5 FT CMU STUCO
50413	976366.108	707459.922	1857.924	X
50414	976384.043	707464.167	1859.397	X
50415	976398.385	707466.587	1862.621	X
50416	976396.907	707473.151	1862.826	PV AZ90 HD8
50417	976410.098	707459.561	1860.560	X
50418	976421.896	707459.481	1858.217	X
50419	976447.119	707463.316	1860.088	X
50420	976450.191	707462.657	1860.496	PV AZ270 HD13
50421	976465.351	707459.564	1861.319	X
50422	976492.469	707458.272	1861.136	X
50423	976510.251	707459.643	1861.517	X
50424	976472.253	707354.029	1858.872	CJR
50425	976508.640	707359.892	1859.488	X
50426	976469.261	707358.605	1859.052	X
50427	976434.994	707356.008	1858.007	X
50428	976411.519	707355.981	1856.242	X
50429	976397.942	707355.277	1857.961	X
50430	976388.495	707353.419	1859.488	X
50431	976375.034	707351.982	1857.342	X
50432	976363.307	707354.784	1856.017	WL/5.8 FT
50433	976394.222	707366.475	1859.300	IV
50434	976397.049	707376.641	1859.720	IV
50435	976400.727	707377.662	1859.246	PV AZ90 HD8
50436	976419.203	707343.532	1857.265	PV AZ270 HD8
50437	976363.202	707274.856	1854.830	WL-7 FWI/6 FT
50438	976363.147	707248.740	1854.247	FWI-7 WL OH-.75/5.3 FT CMU STUCO
50439	976373.031	707260.084	1854.977	X
50440	976374.879	707279.897	1855.903	PV
50441	976390.427	707262.582	1853.766	X
50442	976410.255	707265.488	1854.093	X
50443	976431.322	707267.414	1856.151	X
50444	976447.478	707274.568	1856.213	X
50445	976468.558	707262.366	1857.540	X
50446	976479.016	707263.355	1856.823	X
50447	976499.781	707263.798	1857.478	X
50448	976516.727	707264.505	1858.291	X
50449	976457.911	707262.342	1856.598	PV
50450	976438.063	707246.830	1856.442	PV AZ270 HD8
50451	976444.032	707258.279	1856.068	R PC/LRG BOULDERS
50452	976442.335	707259.242	1856.004	DFL PC
50453	976436.673	707251.305	1855.955	DFL
50454	976437.737	707248.217	1856.188	R
50455	976428.875	707243.318	1855.188	IV
50456	976423.935	707248.090	1853.844	DFL
50457	976416.130	707241.399	1852.376	R
50458	976408.329	707244.036	1851.243	R DFL-7 PT
50459	976405.942	707251.058	1851.434	R
50460	976400.174	707247.930	1851.231	R
50461	976393.499	707241.318	1852.658	R
50462	976392.896	707260.938	1853.443	R
50463	976392.818	707260.893	1853.471	MES AZ270 HD6
50464	976393.101	707279.288	1855.355	R
50465	976391.176	707292.085	1856.916	R
50466	976401.746	707297.358	1854.872	R DFL PC
50467	976408.209	707296.243	1855.859	R
50468	976407.382	707281.761	1854.890	R
50469	976400.642	707282.239	1854.260	DFL
50470	976416.062	707289.031	1856.122	PV AZ90 HD10
50471	976412.225	707261.648	1854.269	R
50472	976405.302	707250.881	1851.432	DFL-7 PT
50473	976418.021	707257.468	1854.495	R
50474	976433.484	707253.494	1856.417	R
50475	976439.167	707260.168	1856.259	R CLO
50476	976516.908	707240.147	1858.214	X
50477	976479.748	707235.430	1856.972	X
50478	976460.473	707231.315	1856.146	X
50479	976441.032	707225.752	1855.685	X
50480	976423.655	707223.094	1852.085	X
50481	976407.373	707220.416	1850.963	X
50482	976400.440	707220.392	1851.081	X
50483	976383.987	707220.592	1854.562	X
50484	976363.450	707218.670	1854.049	WL/5.3 CMU STUCO
50485	976391.563	707201.280	1853.381	MES AZ270 HD8
50486	976425.688	707198.248	1851.291	R/STONES 6 X 6 INCH + SMALLER
50487	976424.521	707202.018	1850.900	DFL PC
50488	976423.534	707205.105	1851.252	R PC
50489	976434.016	707209.057	1854.811	R

50490	976434.227	707206.228	1853.187	DFL
50491	976440.281	707213.201	1855.859	R PT
50492	976443.553	707209.696	1855.500	DFL-7 PT
50493	976447.145	707205.821	1855.946	R PC
50494	976435.196	707200.925	1854.139	R
50495	976427.336	707198.720	1851.760	R PT
50496	976426.120	707198.217	1851.427	R CLO
50497	976363.588	707167.153	1853.170	WL PC/2.5 FT CMU + 4 FT FWI
50498	976365.983	707155.944	1853.148	WL
50499	976363.768	707143.172	1852.572	WL PC/6.7 FT CMU STUCO
50500	976372.944	707106.401	1852.690	IW AZ180 HD6
50501	976363.357	707096.181	1851.965	WL-7 FWI/6 FT
50502	976373.286	707117.289	1852.872	X
50503	976391.960	707118.758	1853.147	X
50504	976402.106	707120.777	1851.729	X
50505	976409.157	707121.949	1850.254	X
50506	976421.561	707123.489	1850.236	X
50507	976435.963	707123.989	1850.366	X
50508	976453.906	707124.552	1854.736	X
50509	976474.129	707128.729	1855.455	X
50510	976479.544	707128.402	1855.694	SMH
50511	976480.766	707128.437	1855.706	MHR
50512	976500.885	707127.038	1855.802	X
50513	976516.773	707127.613	1856.185	X
50514	976461.685	707083.280	1854.828	PV AZ90 HD10
50515	976472.406	707079.260	1855.300	TMH
50516	976473.743	707079.261	1855.289	MHR
50517	976470.077	707079.820	1854.647	X
50518	976514.095	707000.756	1854.083	X
50519	976514.436	707012.724	1854.276	X
50520	976513.519	707009.694	1853.485	DFL PC
50521	976478.607	707007.789	1852.962	DFL
50522	976478.899	707005.053	1853.221	X
50523	976478.475	707011.822	1853.516	X
50524	976463.826	707002.474	1852.745	DFL
50525	976467.922	707001.322	1853.025	X
50526	976461.980	707001.566	1853.156	X
50527	976465.869	706979.480	1852.517	DFL
50528	976467.396	706978.952	1852.602	R PC/ROCK 4 X4 INCH + LARGER
50529	976460.925	706980.936	1852.757	R
50530	976453.694	706972.240	1851.451	DFL
50531	976436.805	706975.044	1846.932	DFL-7 PT
50532	976448.126	706978.134	1850.757	R
50533	976444.843	706989.330	1852.425	R
50534	976448.249	706991.207	1853.022	MES AZ90 HD12
50535	976435.211	706999.312	1850.612	R
50536	976429.162	706992.910	1850.730	X/FALL LINE
50537	976422.117	706993.730	1849.911	X/FALL LINE
50538	976421.065	707000.931	1850.222	R
50539	976408.401	706993.009	1850.231	X/FALL LINE
50540	976407.609	707001.326	1850.937	R
50541	976400.951	706996.906	1852.054	R
50542	976401.115	706986.549	1850.588	R
50543	976410.845	706978.359	1846.248	R
50544	976412.156	706990.180	1845.911	R
50545	976424.205	706987.714	1846.081	R
50546	976434.451	706988.514	1846.391	R
50547	976436.393	706975.748	1846.818	R
50548	976439.942	706965.565	1847.368	R
50549	976453.925	706967.271	1852.173	R
50550	976470.052	706971.564	1853.112	R CLO PT
50551	976462.399	707016.697	1853.249	R PC/ROCK 1 X1 + SMALLER
50552	976461.456	707019.595	1853.080	DFL PC
50553	976459.833	707022.511	1853.451	R
50554	976452.505	707022.641	1851.857	R
50555	976451.302	707021.105	1851.537	DFL
50556	976442.718	707022.922	1850.829	DFL-7 PT
50557	976443.585	707025.032	1850.904	R
50558	976443.000	707016.167	1850.772	R
50559	976453.363	707015.812	1852.803	R
50560	976462.001	707016.510	1853.144	R CLO PT
50561	976457.432	707025.197	1853.266	PV AZ90 HD15
50562	976418.967	707009.719	1850.365	PV AZ270 HD6
50563	976391.180	707001.962	1851.633	PV AZ90 HD15
50564	976390.329	707002.383	1851.711	X
50565	976366.902	707001.041	1851.824	X
50566	976363.481	707019.088	1851.589	FWI-7 WL OH-.75/5.3 FT CMU STUCO
50567	976363.653	707001.488	1851.606	WL
50568	976395.804	706980.301	1849.809	PV AZ270 HD12
50569	976363.814	706977.783	1850.873	WL/5.4 FT
				X

50571	976395.120	706980.374	1849.912	X
50572	976424.142	706979.477	1846.607	X
50573	976457.043	706983.858	1852.782	X
50574	976483.685	706978.132	1853.484	X
50575	976509.334	706979.010	1854.126	X
50576	976466.171	706956.440	1852.605	BAR
50577	976462.242	706947.061	1852.355	IV
50578	976457.156	706941.977	1852.135	SAG AZ180 HD3
50579	976453.982	706936.940	1851.267	PV AZ270 HD10
50580	976508.725	706928.251	1853.401	X
50581	976478.016	706925.749	1852.378	X
50582	976461.796	706924.200	1851.955	X
50583	976438.781	706929.466	1846.795	X
50584	976418.778	706927.258	1846.192	X
50585	976406.157	706926.870	1846.218	X
50586	976394.630	706926.043	1848.192	IV
50587	976393.220	706920.471	1848.902	MES AZ270 HD12
50588	976384.935	706924.388	1849.866	X
50589	976378.022	706922.600	1849.919	PV AZ90 HD12
50590	976363.746	706902.933	1848.909	WL/6 FT CMU STUCO
50591	976515.702	706892.835	1851.968	X
50592	976515.806	706896.218	1851.845	DFL PC
50593	976514.917	706898.962	1852.248	X
50594	976492.000	706888.733	1850.969	DFL
50595	976491.443	706891.165	1851.617	X
50596	976492.439	706885.187	1851.598	X
50597	976476.977	706869.877	1850.973	X
50598	976472.013	706875.086	1850.268	DFL
50599	976468.256	706880.519	1851.138	X
50600	976466.657	706885.349	1851.431	PV AZ90 HD12
50601	976460.429	706879.306	1851.342	X
50602	976472.622	706868.971	1850.683	R PC
50603	976470.993	706874.376	1850.187	R
50604	976468.528	706877.107	1850.373	R
50605	976457.280	706864.968	1849.347	DFL
50606	976456.352	706868.947	1850.099	R
50607	976452.327	706876.093	1851.273	R
50608	976449.059	706859.969	1846.619	DFL
50609	976440.962	706860.500	1843.159	DFL-7 PT
50610	976448.068	706885.966	1849.738	PV AZ270 HD6
50611	976444.920	706885.977	1848.628	R
50612	976438.763	706883.103	1846.410	R
50613	976424.531	706889.268	1846.017	R
50614	976407.163	706881.088	1846.250	R
50615	976407.867	706881.180	1846.402	PV AZ90 HD12
50616	976408.665	706877.357	1846.381	X/FALL LINE
50617	976423.586	706878.200	1845.508	X/FALL LINE
50618	976435.493	706877.093	1846.389	X/FALL LINE
50619	976400.915	706879.122	1848.548	R
50620	976398.595	706869.573	1848.120	R
50621	976381.809	706879.627	1848.556	X
50622	976363.888	706879.879	1848.128	WL/6 FT CMU
50623	976363.569	706854.801	1847.229	WL-7 FWI/6 FT
50624	976379.857	706857.060	1848.133	PV AZ270 HD8
50625	976389.419	706849.325	1846.970	X
50626	976404.421	706858.663	1843.701	R
50627	976408.823	706859.343	1842.082	R
50628	976409.397	706871.216	1842.179	R
50629	976422.403	706874.450	1842.303	R
50630	976424.594	706861.043	1842.535	X
50631	976439.183	706866.729	1843.094	R
50632	976438.681	706856.396	1843.251	R
50633	976453.252	706855.315	1848.073	R
50634	976453.142	706855.329	1848.162	PV AZ270 HD12
50635	976464.860	706863.135	1850.276	R
50636	976470.859	706866.787	1850.698	R PT CLO
50637	976480.058	706857.056	1851.134	X
50638	976496.629	706855.587	1851.092	X
50639	976516.703	706858.504	1851.793	X
50640	976517.618	706854.068	1851.319	DFL PC
50641	976518.242	706851.215	1851.697	X
50642	976483.706	706842.051	1850.587	DFL
50643	976484.488	706837.838	1850.851	X
50644	976479.873	706845.359	1850.977	X
50645	976473.443	706851.913	1850.894	CJR
50646	976479.021	706836.646	1850.592	R OH7.0 PC
50647	976476.442	706838.337	1850.345	DFL
50648	976462.765	706834.656	1848.520	DFL
50649	976464.232	706831.298	1849.818	R
50650	976453.025	706829.846	1846.967	R
50651	976452.326	706833.126	1846.466	DFL

50652	976441.592	706834.388	1842.549	DFL-7 PT
50653	976443.017	706829.232	1843.760	R-7 PT
50654	976429.461	706832.800	1841.952	X
50655	976381.051	706828.989	1847.845	X
50656	976364.434	706840.340	1846.233	X
50657	976363.615	706828.627	1846.747	FRI-7 WL OH.72/6 FT CMU STUCO
50658	976363.900	706777.172	1847.426	WL
50659	976375.113	706777.737	1848.035	X
50660	976393.356	706778.255	1844.079	X
50661	976404.808	706779.967	1841.627	X
50662	976419.475	706780.014	1841.760	X
50663	976429.904	706786.804	1842.268	PV AZ90 HD12
50664	976434.789	706778.134	1842.822	X
50665	976452.309	706778.583	1847.169	X
50666	976467.422	706776.385	1849.841	X
50667	976498.892	706775.051	1850.580	X
50668	976517.749	706776.003	1851.419	X
50669	976518.766	706785.269	1851.155	X
50670	976449.139	706725.111	1848.365	PV AZ90 HO10
50671	976391.904	706737.120	1843.162	MES AZ90 HD15
50672	976388.066	706720.462	1843.850	PV AZ270 HD12
50673	976375.984	706700.214	1846.322	MES AZ270 HD8
50674	976368.372	706691.033	1845.954	MES AZ270 HD8
50675	976364.167	706680.161	1845.700	WL
50676	976366.901	706671.986	1844.996	PV AZ270 HD8
50677	976378.355	706680.091	1846.210	X
50678	976363.920	706658.405	1845.512	WL-7 FWR/6 FT
50679	976390.112	706681.700	1843.197	X
50680	976397.984	706683.117	1841.844	X
50681	976410.843	706683.204	1841.700	X
50682	976424.539	706683.735	1842.114	X
50683	976427.934	706680.227	1842.599	R OH-7.0 PC
50684	976428.492	706677.549	1842.757	DFL PC
50685	976438.947	706679.663	1844.649	DFL
50686	976438.581	706683.606	1845.985	R
50687	976439.249	706687.053	1846.142	X
50688	976449.812	706687.141	1847.388	R-7 PT
50689	976451.684	706684.028	1847.308	DFL-7 PT
50690	976459.737	706676.953	1848.096	SNW/TRAIL
50691	976448.119	706665.423	1847.632	SAG
50692	976461.104	706664.640	1847.975	MES AZ270 HD12
50693	976465.388	706687.220	1848.541	X
50694	976494.290	706688.952	1849.087	X
50695	976516.668	706688.817	1849.394	X
50696	976518.261	706676.173	1848.771	DFL PC
50697	976516.586	706667.282	1849.221	X
50698	976497.466	706661.153	1847.986	DFL
50699	976500.331	706659.298	1848.400	X
50700	976491.621	706664.921	1848.223	X
50701	976479.304	706645.945	1847.670	X
50702	976481.639	706642.399	1847.232	DFL
50703	976483.214	706636.570	1847.697	X
50704	976510.367	706633.170	1848.119	W/E-W
50705	976509.998	706625.441	1847.801	W/E-W
50706	976460.287	706633.063	1846.951	X
50707	976453.204	706638.597	1846.423	DFL
50708	976452.073	706641.706	1846.569	R OH8.0 PC
50709	976446.580	706633.909	1846.027	PV AZ270 HD10
50710	976442.671	706637.584	1845.034	DFL
50711	976440.297	706640.817	1845.385	R
50712	976431.701	706638.470	1842.773	R-7 PT
50713	976431.288	706635.594	1842.270	DFL-7 PT
50714	976423.971	706636.796	1842.070	MES AZ90 HD10
50715	976413.246	706680.164	1841.751	X
50716	976364.228	706591.727	1844.260	FWI-7 WL OH-.75/6 FT CMU STUCO
50717	976516.915	706604.333	1847.841	X/START 07 17 09
50718	976517.458	706602.570	1847.443	DFL PC
50719	976517.173	706600.245	1847.770	X
50720	976495.008	706599.603	1847.121	DFL
50721	976494.155	706597.343	1847.160	X
50722	976493.141	706602.414	1847.159	X
50723	976487.607	706600.072	1847.093	DFL
50724	976485.342	706583.044	1846.781	DFL-7
50725	976478.939	706597.810	1847.420	X
50726	976456.278	706597.869	1846.256	X
50727	976448.784	706589.169	1844.106	R PC
50728	976447.510	706598.903	1846.255	R
50729	976436.463	706605.622	1842.911	R
50730	976429.159	706601.808	1841.803	R
50731	976433.335	706595.777	1842.312	X/FALL LINE
50732	976420.048	706595.156	1841.723	X/FALL LINE

50733	976407.270	706588.669	1842.436	X/FALL LINE
50734	976425.605	706604.397	1841.773	X
50735	976414.581	706605.835	1841.584	X
50736	976414.335	706602.180	1841.679	R
50737	976397.005	706594.082	1844.000	R
50738	976388.999	706598.875	1844.388	X
50739	976371.780	706592.396	1844.383	X
50740	976363.750	706576.068	1843.555	WL PC
50741	976366.870	706562.903	1842.922	WL
50742	976365.908	706551.580	1843.369	WL
50743	976364.242	706544.986	1843.258	WL PT/5.7 FT CMU STUCO
50744	976377.079	706570.073	1843.740	MES AZ270 HD8
50745	976382.272	706570.573	1843.916	X
50746	976392.718	706571.235	1842.416	X
50747	976398.679	706580.417	1841.861	R
50748	976402.281	706569.710	1839.295	R
50749	976400.642	706564.464	1839.682	X
50750	976423.153	706565.774	1837.661	X
50751	976423.088	706574.273	1837.627	R
50752	976422.936	706587.443	1836.419	X
50753	976437.472	706571.931	1838.337	R
50754	976445.631	706575.946	1840.682	R CLO PT
50755	976447.028	706570.630	1840.382	X
50756	976465.437	706569.628	1845.929	X
50757	976474.147	706570.455	1846.988	X
50758	976498.838	706569.588	1847.055	X
50759	976518.710	706569.236	1847.686	X
50760	976512.572	706470.011	1847.148	X
50761	976513.091	706489.166	1846.678	X
50762	976513.759	706493.339	1845.886	DFL PC
50763	976513.485	706496.743	1846.645	X
50764	976494.578	706491.673	1845.407	DFL
50765	976493.238	706488.972	1846.052	X
50766	976493.327	706497.803	1846.069	X
50767	976491.955	706466.552	1846.586	X
50768	976473.151	706464.297	1845.922	X
50769	976470.250	706467.907	1845.771	MES AZ90 HD12
50770	976474.972	706494.149	1844.905	DFL
50771	976470.226	706486.063	1845.748	R PC
50772	976474.672	706490.744	1845.365	R
50773	976477.127	706499.345	1845.389	R
50774	976477.687	706505.797	1845.876	IV
50775	976466.414	706500.686	1845.082	R
50776	976465.324	706493.441	1843.736	DFL
50777	976453.711	706500.180	1839.975	R
50778	976447.317	706501.582	1838.342	R
50779	976450.206	706490.567	1837.987	R
50780	976442.043	706489.499	1837.847	DFL-7 PT
50781	976450.423	706479.047	1838.529	R
50782	976461.384	706484.787	1842.225	R CLO PT
50783	976456.015	706467.712	1840.975	X
50784	976444.880	706469.269	1837.977	X
50785	976427.451	706468.834	1837.444	X
50786	976414.672	706469.446	1837.557	X
50787	976391.378	706470.233	1843.494	X
50788	976379.485	706472.036	1843.540	X
50789	976364.480	706473.052	1843.287	WL/5.6 FT CMU STUCO
50790	976376.726	706479.087	1843.624	MES AZ90 HD6
50791	976393.842	706489.003	1841.861	IV
50792	976393.639	706492.565	1841.889	IV
50793	976384.971	706526.098	1843.071	PV AZ90 HD8
50794	976403.129	706426.965	1841.402	MES AZ90 HD12
50795	976382.698	706399.080	1842.873	PV AZ270 HD6
50796	976364.170	706414.124	1842.675	WL-7 FWI/6 FT
50797	976367.584	706403.070	1842.551	X
50798	976364.117	706388.258	1841.824	FWI-7 WL OH-.75/6 FT MU STUCO
50799	976364.508	706369.377	1841.689	WL
50800	976389.498	706371.333	1842.807	X
50801	976390.400	706353.211	1842.333	PV AZ270 HD12
50802	976407.553	706369.370	1839.269	X
50803	976418.849	706369.880	1837.370	X
50804	976441.662	706368.005	1837.659	X
50805	976438.920	706393.958	1837.522	MES AZ90 HD8
50806	976450.365	706358.373	1838.875	R PC
50807	976447.385	706358.647	1838.034	R
50808	976447.937	706352.060	1837.703	R
50809	976441.515	706351.456	1837.556	DFL PC
50810	976448.325	706353.939	1837.561	DFL
50811	976455.446	706350.309	1838.212	DFL
50812	976448.817	706345.549	1838.437	R
50813	976460.288	706344.938	1842.831	R

50814	976461.980	706349.391	1842.636	DFL
50815	976468.578	706344.659	1844.079	R
50816	976465.177	706341.481	1844.046	MES AZ270 HD10
50817	976470.183	706349.012	1843.433	DFL
50818	976469.517	706355.483	1844.074	R
50819	976464.530	706355.590	1843.799	R CLO PT
50820	976460.373	706378.102	1841.738	PV AZ270 HD15
50821	976472.272	706374.182	1844.390	IV
50822	976484.346	706354.705	1844.128	X
50823	976485.625	706350.712	1843.724	DFL
50824	976486.693	706347.271	1844.179	X
50825	976508.549	706356.194	1844.696	X
50826	976506.787	706369.346	1844.704	X
50827	976510.580	706364.735	1844.140	DFL
50828	976519.500	706366.831	1844.499	DFL-7 PT
50829	976519.292	706370.393	1844.897	X
50830	976519.333	706362.953	1844.594	X
50831	976474.112	706325.793	1844.147	CJR
50832	976508.661	706278.351	1844.804	X
50833	976479.392	706281.038	1843.921	X
50834	976463.293	706280.616	1844.282	X
50835	976459.979	706241.314	1843.275	SAG AZ270 HD3
50836	976460.845	706235.956	1843.373	PV AZ270 HD12
50837	976449.026	706256.602	1843.386	PV AZ90 HD12
50838	976441.258	706283.125	1839.589	X
50839	976430.797	706283.183	1837.487	X
50840	976432.633	706293.275	1837.631	PV AZ90 HD10
50841	976413.982	706279.684	1837.091	X
50842	976399.347	706278.355	1837.605	X
50843	976386.615	706277.970	1840.288	X
50844	976377.819	706276.981	1842.594	X
50845	976364.565	706280.862	1841.972	WL
50846	976364.356	706218.963	1841.478	WL-7 FWI/6 FT
50847	976374.238	706212.944	1841.297	MES AZ270 HD6
50848	976376.769	706201.096	1840.826	SAG AZ90 HD3
50849	976375.261	706189.635	1840.986	MES AZ90 HD8
50850	976364.541	706193.033	1840.414	FRI-7 WL OH-.75/5 FT CMU STUCO
50851	976364.768	706179.219	1840.085	WL
50852	976377.363	706179.697	1840.390	X
50853	976390.666	706180.986	1837.218	MES AZ90 HD15
50854	976380.222	706157.122	1839.171	R PC
50855	976381.164	706164.530	1840.236	R
50856	976389.470	706170.789	1837.817	R
50857	976406.606	706178.017	1837.309	R
50858	976406.997	706186.622	1837.205	X
50859	976420.320	706180.923	1837.711	R1 OH-7.0 PC
50860	976419.448	706184.611	1837.671	DFL PC
50861	976416.129	706177.319	1837.302	R
50862	976394.957	706163.813	1837.834	X/FALL LINEE
50863	976409.998	706170.898	1836.698	X/FALL LINEE
50864	976432.404	706179.103	1840.465	R1
50865	976433.903	706168.840	1841.306	R
50866	976444.233	706177.635	1841.427	R1
50867	976448.882	706180.434	1841.646	R1-7 PT
50868	976435.735	706182.211	1840.341	DFL
50869	976449.789	706186.088	1841.664	DFL
50870	976480.659	706208.494	1842.521	DFL-7
50871	976462.188	706200.045	1842.467	X
50872	976452.427	706208.367	1842.374	IV
50873	976437.605	706199.119	1841.569	PV AZ90 HD10
50874	976454.064	706181.725	1841.788	MES AZ270 HD10
50875	976464.754	706181.784	1842.576	SNW/TRAIL
50876	976467.155	706178.705	1842.582	X
50877	976500.814	706177.481	1843.157	X
50878	976519.785	706177.067	1843.546	X
50879	976517.588	706143.084	1843.214	X
50880	976484.635	706143.255	1842.144	X
50881	976467.832	706143.182	1841.829	X
50882	976457.281	706141.636	1840.905	DFL PC
50883	976457.602	706136.144	1841.143	R1 OH-10.0 PC
50884	976442.190	706134.426	1838.026	R1
50885	976440.704	706138.815	1837.563	DFL
50886	976427.341	706136.279	1834.163	DFL
50887	976429.905	706132.715	1834.714	R1-7 PT
50888	976420.282	706132.497	1833.355	DFL-7 PT
50889	976420.215	706138.022	1833.287	X
50890	976424.668	706151.536	1834.288	R
50891	976401.696	706146.801	1833.243	R
50892	976403.148	706157.195	1832.800	X
				X

50895	976386.918	706146.678	1835.229	R CLO PT
50896	976391.968	706136.745	1833.816	R OH10 PC
50897	976381.770	706138.859	1837.183	R
50898	976375.206	706139.814	1838.949	R-7 PT
50899	976374.332	706141.124	1839.110	T AZ90 HD10
50900	976364.840	706143.355	1838.875	WL/6 FT CMU STUCO
50901	976373.751	706135.804	1838.789	DFL-7 PT
50902	976374.087	706108.949	1838.894	MES AZ270 HD12
50903	976389.693	706098.555	1835.853	IV
50904	976390.334	706093.164	1836.182	IV
50905	976419.406	706108.073	1833.064	MES AZ90 HD10
50906	976408.347	706096.608	1833.085	MES AZ270 HD8
50907	976364.821	706043.779	1837.982	WL
50908	976384.143	706042.757	1838.997	X
50909	976369.793	706013.554	1838.398	MES AZ90 HD9
50910	976365.406	706011.852	1838.009	WL-7 AZ90 HD9
50911	976365.414	706011.837	1838.032	WL-7 AZ90 HD9
50912	976394.185	706010.510	1837.013	MES AZ270 HD15
50913	976387.612	706041.855	1838.686	X
50914	976401.982	706043.571	1835.255	X
50915	976411.454	706043.985	1832.798	X
50916	976427.151	706043.829	1832.680	X
50917	976439.045	706046.140	1832.953	X
50918	976433.241	706065.874	1832.853	DFL PC
50919	976442.810	706066.308	1832.758	DFL
50920	976449.248	706073.575	1836.662	R PC
50921	976447.899	706077.093	1836.350	PV AZ90 HD15
50922	976450.848	706067.876	1833.875	DFL
50923	976441.867	706072.282	1833.461	R
50924	976442.602	706066.225	1832.895	R
50925	976444.677	706061.168	1833.733	R
50926	976448.857	706059.451	1835.220	R
50927	976458.564	706068.259	1838.934	DFL
50928	976460.633	706062.881	1840.083	R
50929	976458.547	706062.945	1839.352	PV AZ270 HD8
50930	976466.035	706063.402	1840.941	R
50931	976468.049	706071.182	1840.131	R DFL
50932	976464.658	706076.002	1841.123	R
50933	976455.174	706073.944	1839.033	R CLO PT
50934	976475.786	706080.256	1840.663	DFL
50935	976479.041	706093.875	1841.102	DFL
50936	976494.774	706094.429	1841.367	DFL
50937	976510.910	706097.457	1841.665	DFL
50938	976519.380	706098.996	1841.841	DFL-7 PT
50939	976516.654	706095.387	1842.225	X
50940	976510.201	706100.172	1842.128	X
50941	976493.283	706098.110	1841.448	X
50942	976494.206	706088.810	1841.510	X
50943	976458.019	706046.555	1839.274	X
50944	976472.971	706046.242	1841.176	X
50945	976499.905	706047.754	1841.348	X
50946	976519.185	706047.586	1841.737	X
50947	976461.100	706004.073	1838.734	PV AZ270 HD12
50948	976461.820	705939.934	1839.794	SAG AZ180 HD3
50949	976461.020	705931.749	1839.401	X
50950	976452.810	705932.304	1838.604	X
50951	976480.963	705977.935	1840.337	DFL PC
50952	976470.154	705951.107	1839.071	DFL
50953	976468.499	705950.210	1836.466	DFL
50954	976470.907	705948.221	1839.646	X
50955	976467.655	705953.684	1839.761	X
50956	976461.644	705950.875	1840.009	R OH10 PC
50957	976451.873	705954.942	1838.406	X
50958	976453.870	705950.939	1835.157	R
50959	976454.145	705948.722	1835.363	DFL
50960	976480.497	705871.980	1839.331	SMH
50961	976481.560	705872.287	1839.349	MHR
50962	976472.187	705895.487	1839.261	IW AZ180 HD10
50963	976451.653	705932.903	1838.413	X
50964	976450.667	705941.263	1837.837	X
50965	976448.154	705945.632	1835.823	X
50966	976442.003	705949.959	1834.348	R
50967	976439.310	705949.232	1834.129	R-7 PT
50968	976437.515	705945.888	1833.761	DFL
50969	976428.326	705942.383	1833.235	DFL-7 PT
50970	976449.050	705920.692	1836.839	PV AZ270 HD14
50971	976436.502	705935.130	1833.224	X
50972	976409.494	705935.185	1832.770	X
50973	976394.616	705944.836	1835.677	T AZ270 HD8
				X

50976	976373.730	705933.916	1837.550	FWI
50977	976380.081	705903.924	1837.295	FWI
50978	976383.593	705888.014	1837.341	FWI
50979	976388.611	705829.887	1836.945	FWI
50980	976389.150	705824.215	1837.240	FWI
50981	976392.503	705831.622	1836.509	X
50982	976396.565	705831.257	1835.964	PV AZ90 HD15
50983	976401.375	705829.461	1834.699	X
50984	976397.036	705819.190	1837.149	R PC
50985	976409.939	705828.603	1832.825	R
50986	976410.302	705833.249	1832.900	X
50987	976421.141	705832.000	1832.985	R
50988	976434.567	705827.453	1833.679	R
50989	976442.017	705822.882	1834.037	R
50990	976437.328	705820.182	1833.698	X/FALL LINE
50991	976424.417	705821.327	1832.725	X/FALL LINE
50992	976412.775	705819.605	1833.680	X/FALL LINE
50993	976427.522	705839.776	1833.159	DFL PC
50994	976436.847	705836.029	1833.515	DFL
50995	976435.590	705833.239	1833.829	R1 OH7.0 PC
50996	976447.666	705826.562	1836.082	R1
50997	976447.706	705821.622	1835.904	R
50998	976450.800	705829.048	1836.088	DFL
50999	976457.204	705828.273	1837.185	DFL
51000	976456.899	705823.841	1837.956	R1
51001	976461.260	705824.900	1838.232	R1-7 PT
51002	976461.742	705825.375	1838.280	DFL
51003	976466.479	705826.410	1838.882	DFL-7 PT
51004	976463.884	705827.436	1838.641	PV AZ90 HD10
51005	976453.684	705819.019	1838.009	R
51006	976475.713	705834.511	1839.071	X
51007	976501.242	705834.881	1839.227	X
51008	976474.399	705811.137	1838.794	CJR
51009	976496.273	705806.309	1838.530	DFL PC
51010	976477.684	705794.527	1837.988	DFL
51011	976474.974	705799.367	1838.555	IV
51012	976467.320	705805.204	1838.614	X
51013	976455.025	705814.805	1838.229	R
51014	976461.380	705798.418	1837.141	R
51015	976467.420	705798.264	1838.194	R
51016	976467.635	705792.551	1837.006	DFL
51017	976475.028	705796.386	1838.390	R
51018	976477.093	705789.701	1838.659	R
51019	976476.512	705787.155	1838.623	IV
51020	976468.025	705787.329	1838.276	R
51021	976470.049	705779.915	1838.124	PV AZ270 HD10
51022	976461.490	705782.759	1835.545	R
51023	976449.475	705776.888	1830.514	R
51024	976455.913	705789.519	1830.200	R DFL
51025	976449.831	705780.499	1829.564	C PC
51026	976440.488	705791.715	1828.882	C
51027	976441.494	705799.034	1829.066	R
51028	976430.075	705802.475	1829.045	R
51029	976431.272	705811.909	1828.483	X
51030	976428.369	705795.630	1828.662	C
51031	976411.556	705796.544	1829.368	C
51032	976409.787	705800.269	1829.489	C-7 PT R
51033	976407.574	705810.003	1829.293	X
51034	976401.198	705806.677	1833.268	R CLO PT
51035	976382.134	705782.910	1835.775	FRI
51036	976385.161	705782.606	1835.208	X
51037	976399.794	705781.650	1830.862	X
51038	976408.744	705779.981	1828.957	X
51039	976425.202	705775.099	1828.545	X
51040	976439.306	705773.382	1828.554	X
51041	976458.648	705771.636	1833.910	X
51042	976453.404	705752.820	1833.059	PV AZ270 HD10
51043	976480.325	705766.996	1838.826	X
51044	976512.852	705768.562	1838.811	X
51045	976512.579	705691.463	1838.081	X
51046	976482.595	705691.038	1837.529	X
51047	976478.876	705694.357	1837.371	DFL PC
51048	976462.803	705692.347	1836.794	DFL
51049	976462.548	705697.504	1837.303	R OH10
51050	976459.753	705700.583	1837.675	PV AZ90 HD8
51051	976453.691	705698.267	1836.853	R
51052	976450.875	705694.337	1835.187	DFL
51053	976448.049	705693.993	1835.255	PV AZ270 HD10
51054	976444.564	705701.418	1833.085	R
51055	976436.525	705704.500	1829.170	R-7 PT
51056	976440.117	705696.857	1829.059	DFL

51057	976431.305	705698.838	1828.803	DFL-7 PT
51058	976414.280	705702.099	1828.475	X
51059	976397.449	705704.464	1828.676	X
51060	976387.052	705710.177	1831.734	X
51061	976378.728	705718.061	1834.717	PV AZ270 HD12
51062	976369.747	705710.731	1834.959	WL
51063	976367.580	705697.529	1834.040	FWI
51064	976358.546	705667.553	1833.997	FWI
51065	976372.365	705657.402	1830.782	PV AZ270 HD15
51066	976341.645	705626.433	1833.287	FWI
51067	976331.427	705611.052	1832.539	FWI
51068	976345.433	705607.857	1829.636	X
51069	976354.852	705606.123	1828.099	X
51070	976342.181	705594.744	1828.681	FWI
51071	976375.409	705605.994	1828.521	X
51072	976386.394	705603.214	1829.106	X
51073	976405.326	705601.230	1833.533	X
51074	976412.390	705600.960	1834.390	IV
51075	976411.438	705597.710	1834.462	IV
51076	976422.443	705597.237	1835.016	X
51077	976451.023	705591.630	1835.196	X
51078	976441.289	705637.876	1836.508	ECB
51079	976442.128	705639.725	1836.495	ECB
51080	976441.267	705640.097	1836.499	ECB
51081	976440.376	705638.191	1836.499	ECB CLO
51082	976441.494	705637.155	1836.447	C
51083	976442.892	705640.068	1836.471	C
51084	976440.880	705640.923	1836.430	C
51085	976439.548	705638.004	1836.467	C
51086	976436.027	705632.538	1835.957	SAG AZ90 HD3
51087	976421.474	705625.856	1833.948	MES AZ270 HD8
51088	976401.057	705554.654	1833.771	SAG AZ180 HD4
51089	976376.146	705578.439	1831.566	MES AZ270 HD15
51090	976357.535	705569.100	1828.999	FRI
51091	976348.149	705587.877	1827.762	X
51092	976364.680	705550.959	1831.846	FWI-7 WL OH-.75/4.0 FT CMU STCU
51093	976365.293	705546.965	1832.438	WL/3.8 FT
51094	976366.601	705533.874	1832.605	WL
51095	976399.156	705537.538	1833.822	X
51096	976430.687	705533.028	1833.864	X
51097	976463.025	705529.470	1834.075	X
51098	976493.001	705530.180	1834.749	X
51099	976502.991	705578.623	1834.077	DFL PC
51100	976473.372	705560.211	1833.931	DFL
51101	976456.047	705540.315	1833.570	DFL
51102	976460.958	705542.492	1834.128	PV AZ90 HD18
51103	976456.619	705519.166	1833.834	X
51104	976450.174	705520.163	1832.580	DFL
51105	976448.321	705522.658	1833.761	X
51106	976422.129	705510.284	1832.594	DFL
51107	976415.231	705494.277	1832.415	DFL
51108	976420.778	705477.215	1832.383	DFL-7 PT
51109	976453.443	705497.615	1834.073	MES AZ270 HD25
51110	976431.828	705534.042	1833.807	X
51111	976368.365	705516.735	1832.658	WL
51112	976369.969	705500.699	1832.259	WL
51113	976369.944	705500.767	1832.221	WL-7
51114	976383.271	705519.924	1832.843	X
51115	976418.488	705524.673	1832.998	X
51116	976403.346	705514.930	1832.959	SAG AZ270 HD3
51117	976431.404	705521.318	1833.627	X
51118	976481.529	705523.625	1834.430	X
51119	976515.910	705525.462	1835.373	X
51120	976523.022	704824.000	1825.966	WL OH-.65/2.5F TALL 7-22-09
51121	976515.471	704813.919	1826.093	EVT
51122	976519.069	704814.027	1826.140	EVT
51123	976519.198	704807.593	1826.189	EVT
51124	976515.722	704807.456	1826.128	EVT CLO
51125	976474.987	704799.230	1825.400	CJR
51126	976480.386	704823.946	1825.335	X
51127	976475.471	704825.512	1824.595	R PC R1 PC
51128	976476.191	704830.012	1825.015	R
51129	976470.879	704833.819	1825.334	R
51130	976463.352	704831.296	1825.080	R
51131	976474.496	704819.997	1824.888	R1
51132	976465.083	704816.938	1824.411	R1
51133	976463.776	704823.993	1823.251	X/RIP RAP
51134	976445.966	704814.307	1817.327	R1
51135	976444.188	704824.282	1817.005	X
51136	976442.280	704822.826	1816.786	R1
51137	976440.164	704825.595	1816.824	R1

51138	976449.917	704831.282	1820.689	R
51139	976446.285	704842.864	1821.401	R
51140	976449.149	704851.800	1824.546	R
51141	976430.314	704860.336	1820.210	R
51142	976414.336	704858.811	1820.471	R
51143	976400.829	704852.143	1823.258	R
51144	976398.224	704845.374	1824.073	R
51145	976385.028	704824.112	1823.423	X
51146	976371.695	704823.962	1823.043	WL1 OH.65 PC/3F TALL
51149	976410.588	704831.501	1816.298	R
51150	976412.208	704824.265	1816.441	X
51151	976425.449	704832.605	1816.307	R-7 PT R1-7 PT
51152	976393.317	704789.978	1821.386	PV AZ270 HD15/10I BASE
51153	976451.097	704773.825	1819.105	PV AZ270 HD15/10I BASE
51154	976421.020	704745.197	1815.953	PV AZ270 HD15/15I BASE
51155	976466.802	704757.597	1823.811	BAR/1F BASE
51156	976522.968	704862.041	1827.040	WL
51157	976458.507	704861.949	1825.432	X
51158	976448.720	704872.485	1823.491	PV AZ90 HD15/10I BASE
51159	976436.903	704907.441	1821.638	MES AZ90 HD15/10I BASE
51160	976407.043	704884.173	1820.834	PV AZ270 HD15/10I BASE
51161	976433.316	704862.051	1820.613	X
51162	976410.998	704861.977	1820.582	X
51163	976385.591	704862.026	1824.383	X
51164	976381.774	704861.977	1824.379	WL1
51165	976384.860	704908.033	1825.346	BAR/10I BASE
51166	976387.841	704912.253	1824.529	PV AZ270 HD15/8I BASE
51167	976379.195	704934.843	1825.404	PV AZ90 HD15/1F BASE
51168	976364.851	704931.009	1824.864	WL1
51169	976383.424	704930.940	1825.445	X
51170	976411.011	704928.756	1820.672	PV AZ90 HD10/8I BASE
51171	976403.798	704931.056	1820.419	X
51172	976432.759	704931.003	1820.711	X
51173	976437.586	704975.204	1821.425	R
51174	976434.095	704948.583	1821.123	R
51175	976456.824	704955.712	1827.427	R
51176	976463.081	704958.141	1827.483	R
51177	976463.760	704960.522	1826.790	R
51178	976463.928	704963.885	1826.771	R
51179	976462.489	704969.026	1827.895	R
51180	976454.386	704969.676	1827.224	R CLO
51181	976454.012	704962.838	1826.573	X/RIPRAP
51182	976456.096	704931.021	1826.830	X
51183	976522.726	704931.052	1827.471	WL
51184	976467.091	704958.386	1827.699	X
51185	976467.131	704962.883	1826.986	FL PC
51186	976466.557	704968.949	1827.663	X
51187	976458.204	704987.129	1827.344	PV AZ270 HD15/10I BASE
51188	976449.005	705012.782	1823.788	PV AZ270 HD20/1F BASE
51189	976481.054	704980.592	1827.899	X
51190	976485.090	704978.252	1827.113	FL
51191	976487.530	704976.713	1828.024	X
51192	976481.747	704992.240	1828.388	SMH
51193	976482.943	704992.344	1828.335	MHR
51194	976481.389	705000.645	1828.409	X
51195	976483.948	705000.630	1827.429	FL
51196	976487.770	705000.647	1828.170	X
51197	976490.871	705019.984	1828.440	X
51198	976489.619	705023.184	1828.259	X
51199	976489.126	705022.335	1827.574	FL-7 PT
51200	976485.879	705022.576	1828.501	X
51201	976462.128	705050.302	1827.811	PV AZ270 HD15/10I BASE
51202	976464.723	705045.072	1828.367	IV
51203	976475.180	705076.119	1829.438	CMH/US WEST
51204	976476.562	705075.870	1829.483	MHR
51205	976522.720	705036.957	1829.797	WL
51206	976471.728	705037.017	1829.204	X
51207	976447.865	705046.395	1822.687	MES AZ90 HD10/8I BASE
51208	976440.349	705037.017	1821.002	X
51209	976406.551	705036.974	1820.749	X
51210	976389.856	705043.462	1825.915	PV AZ270 HD/10I BASE
51211	976373.026	705036.990	1826.405	WL1
51212	976378.677	705012.701	1826.138	BAR/10I BASE
51213	976379.339	705165.950	1828.569	WL1
51214	976384.296	705166.018	1828.511	X
51215	976394.720	705177.762	1828.551	R PC R1 PC
51216	976396.559	705163.804	1826.035	R1
51217	976411.272	705148.547	1821.763	MES AZ270 HD10/10I BASE
				X

51221	976422.975	705171.510	1821.995	R1
51222	976431.501	705168.462	1822.219	R1
51223	976407.211	705182.071	1824.598	R
51224	976428.385	705184.908	1824.504	R
51225	976435.050	705183.039	1825.145	R
51226	976456.884	705201.155	1830.720	PV AZ270 HD20/1F BASE
51227	976444.067	705158.173	1824.512	R
51228	976435.970	705157.289	1821.924	R1
51229	976438.845	705143.130	1821.838	R1
51230	976434.908	705166.032	1821.985	X
51231	976447.775	705141.708	1824.725	R1
51232	976460.299	705145.570	1829.538	R1
51233	976466.211	705156.239	1829.823	R1
51234	976466.034	705161.217	1830.022	R1
51235	976455.601	705158.484	1828.751	R1-7 PT R-7 PT
51236	976458.751	705166.027	1830.244	X
51237	976522.818	705166.066	1830.834	WL
51238	976522.587	705189.978	1830.892	WL
51239	976454.782	705195.117	1830.621	X
51240	976415.520	705227.399	1824.988	PV AZ270 HD15/10I BASE
51241	976408.983	705189.932	1824.861	X
51242	976389.334	705190.031	1828.509	X
51243	976379.610	705189.986	1828.636	WL
51244	976382.610	705231.951	1830.136	WL
51245	976390.567	705232.019	1829.977	X
51246	976409.261	705232.040	1825.295	X
51247	976432.280	705234.520	1825.062	PV AZ90 HD15/8I BASE
51248	976435.016	705232.050	1825.078	X
51249	976463.212	705252.176	1831.624	IV
51250	976460.291	705255.868	1831.566	SAG AZ90 HD5/1F BASE
51251	976465.550	705231.921	1831.591	X
51252	976522.614	705231.909	1832.785	WL
51253	976522.765	705254.405	1832.534	WL-7 FWI/2.5F TALL
51254	976523.266	705268.027	1832.034	FWI
51255	976523.377	705282.238	1832.951	FWI-7 WL OH-.65/6F TALL
51256	976520.366	705281.897	1832.700	WL PC
51257	976459.164	705267.976	1831.186	X
51258	976456.601	705295.587	1830.851	SAG AZ90 HD5/1F BASE
51259	976449.053	705305.219	1830.688	R PC
51260	976446.950	705289.283	1829.307	R
51261	976448.633	705267.527	1829.045	R
51262	976438.941	705265.785	1826.715	R
51263	976423.439	705268.074	1825.310	X
51264	976423.618	705269.944	1825.235	R
51265	976410.048	705263.061	1826.910	R
51266	976414.465	705268.345	1826.049	X/RIPRAP
51267	976402.965	705278.617	1830.369	R
51268	976398.871	705267.981	1829.881	X
51269	976382.628	705231.992	1830.127	WL1
51270	976384.076	705267.979	1830.382	WL1
51271	976396.103	705277.875	1830.249	PV AZ270 HD10/8I BASE
51272	976392.069	705298.565	1830.864	SAG/1F BASE
51273	976395.444	705299.952	1830.982	R
51274	976394.610	705304.857	1830.811	R
51275	976373.783	705316.644	1830.636	WL1-7 PT GTE
51276	976372.925	705320.436	1830.673	WL1 PC
51277	976391.132	705317.800	1830.554	R
51278	976383.474	705336.337	1831.216	R
51279	976385.065	705338.715	1830.648	R
51280	976386.859	705339.470	1830.827	R
51281	976389.699	705340.135	1831.172	R
51282	976390.968	705336.629	1830.886	R
51283	976395.469	705334.478	1830.672	IV
51284	976400.925	705315.302	1830.803	R
51285	976406.243	705303.990	1830.918	R
51286	976414.691	705310.405	1831.093	PV AZ270 HD15/10I BASE
51287	976412.093	705284.184	1829.276	R
51288	976415.860	705283.020	1828.271	R
51289	976422.186	705286.672	1828.310	R
51290	976434.405	705295.789	1828.790	R
51291	976427.615	705308.290	1830.081	R
51292	976428.633	705315.883	1830.973	R
51293	976445.487	705316.379	1830.922	R CLO PT
51294	976462.400	705348.912	1832.189	IV
51295	976461.554	705342.782	1831.939	IV
51296	976473.362	705312.379	1831.654	CJR
51297	976478.631	705318.048	1832.094	X
51298	976514.010	705320.193	1833.378	PV AZ270 HD20/10I BASE
51299	976511.408	705318.384	1833.274	WV
51300	976520.327	705317.950	1833.509	WL
51301	976411.510	705340.532	1831.178	IV

51302	976422.540	705354.944	1831.689	PV AZ180 HD10/10I BASE
51303	976426.233	705373.920	1831.973	SAG AZ180 HD5/1F BASE
51304	976376.548	705336.051	1831.034	EM
51305	976366.666	705401.950	1830.647	WL-7
51306	976416.246	705401.830	1831.729	X
51307	976438.767	705323.095	1831.314	X
51308	976443.307	705322.697	1830.901	FL PC
51309	976448.396	705322.093	1831.433	X
51310	976454.727	705367.254	1831.385	L/ZZZ2I PVC
51311	976452.744	705369.119	1831.374	L-7/ZZZ2I PVC
51312	976452.423	705370.087	1831.960	X
51313	976454.588	705370.012	1831.400	FL
51314	976457.592	705368.327	1832.351	X
51315	976460.475	705402.015	1833.027	X
51316	976465.785	705402.236	1831.807	FL
51317	976472.725	705400.126	1833.380	X
51318	976499.308	705401.974	1833.989	X
51319	976520.506	705401.964	1834.646	WL-7
51320	976481.582	705432.151	1833.498	SMH
51321	976482.778	705432.018	1833.494	MHR
51322	976479.512	705441.793	1832.987	X
51323	976476.533	705444.208	1832.134	FL
51324	976469.663	705451.275	1833.384	X
51325	976499.194	705465.373	1833.729	X
51326	976500.719	705462.723	1832.783	FL
51327	976503.026	705458.527	1833.499	X
51328	976518.041	705475.144	1833.813	X
51329	976517.858	705478.091	1833.671	FL-7 PT
51330	976516.524	705480.932	1834.235	X
51331	976523.196	704726.013	1825.972	WL OH.65/2.5F TALL
51332	976470.332	704725.939	1824.705	X
51333	976440.546	704725.788	1816.603	X
51334	976426.295	704743.530	1816.148	PV AZ270 HD15/1F BASE
51335	976409.000	704725.999	1815.751	X
51336	976383.658	704726.004	1823.468	X
51337	976376.980	704726.043	1823.379	WL1 OH-.65/2.5F TALL
51338	976380.209	704710.841	1823.161	PV AZ270 HD15/10I BASE
51339	976369.506	704592.942	1820.524	WL1
51340	976391.225	704584.097	1820.229	PV AZ90 HD25/1F BASE
51341	976388.964	704593.137	1820.723	X
51342	976393.208	704578.954	1820.069	R PC R1 PC
51343	976397.440	704583.966	1818.944	R
51344	976407.514	704583.319	1815.623	R
51345	976416.709	704588.654	1815.906	R
51346	976410.315	704593.016	1815.541	X
51347	976422.943	704592.298	1816.038	R
51348	976432.815	704584.801	1816.549	R
51349	976433.774	704592.932	1816.630	X
51350	976435.023	704621.625	1816.307	R2 R3
51351	976435.812	704628.257	1816.360	R2
51352	976464.244	704630.677	1823.540	R2
51353	976462.569	704619.549	1823.216	R2-7 R3-7
51354	976454.760	704593.927	1822.004	PV AZ270 HD15/10I BASE
51355	976467.799	704592.959	1823.699	X
51356	976523.391	704593.065	1824.039	WL
51357	976445.719	704569.072	1820.864	R
51358	976447.881	704555.025	1820.710	R
51359	976451.770	704549.225	1820.143	R
51360	976459.000	704546.276	1820.830	R-7 PT C
51361	976473.304	704544.753	1822.735	C PC
51362	976475.393	704545.602	1823.031	C
51363	976477.160	704547.883	1823.247	C
51364	976477.964	704550.492	1823.257	C PT
51365	976479.785	704557.452	1823.262	C
51366	976482.327	704552.986	1822.759	SMH
51367	976483.409	704553.044	1822.737	MHR
51368	976492.372	704557.366	1823.277	C
51369	976492.623	704542.716	1821.660	C
51370	976492.743	704530.921	1821.653	C
51371	976493.232	704516.032	1823.277	C
51372	976481.103	704515.732	1823.299	C1 C
51373	976480.156	704515.631	1823.234	C
51374	976477.812	704521.549	1823.238	C PC
51375	976476.822	704522.889	1823.083	C
51376	976475.181	704523.660	1822.865	C
51377	976473.247	704523.791	1822.657	C
51378	976471.864	704521.946	1822.583	C PT
51379	976471.202	704519.971	1822.462	IV
51380	976481.035	704529.705	1821.516	C1 C2
51381	976480.915	704541.618	1821.447	C1 C3
51382	976480.721	704557.351	1823.186	C1-7

51383	976472.037	704540.057	1821.334	C3
51384	976475.230	704534.728	1821.321	X/CONC
51385	976475.251	704528.867	1821.316	C2
51386	976470.948	704502.694	1823.258	IV
51387	976467.911	704501.658	1822.397	IV
51388	976454.632	704491.091	1821.256	C R PC
51389	976456.442	704484.988	1821.632	R
51390	976466.238	704475.999	1822.423	PV AZ180 HD10/10I BASE
51391	976445.709	704471.308	1818.862	R
51392	976437.698	704468.851	1814.665	R
51393	976431.006	704474.997	1812.791	R
51394	976417.099	704499.536	1812.110	MES AZ0 HD15/1F BASE
51395	976426.040	704487.216	1812.055	R
51396	976439.887	704491.095	1813.706	C
51397	976450.975	704515.124	1812.704	C
51398	976459.257	704524.177	1812.533	C C2-7
51399	976455.321	704535.211	1812.528	C C3-7
51400	976452.191	704536.105	1812.632	C PC
51401	976445.252	704539.201	1813.148	C
51402	976439.140	704541.370	1812.998	C
51403	976429.163	704515.425	1812.206	R
51404	976423.236	704535.324	1812.275	R
51405	976434.562	704545.915	1812.638	R-7 PT C
51406	976432.347	704552.130	1812.337	R-7 PT C
51407	976403.242	704560.795	1812.673	R1
51408	976413.974	704562.998	1812.804	R1
51409	976422.637	704565.512	1812.580	R1
51410	976429.521	704570.198	1814.030	R1
51411	976432.765	704563.481	1814.008	R1
51412	976433.351	704554.932	1812.644	R1-7 PT C-7 PT
51413	976407.584	704503.872	1812.519	MES AZ90 HD20/1F BASE
51414	976374.279	704558.989	1819.576	WL1
51415	976378.556	704559.059	1819.245	X
51416	976404.428	704558.972	1812.656	X
51417	976426.463	704559.078	1812.289	X
51418	976466.940	704559.134	1824.154	X
51419	976523.579	704559.067	1823.458	WL
51420	976523.730	704551.572	1823.373	WL-7 FWI
51421	976492.613	704543.812	1821.781	PV AZ0 HD15/1F BASE
51422	976523.547	704511.897	1823.786	FWI-7 WL OH.65/2.5F TALL
51423	976523.219	704495.993	1823.547	WL
51424	976457.126	704496.020	1821.419	X
51425	976441.747	704497.318	1812.845	X
51426	976392.618	704496.028	1813.078	X
51427	976371.742	704495.967	1818.508	WL1
51428	976367.920	704399.047	1818.766	WL1
51429	976372.781	704398.953	1818.540	X
51430	976433.337	704348.581	1812.258	R
51431	976431.182	704357.608	1812.137	R1
51432	976429.468	704374.007	1812.514	R2
51433	976429.665	704380.488	1812.521	R3
51434	976434.340	704391.559	1813.900	R4
51435	976433.659	704399.267	1814.158	R5
51436	976418.476	704398.747	1812.059	X
51437	976420.033	704413.138	1812.645	MES AZ180 HD20/1F BASE
51438	976428.250	704399.062	1813.109	X
51439	976454.525	704421.344	1820.988	MES AZ270 HD15/10I BASE
51440	976462.731	704427.108	1821.834	IV
51441	976459.235	704389.980	1821.062	SAG AZ90 HD5/1F BASE
51442	976453.169	704400.266	1820.561	R5
51443	976453.494	704392.235	1820.616	R5-7 R4-7
51444	976457.488	704385.594	1820.922	BAR/10I BASE
51445	976456.660	704384.393	1820.940	R3
51446	976456.189	704376.303	1820.665	R3-7 R2-7
51447	976460.818	704365.141	1820.792	R1
51448	976463.489	704356.961	1820.747	R1-7 R-7
51449	976455.959	704399.162	1820.985	X
51450	976523.257	704399.039	1822.038	WL
51451	976523.726	704306.982	1822.066	WL
51452	976475.169	704282.725	1820.584	CJR
51453	976465.260	704287.700	1819.983	R
51454	976465.733	704292.534	1820.220	R
51455	976465.449	704306.949	1820.520	X
51456	976440.178	704307.012	1812.603	X
51457	976441.217	704293.073	1813.015	R
51458	976440.946	704286.810	1812.701	R CLO
51459	976423.869	704320.977	1811.863	PV AZ0 HD15/1F BASE
51460	976408.293	704306.956	1811.154	X
51461	976393.987	704306.510	1814.393	PV AZ270 HD10/10IBASE
51462	976382.331	704318.350	1817.716	BAR/10I BASE
51463	976381.340	704321.405	1817.874	PV AZ90 HD20/10I BASE

51464	976381.561	704307.100	1817.591	X
51465	976373.953	704306.991	1818.131	WL1
51466	976386.476	704271.501	1818.001	PV AZ270 HD15/10I BASE
51467	976370.450	704208.964	1817.643	WL1
51468	976388.004	704209.088	1817.017	X
51469	976412.532	704209.248	1811.190	X
51470	976433.930	704208.822	1811.682	X
51471	976440.860	704215.726	1812.842	R R1
51472	976441.424	704220.732	1812.983	R1
51473	976440.619	704234.373	1812.604	R2 R3
51474	976440.808	704239.124	1812.407	R3
51475	976440.518	704287.436	1812.466	R4 R5
51476	976441.104	704293.105	1812.992	R5
51477	976465.861	704292.723	1820.189	R5
51478	976465.200	704287.629	1819.883	R5-7 R4-7
51479	976523.488	704262.291	1821.561	WL-7 FWI
51480	976523.570	704243.727	1821.453	FWI WL OH.65/2.5F TALL
51481	976523.401	704209.103	1821.411	WL
51482	976466.195	704235.688	1819.903	IV
51483	976464.877	704234.701	1819.732	R3
51484	976463.494	704229.788	1819.528	R3-7 R2-7
51485	976463.302	704221.860	1819.444	R1
51486	976463.127	704215.928	1819.588	R1-7 R-7
51487	976494.640	704110.279	1818.878	SMH
51488	976495.795	704110.233	1818.810	MHR
51489	976483.382	704110.858	1818.910	MHR
51490	976482.208	704110.818	1818.980	SMH
51491	976457.018	704129.969	1818.941	PV AZ270 HD15/1F BASE
51492	976459.695	704138.006	1819.003	IV
51493	976523.730	704072.100	1819.118	WL
51494	976468.662	704071.155	1818.457	BAR/10I BASE
51495	976461.853	704072.000	1817.723	X
51496	976448.069	704084.992	1814.986	PV AZ270 HD15/1F BASE
51497	976431.659	704072.105	1811.143	X
51498	976403.825	704072.481	1811.193	X
51499	976413.768	704068.738	1810.764	R PC
51500	976401.250	704060.401	1811.445	R
51501	976393.707	704047.673	1813.517	R
51502	976393.057	704049.189	1813.848	PV AZ90 HD15/1F BASE
51503	976371.821	704071.846	1816.957	WL1
51504	976376.838	704071.892	1816.836	X
51505	976371.883	704038.917	1815.938	WL
51506	976375.875	704031.665	1815.130	PV AZ270 HD15/1F BASE
51507	976382.284	704039.063	1814.987	X
51508	976400.401	704035.764	1808.530	R
51509	976403.306	704039.255	1807.407	X
51510	976411.445	704039.722	1807.117	R
51511	976430.127	704037.828	1807.607	R
51512	976433.720	704038.961	1807.542	X
51513	976436.333	704037.063	1807.855	R
51514	976442.206	704043.977	1811.618	R
51515	976449.855	704048.790	1814.562	R
51516	976454.291	704057.275	1816.396	R
51517	976437.687	704060.557	1812.253	R
51518	976429.885	704062.760	1810.828	R CLO PT
51519	976466.969	704039.044	1817.887	X
51520	976468.644	704032.047	1817.850	IV
51521	976470.534	704026.695	1816.745	X/ZZZ 4 PVC PIPE E TO W
51522	976523.711	704038.959	1818.170	WL
51523	976485.906	705402.097	1833.583	X/7-23-09
51524	976486.437	705318.008	1832.254	X
51525	976485.079	705267.977	1831.760	X
51526	976484.640	705231.903	1831.325	X
51527	976487.095	705190.007	1830.678	X
51528	976487.875	705166.072	1830.232	X
51529	976487.403	704931.063	1827.325	X
51530	976486.099	705037.040	1828.873	X
51531	976486.778	704861.771	1825.967	X
51532	976484.312	704823.890	1825.713	X
51533	976488.535	704724.336	1825.171	X
51534	976489.651	704592.910	1823.023	X
51535	976489.999	704559.037	1823.204	X
51536	976492.849	704495.929	1823.269	X
51537	976492.851	704398.871	1821.741	X
51538	976495.906	704306.949	1821.115	X
51539	976496.029	704208.822	1820.312	X
51540	976496.089	704071.996	1818.456	X

X

51545	976466.587	703959.769	1816.378	TP-7
51546	976435.308	703971.805	1807.595	TO PC
51547	976404.033	703972.092	1807.272	TO1 PC
51548	976371.575	703971.941	1815.878	TP1 PC
51549	976365.125	703972.009	1815.523	WL1
51550	976372.570	703867.871	1813.623	WL1
51551	976377.194	703868.111	1813.328	TP1
51552	976401.576	703867.990	1806.909	TO1
51553	976429.688	703867.952	1807.271	TO
51554	976466.469	703942.430	1815.972	TP PC
51555	976462.497	703868.144	1815.912	TP
51556	976511.052	703868.402	1816.976	X
51557	976524.381	703957.583	1819.819	WL PC
51558	976534.565	703944.208	1819.804	WL
51559	976536.906	703936.015	1819.741	WL
51560	976532.525	703921.693	1819.597	WL
51561	976529.003	703868.185	1819.846	WL
51562	976527.803	703856.895	1820.197	WL
51563	976530.317	703850.043	1819.871	WL
51564	976530.263	703845.641	1819.326	WL-7 PT GTW
51565	976528.752	703838.706	1819.217	WL OH.65 PC/3F TALL
51566	976504.312	703825.401	1815.964	WL AZ0 HD15
51567	976523.814	703811.344	1817.960	WL
51568	976529.932	703803.646	1817.754	WL
51569	976539.709	703803.675	1817.574	WL
51570	976543.340	703805.502	1817.731	WL-7 PT
51571	976532.068	703771.931	1816.709	X
51572	976516.791	703771.944	1816.592	X
51573	976500.989	703772.017	1815.180	X
51574	976445.959	703772.260	1813.947	TP-7 PT
51575	976421.386	703772.068	1807.083	TO
51576	976446.936	703759.105	1813.476	TP PC
51577	976391.581	703771.897	1806.977	TO1
51578	976373.805	703772.127	1811.689	TP1
51579	976369.890	703771.249	1812.023	WL1
51580	976365.913	703726.982	1811.970	WL1
51581	976370.616	703726.940	1811.668	TP1
51582	976395.761	703727.068	1806.849	TO1-7 PT
51583	976423.455	703727.137	1806.962	TO-7 PT
51584	976449.337	703727.522	1813.176	TP
51585	976488.767	703726.811	1813.941	X
51586	976529.043	703727.026	1814.767	X
51587	976539.672	703692.090	1815.086	WL OH.33/4F TALL
51588	976536.025	703690.909	1815.307	WL
51589	976492.084	703689.994	1813.101	X
51590	976461.136	703690.081	1813.115	TP
51591	976430.862	703690.074	1803.609	TO PC
51592	976399.619	703690.070	1802.510	TO1 PC
51593	976374.048	703690.047	1810.593	TP1
51594	976370.687	703690.028	1810.752	WL1
51595	976366.896	703596.072	1810.693	WL1
51596	976371.447	703596.014	1810.446	TP1
51597	976406.168	703595.970	1802.816	TO1
51598	976431.663	703596.037	1802.825	TO
51599	976467.265	703596.030	1811.728	TP
51600	976486.411	703596.279	1811.694	X
51601	976545.341	703617.417	1814.200	WL
51602	976551.488	703618.852	1814.415	WL-7
51603	976544.458	703595.937	1813.547	X
51604	976518.935	703475.961	1812.028	X
51605	976492.079	703475.961	1810.707	X
51606	976471.329	703476.338	1810.603	TP-7 PT
51607	976468.810	703457.937	1810.700	TP PC
51608	976438.396	703476.255	1803.284	TO
51609	976414.353	703476.436	1802.960	TO1
51610	976387.963	703476.090	1808.140	TP1
51611	976367.604	703476.038	1808.820	WL1
51612	976367.634	703353.020	1807.368	WL1
51613	976384.526	703352.964	1807.796	TP1
51614	976407.152	703352.986	1803.590	TO1-7 PT
51615	976428.418	703349.013	1803.102	TO-7 PT
51616	976463.445	703345.753	1808.571	TP
51617	976477.545	703353.083	1808.407	X
51618	976483.632	703340.949	1808.623	X
51619	976470.611	703341.001	1807.813	X
51620	976455.931	703341.311	1808.466	TP
51621	976334.952	705445.075	1831.405	RRC
				AP

51626	976334.126	705394.894	1830.891	AP
51627	976346.695	705394.960	1830.639	EP-7 PT
51628	976348.775	705394.734	1830.899	RRC-7 PT
51629	976475.899	703945.552	1816.875	R
51630	976473.897	703958.158	1816.511	R1
51631	976471.416	703981.219	1817.141	R2
51632	976471.394	703994.441	1817.292	R3
51633	976442.703	703990.784	1809.092	R3
51634	976445.917	703978.665	1809.911	R3-7 R2-7
51635	976434.882	703956.443	1807.458	R1
51636	976438.209	703937.027	1808.435	R1-7 R-7
51637	976450.410	703761.383	1813.555	R
51638	976449.520	703768.068	1813.701	R
51639	976166.949	705799.885	1832.568	AP
51640	976174.346	705802.748	1832.662	EP1 PC
51641	976175.945	705804.179	1832.969	RRC1 PC
51642	976181.600	705796.277	1832.948	RRC1
51643	976180.082	705795.282	1832.616	EP1
51644	976184.828	705791.143	1832.583	EP1
51645	976185.547	705792.899	1832.955	RRC1
51646	976190.904	705792.312	1832.983	RRC1
51647	976191.316	705790.418	1832.623	EP1
51648	976197.550	705794.107	1832.641	EP1
51649	976196.113	705795.264	1832.962	RRC1
51650	976198.177	705799.359	1832.887	RRC1
51651	976199.958	705799.106	1832.597	EP1
51652	976201.840	705807.160	1832.669	EP1-7 PT
51653	976200.165	705807.565	1832.973	RRC1-7 PT
51654	976206.713	705794.984	1832.507	AP
51655	976216.102	705796.821	1832.218	EP-7 PT
51656	976217.888	705796.418	1832.490	RRC-7 PT
51657	976314.756	705495.059	1831.271	RRC PC
51658	976313.187	705494.325	1831.018	EP PC
51659	976300.905	705494.010	1831.281	AP
51660	976287.082	705495.071	1830.988	EP1 PC
51661	976285.404	705494.448	1831.294	RRC1 PC
51662	976305.566	705444.180	1831.425	RRC1
51663	976307.291	705444.979	1831.149	EP1
51664	976423.736	703764.011	1807.420	R
51665	976423.743	703756.628	1807.642	R CLO
51666	976433.979	703712.893	1809.315	R
51667	976417.741	703717.981	1806.525	R
51668	976395.048	703714.254	1807.100	R
51669	976384.733	703708.375	1810.527	R
51670	976388.140	703691.887	1808.302	R
51671	976403.332	703688.298	1803.361	R
51672	976429.959	703690.744	1803.720	R
51673	976439.896	703703.817	1809.127	R CLO
51674	976479.848	703481.429	1810.776	R
51675	976474.990	703481.050	1810.773	R
51676	976468.317	703469.126	1810.485	R
51677	976440.362	703468.670	1803.846	R
51678	976439.897	703459.799	1803.934	R
51679	976443.600	703437.241	1803.623	R1 AZ270 HD10
51680	976443.350	703444.611	1803.672	R1
51681	976474.795	703458.728	1810.453	R CLO
51682	976471.954	703445.763	1810.728	R1
51683	976470.439	703424.688	1810.545	R1 CLO
51684	976479.247	703318.398	1807.164	R1
51685	976472.304	703295.853	1806.717	R1
51686	976447.969	703324.961	1805.318	R
51687	976448.220	703337.400	1807.632	R
51688	976436.268	703341.984	1803.657	R
51689	976415.452	703345.922	1802.935	R
51690	976405.936	703341.928	1803.568	R
51691	976391.186	703334.569	1807.351	R
51692	976408.559	703314.645	1798.549	R
51693	976412.807	703326.916	1797.795	R
51694	976424.055	703329.687	1797.725	R
51695	976432.093	703327.051	1797.762	R
51696	976436.606	703314.087	1799.751	R CLO
51697	976432.063	703277.204	1799.612	R1
51698	976429.404	703292.588	1799.146	R1 CLO
51699	976367.624	703313.978	1806.862	R1 CLO
51700	976375.917	703314.271	1807.016	TP1
51701	976409.341	703314.089	1798.451	TO1-7
51702	976431.512	703314.167	1798.257	TO-7

51707	976472.287	703153.850	1805.251	R AZ180 HD10
51708	976471.616	703153.674	1805.097	R
51709	976471.579	703153.663	1805.053	PV AZ180 HD20/1F BASE
51710	976472.142	703125.191	1804.592	R
51711	976472.673	703114.170	1804.408	X
51712	976464.364	703115.169	1804.658	X
51713	976432.483	703131.403	1802.917	R
51714	976414.422	703135.487	1798.768	R
51715	976416.756	703142.846	1799.029	R
51716	976438.182	703139.352	1803.891	R CLO
51717	976428.583	703124.780	1802.445	MES AZ270 HD10/1F BASE
51718	976426.419	703113.117	1802.807	TP-7 PT
51719	976414.496	703098.296	1799.883	R
51720	976419.072	703109.270	1802.351	R
51721	976410.882	703120.066	1798.722	R
51722	976392.579	703128.517	1797.882	R
51723	976383.109	703126.802	1798.041	R
51724	976368.951	703125.750	1802.555	R
51725	976364.297	703122.531	1801.998	R
51726	976375.728	703108.352	1794.077	R
51727	976395.391	703111.717	1794.332	R
51728	976403.172	703100.398	1794.433	R CLO
51729	976398.811	703111.621	1794.309	TO
51730	976381.408	703112.140	1794.473	TO1-7
51731	976368.275	703204.557	1803.753	WL1 PT
51732	976323.097	703183.727	1803.480	WL-7
51733	976302.936	703114.031	1801.130	X
51734	976310.171	703108.524	1802.148	X
51735	976451.842	703046.905	1804.071	X
51736	976449.793	702994.776	1803.144	X
51737	976402.386	702995.585	1802.652	X
51738	976357.652	702995.071	1801.380	X
51739	976255.095	702945.690	1798.968	X
51740	976304.519	702944.603	1798.428	X
51741	976355.793	702944.713	1800.308	X
51742	976406.851	702943.824	1801.880	X
51743	976448.485	702945.195	1802.499	X
51744	976446.538	702894.840	1801.487	X
51745	976396.041	702893.935	1800.709	X
51746	976396.204	702843.381	1799.882	X
51747	976451.674	702844.926	1800.774	X
51748	976449.585	702795.446	1799.470	X
51749	976395.554	702794.794	1798.411	X
51750	976380.466	702749.795	1797.102	X
51751	976448.037	702751.571	1799.526	X
51752	976433.819	702695.016	1798.327	X
51753	976397.115	702695.241	1797.396	X
51754	976377.554	702645.381	1796.509	X
51755	976425.601	702644.745	1796.689	X
51756	976386.387	702719.796	1797.596	PV AZ90 HD20/1F BASE
51757	976427.466	702735.870	1798.685	PV AZ0 HD20/1F BASE
51758	976427.529	702735.965	1798.614	SAG AZ0 HD15/1F BASE
51759	976435.053	702780.998	1797.531	PV AZ180 HD25/1F BASE
51760	976446.777	702830.323	1800.746	PV AZ0 HD20/1F BASE
51761	976421.079	702878.096	1800.633	SAG AZ180 HD5/1F BASE
51762	976423.927	702887.105	1800.684	SAG AZ180 HD5/1F BASE
51763	976441.441	702971.415	1802.506	PV AZ180 HD20/1F BASE
51764	976440.109	702978.640	1802.589	SAG AZ180 HD10/1F BASE
51765	976443.500	703014.710	1803.562	SAG AZ180 HD10/1F BASE
51766	976450.806	703011.751	1803.623	SAG AZ0 HD10/1F BASE
51767	976254.449	705644.828	1831.626	RRC PC
51768	976252.676	705644.326	1831.345	EP PC
51769	976241.590	705639.905	1831.582	AP
51770	976226.455	705645.198	1831.388	EP1 PC
51771	976224.846	705644.207	1831.669	RRC1 PC
51772	976204.728	705694.191	1832.100	RRC1
51773	976206.432	705694.817	1831.808	EP1
51774	976219.055	705695.196	1831.992	AP
51775	976232.207	705694.990	1831.712	EP
51776	976234.037	705695.536	1831.939	RRC
51777	976217.617	705744.989	1832.286	RRC
51778	976215.828	705744.691	1831.980	EP
51779	976202.670	705744.874	1832.274	AP
51780	976189.016	705744.554	1832.080	EP1
51781	976187.150	705744.028	1832.402	RRC1
51782	976157.661	705795.135	1832.676	RRC1-7 PT
51783	976159.257	705796.107	1832.404	EP1-7 PT
103107	980505.983	707899.340	1957.751	ph/16
103108	980505.983	707894.450	1957.656	spk/5fe ph16
103109	980705.925	707884.498	1959.853	ph/17 wl bs
103110	980705.911	707889.428	1961.829	spk/5os fw ph17

103111	980606.115	707899.491	1959.874	ph/18
103112	980605.989	707892.388	1959.482	spk/7 fe ph18
103113	980740.917	707881.380	1961.371	ph/19
103114	980740.981	707887.340	1962.336	spk/6fw ph19
103115	980354.668	707876.694	1954.063	fhub/10fe tel c-3.16tp
103116	980354.835	707876.684	1954.129	fhub/14 fe h2o c-.6tp 21 fe tel c-3.46 tp
103117	980368.410	707857.418	1956.229	ccx/c-2.33 cx on cob drn
103118	980287.931	707878.570	1953.211	fhub/13 fe ws.75 c-1.74tp 19 fe c-5.48 tco
103119	980240.400	707875.738	1952.852	fhub/12 fe qw c-4.8 21.6 fe c-5.68 tcox
103120	980235.029	707892.807	1952.148	fhub/dstrb 6os 4in sl c-4.7tp
103121	978418.024	707867.845	1913.901	fhub/6 fe c-4.22 tqw 11fe c-4.4 tcox
103122	977665.490	707868.415	1897.707	fhub/12fe c-2.05tcx 6.5fe c1.45 telct
103123	977665.480	707868.418	1897.716	fhub/6fe c-3.7 tqwst
103124	976905.341	707868.723	1879.546	fhub/14fe qw cx c-3 tp
103125	970946.153	707868.518	1746.140	ccx/20fw c-12.90 twl20in

mhr

APPENDIX E: HYDROLOGY DOCUMENTATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*   RUN DATE   28AUG09  TIME  12:20:33 *
*                                      *
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****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
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X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X               X
XXXXXXX  XXXX    X       XXXXX   X
X     X  X       X               X
X     X  X       X     X         X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

  1           ID   *-* -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
  2           ID   *-* *-*-*-*-*-*-*-*-*- DEER VALLEY CHANNEL IMPROVEMENTS *-*-*-*-*-*-*-*-* *-*
  3           ID   *-* -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
  4           ID   *-*                                                                        *-*
  5           ID   *-*  Modified:     AUGUST 2009                                             *-*
  6           ID   *-*  Project:      PIMA ROAD                                               *-*
  7           ID   *-*  Client:       City of Scottsdale                                      *-*
  8           ID   *-*  File Name:    Pima_Rd_Proposed_Conditions-100yr.hc1                   *-*
  9           ID   *-*                                                                        *-*
 10           ID   *-*                                                                        *-*
 11           ID   *-*  Client Project#:                                                      *-*
 12           ID   *-*  Entellus Prj#:    410.061                                              *-*
 13           ID   *-*  Modelers:         RAS                                                  *-*
 14           ID   *-*  Storm:            100-year, 6-hour                                     *-*
 15           ID   *-*  Development Cond: Proposed                                             *-*
 16           ID   *-*                                                                        *-*
 17           ID   *-*                                                                        *-*
 18           ID   *-*       Reasons for Modifications to model:                              *-*
 19           ID   *-*                                                                        *-*
 20           ID   *-*         1) This model was produced to analyze the size of the Pima     *-*
 21           ID   *-*            Road Drainage Channel and the potential upgrades to         *-*
 22           ID   *-*            the Deer Valley Channel based.                              *-*
 23           ID   *-*                                                                        *-*
 24           ID   *-*       Modifications made to model:                                     *-*
 25           ID   *-*                                                                        *-*
 26           ID   *-*         2) Modified Diversions D1A2F along Pima Rd.                   *-*
 27           ID   *-*            This is a diversion from across Pima Road to the west       *-*
 28           ID   *-*            through existing 2-36" culvert. The diversion was based     *-*
 29           ID   *-*            on a stage discharge relationship of the culvert and the    *-*
 30           ID   *-*            east side of Pima Road as follows:                          *-*
 31           ID   *-*                                                                        *-*
 32           ID   *-*               Stage      Total Q    Pima Rd. Q     Culvert Q            *-*
 33           ID   *-*                 0            0            0             0              *-*
 34           ID   *-*                 1          132          116            16              *-*
 35           ID   *-*                 2          417          377            40              *-*
 36           ID   *-*                 3          835          765            70              *-*
 37           ID   *-*                 4         1375         1275           100              *-*
 38           ID   *-*                                                                        *-*
 39           ID   *-*         3) With the impementation of Pima Rd. Channel, no flow will    *-*
 40           ID   *-*            be allowed to cross Pima Rd. The following diversions       *-*
 41           ID   *-*            representing flow crossing Pima Road were set to zero:      *-*
 42           ID   *-*                                                                        *-*
 43           ID   *-*                                 -D1A2E/DO1A2E                          *-*
 44           ID   *-*                                 -D1A2D/DO1A2D                          *-*
 45           ID   *-*                                 -D1A2G/DO1A2G                          *-*
 46           ID   *-*                                 -D1B4/DO1B4                            *-*
 47           ID   *-*                                 -D1B2/DO1B2                            *-*
 48           ID   *-*                                                                        *-*
 49           ID   *-*         4) The following routes were modified to representing the      *-*
 50           ID   *-*            Pima Road Channel:                                          *-*
 51           ID   *-*                                                                        *-*
 52           ID   *-*                                 -R36R1D                                *-*
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 53          ID   *-*                          -R1A2F                                  *-*
 54          ID   *-*                          -R1A2E                                  *-*
 55          ID   *-*                          -R1A2D                                  *-*
1                                        HEC-1 INPUT                                          PAGE  2

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

 56          ID   *-*                          -R1A2C                                  *-*
 57          ID   *-*                                                                  *-*
 58          ID   *-*          Channel Assumptions are:                                *-*
 59          ID   *-*                                                                  *-*
 60          ID   *-*               i) North Portion (R36R1D,R1A2F)                    *-*
 61          ID   *-*                          -Right Side Slope = 4:1                 *-*
 62          ID   *-*                          -Right Bottom Side Slope = 2%           *-*
 63          ID   *-*                          -Left Side Slope = 4:1                  *-*
 64          ID   *-*                          -Left Bottom Side Slope = 2%            *-*
 65          ID   *-*                          -Bottom Width = 12'                     *-*
 66          ID   *-*                          -Channel Depth = 4'                     *-*
 67          ID   *-*                                                                  *-*
 68          ID   *-*               ii) South Portion (R1A2E,R1A2D and R1A2C)          *-*
 69          ID   *-*                          -Right Side Slope = 4:1                 *-*
 70          ID   *-*                          -Right Bottom Side Slope = 2%           *-*
 71          ID   *-*                          -Left Side Slope = 4:1                  *-*
 72          ID   *-*                          -Left Bottom Side Slope = 2%            *-*
 73          ID   *-*                          -Bottom Width = 9'                      *-*
 74          ID   *-*                          -Channel Depth = 4'                     *-*
 75          ID   *-*                                                                  *-*
 76          ID   *-*        5) Diversions utilized to account for the storage at      *-*
 77          ID   *-*           DESERT VILLAGE RETAIL CENTER and CANADA VISTAS were    *-*
 78          ID   *-*           removed from the model to accomodate the Pima Rd. Channel *-*
 79          ID   *-*                                                                  *-*
 80          ID   *-*                          -DS-A2E                                 *-*
 81          ID   *-*                          -DS-1B4                                 *-*
 82          ID   *-*                                                                  *-*
 83          ID   *-*        6) New diversions were added at  C1A2G, C1B4,C1B3 and     *-*
 84          ID   *-*           C1B2, in order to acomodate the new 78" stormdrain     *-*
 85          ID   *-*           pipes along Pima Road. Three diversion were added      *-*
 86          ID   *-*           at each location, one for each barrel.                 *-*
 87          ID   *-*                                                                  *-*
 88          ID   *-*                          -DA2G1/DOA2G1                           *-*
 89          ID   *-*                          -DB4_1/DOB4_1                           *-*
 90          ID   *-*                          -DB3_1/DOB3_1                           *-*
 91          ID   *-*                          -DB2_1/DOB2_1                           *-*
 92          ID   *-*                          -DB2_1/DOB2_2                           *-*
 93          ID   *-*                                                                  *-*
 94          ID   *-*        7) New kinematic wave routes were added to represent      *-*
 95          ID   *-*           the proposed stormdrain.Also CRA2G1, CR1B4, CR1B4,     *-*
 96          ID   *-*           and CR1B4 were added to combine the new routes.        *-*
 97          ID   *-*                                                                  *-*
 98          ID   *-*                 -between C1A2G to CRA2G1:                        *-*
 99          ID   *-*                                   -RB4_1                         *-*
100          ID   *-*                                   -RB4_2                         *-*
101          ID   *-*                 -between C1B4 to CR1B4:                          *-*
102          ID   *-*                                   -RB4_1                         *-*
103          ID   *-*                                   -RB4_2                         *-*
104          ID   *-*                 -between C1B3 to CR1B3:                          *-*
105          ID   *-*                                   -RB3_1                         *-*
106          ID   *-*                                   -RB3_2                         *-*
107          ID   *-*                 -between C1B2 to CR1B2:                          *-*
108          ID   *-*                                   -RB2_1                         *-*
109          ID   *-*                                   -RB2_2                         *-*
110          ID   *-*                                   -RB2_3                         *-*
1                                        HEC-1 INPUT                                          PAGE  3

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

111          ID   *-*                                                                  *-*
112          ID   *-*        8) Diversion D51.1D/DO5115, representing the split at     *-*
113          ID   *-*           Deer Valley and Pima Roads was modified. This split    *-*
114          ID   *-*           was determined based on the existing conditions. It    *-*
115          ID   *-*           was assumed that all flow under existing conditions    *-*
116          ID   *-*           would continue west into the Deer Valley Channel.      *-*
117          ID   *-*                                                                  *-*
118          ID   *-*        9) Modified Diversions 37AE along Deer Valley Channel.    *-*
119          ID   *-*           This is a diversion from Deer Valley Channel to the    *-*
120          ID   *-*           Grayhawk detention through existing 5'x10'box culvert. *-*
121          ID   *-*           The diversion was based on proposed deversion structure *-*
122          ID   *-*           rating curve.                                          *-*
123          ID   *-*                                                                  *-*
124          ID   *-*               Stage      Total Q  DV Channel Q  Pipe+Weir Q       *-*
125          ID   *-*                 0.0          0.0           0.0          0.0       *-*
```

```
ID  *-*          0.5        20.0        10.0        10.0        *-*
ID  *-*          1.0        46.0        23.0        23.0        *-*
ID  *-*          1.5        80.0        40.0        40.0        *-*
ID  *-*          2.0       118.0        59.0        59.0        *-*
ID  *-*          2.5       160.0        80.0        80.0        *-*
ID  *-*          3.0       206.0       103.0       103.0        *-*
ID  *-*          3.5       721.0       368.0       353.0        *-*
ID  *-*          4.0      1308.0       669.0       639.0        *-*
ID  *-*          4.5      1969.0      1008.0       961.0        *-*
ID  *-*          5.0      2704.0      1384.0      1320.0        *-*
ID  *-*          5.5      3519.0      1801.0      1718.0        *-*
ID  *-*          6.0      4413.0      2258.0      2155.0        *-*
ID  *-*          6.5      5390.0      2756.0      2634.0        *-*
ID  *-*                                                        *-*
ID  *-*     10) A new stage-Storage-Discharge D37A2 card was added  *-*
ID  *-*         to represent the Deer Valley Detention Basin along  *-*
ID  *-*         the Grayhawk property. The elevation and area data  *-*
ID  *-*         are based on survey conducted in April of 2009 by  *-*
ID  *-*         Entellus.  It is an online retention basin and no  *-*
ID  *-*         outlet was found by survey.  If one exists it is at  *-*
ID  *-*         this time buried. It was assumed that all flow enters  *-*
ID  *-*         the basin, and once the basin is full flow will bypass  *-*
ID  *-*         the basin without additional storage occuring. Storage  *-*
ID  *-*         volume was calculated utilizing the conic method.  *-*
ID  *-*                                                        *-*
ID  *-*                        Stage       Area      Total Vol  *-*
ID  *-*                         1784     0.0045              0  *-*
ID  *-*                         1785     0.0931           0.04  *-*
ID  *-*                         1786     0.3018           0.23  *-*
ID  *-*                         1787     0.5920           0.37  *-*
ID  *-*                         1788     0.7332           1.33  *-*
ID  *-*                         1789     0.8471           2.12  *-*
ID  *-*                         1790     0.9618           3.02  *-*
ID  *-*                         1791     1.0864           4.04  *-*
ID  *-*                                                        *-*
ID  *-*     11) The following routes were modified to representing the  *-*
ID  *-*         proposed Deer Valley Channel:                  *-*
ID  *-*                                                        *-*
ID  *-*         i)              -R51.1D                        *-*
ID  *-*                         -REEC13                        *-*
```



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

ID  *-*                         -REEC12                        *-*
ID  *-*                         -REEC11                        *-*
ID  *-*                         -REEC10                        *-*
ID  *-*                         -REEC09                        *-*
ID  *-*                         -REEC08                        *-*
ID  *-*                         -REEC07                        *-*
ID  *-*                         -REEC06                        *-*
ID  *-*                                                        *-*
ID  *-*         Channel Assumptions:                           *-*
ID  *-*                         -Right Side Slope = 4:1        *-*
ID  *-*                         -Left Side Slope = 4:1         *-*
ID  *-*                         -Bottom Width = 30'            *-*
ID  *-*                         -Channel Depth = 5'            *-*
ID  *-*                                                        *-*
ID  *-*         ii)             -REEC05                        *-*
ID  *-*                         -REEC04                        *-*
ID  *-*                         -REEC03                        *-*
ID  *-*                         -REEC02                        *-*
ID  *-*                         -REEC01                        *-*
ID  *-*                         -R37A3                         *-*
ID  *-*                                                        *-*
ID  *-*         Channel Assumptions:                           *-*
ID  *-*                         -Right Side Slope = 4:1        *-*
ID  *-*                         -Left Side Slope = 4:1         *-*
ID  *-*                         -Bottom Width = 44'            *-*
ID  *-*                         -Channel Depth = 5'            *-*
ID  *-*                                                        *-*
ID  *-*     12) Modified Diversions DV52AW representing the split at  *-*
ID  *-*         Pima Rd. and Thompson Peak Parkway. This diversion  *-*
ID  *-*         represent the existing conditions and the rating curve  *-*
ID  *-*         is based on the FLO-2D results.                *-*
ID  *-*                                                        *-*
ID  *-*               Total Q    West Q    South Q             *-*
ID  *-*                   0.0       0.0        0.0             *-*
ID  *-*                 100.0       1.0       99.0             *-*
ID  *-*                 250.0       4.0      246.0             *-*
ID  *-*                 375.0       6.0      369.0             *-*
```

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ID  *-*                  500.0      13.0     487.0                  *-*
ID  *-*                  625.0      22.0     603.0                  *-*
ID  *-*                  750.0      41.0     709.0                  *-*
ID  *-*                  875.0      63.0     812.0                  *-*
ID  *-*                 1000.0      82.0     918.0                  *-*
ID  *-*                 1125.0      96.0    1029.0                  *-*
ID  *-*                 1250.0     109.0    1141.0                  *-*
ID  *-*                 1375.0     124.0    1251.0                  *-*
ID  *-*                 1500.0     137.0    1363.0                  *-*
ID  *-*                 1750.0     161.0    1589.0                  *-*
ID  *-*                 2000.0     186.0    1814.0                  *-*
ID  *-*                 2500.0     238.0    2262.0                  *-*
ID  *-*                 2750.0     256.0    2494.0                  *-*
ID  *-*                 2875.0     259.0    2616.0                  *-*
ID  *-*                 3000.0     255.0    2745.0                  *-*
ID  *-*                 3500.0     280.0    3220.0                  *-*
ID  *-*                                                             *-*
ID  *-* -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
1                                HEC-1 INPUT                                      PAGE  5

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

ID  *-* *-*-*-*-*-*-*-*- DEER VALLEY CHANNEL IMPROVEMENTS *-*-*-*-*-*-*-* *-*
ID  *-* -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
ID  *-*                                                             *-*
ID  *************************************************************************
ID  ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
ID  *************************************************************************
ID  ***                                                                   ***
ID  ***  Modified:   July 2009                                            ***
ID  ***  Project:    PIMA ROAD                                            ***
ID  ***  Client:     City of Scottsdale                                   ***
ID  ***  File Name:  2009-07_Pima_Rd_DV_PA_EX_w-los_gatos-wall-100-yr.hc1  ***
ID  ***                                                                   ***
ID  ***  Client Project#:                                                 ***
ID  ***  Entellus Prj#:    410.061                                        ***
ID  ***  Modelers:         RAS                                            ***
ID  ***  Storm:            100-year, 6-hour                               ***
ID  ***  Development Cond: Existing Conditions With Los Gatos Wall In Place  ***
ID  ***                                                                   ***
ID  ***                                                                   ***
ID  ***  It was decided that various flow conditions needed to be modeled.  ***
ID  ***    This was to enable the best decision making in regards to the    ***
ID  ***    Pima Road Channel, Deer Valley channel and Sierra Pinta Outlet.  ***
ID  ***    Three scenarios will be modeled and they are as follows:        ***
ID  ***                                                                   ***
ID  ***    1) Existing conditions assuming the Los Gatos wall is in place.  ***
ID  ***         This scenario will model the Los Gatos wall as though it    ***
ID  ***         does not allow flow to cross it.  The Los Gatos entrance    ***
ID  ***         will, however allow flow in, and this diversion into the    ***
ID  ***         subdivision will be modeled.                                ***
ID  ***                                                                   ***
ID  ***    2) Existing Conditions assuming the Los Gatos Wall is not in place.***
ID  ***         This scenario will model the Los Gatos wall as though it    ***
ID  ***         does not exist and all flow will be allowed to cross Pima   ***
ID  ***         Rd. unimpeded along the Los Gatos subdivision boundary.     ***
ID  ***                                                                   ***
ID  ***    3) Proposed Conditions:                                         ***
ID  ***         The proposed conditions for the design of the Pima Rd       ***
ID  ***         Channel, Deer Valley Channel and the Sierra Pinta Outfall.  ***
ID  ***                                                                   ***
ID  ***                                                                   ***
ID  ***  PIMA ROAD DIVERSION ASSUMPTIONS                                   ***
ID  ***     The following assumptions were made for this model            ***
ID  ***     regarding the diversion along Pima Rd:                        ***
ID  ***       1) DO36R1c - Northeast side of Pinnacle Peak and Pima Rd.     ***
ID  ***           This diversion to the west was assumed to be equal to the  ***
ID  ***           capacity of the existing 2-3x4.5' box culverts.          ***
ID  ***           The capacity was estimated as being 234 cfs.             ***
ID  ***           Flow was diverted to the west up to the capacity of      ***
ID  ***           the culvert before flow was allowed to continue          ***
ID  ***           south along Pima Rd.                                     ***
ID  ***                                                                   ***
ID  ***       2) DO1A2F - Flow crossing Pima Rd. 1000' S. of Pinnacle Peak  ***
ID  ***           Based on field observations any flow that does not       ***
ID  ***           cross through the existing 2-36" culverts will           ***
ID  ***           cross Pima Rd prior to the following driveway.           ***
1                                HEC-1 INPUT                                      PAGE

LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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ID  ***        Thus it was assumed that all flow crosses Pima Rd.          ***
ID  ***        and heads to the west through subbasin SEEC01 at            ***
ID  ***        this location.                                              ***
ID  ***                                                                    ***
ID  ***     3) DO1A2E - Flow Crossing Pima Rd. at/near E. Paraiso Dr.      ***
ID  ***        Based on field observations it was determined               ***
ID  ***        that all flow crosses Pima Rd. at or near                   ***
ID  ***        E. Paraiso / E. Calle Buena Vista and flows                 ***
ID  ***        to the west through subbasin SEEC04.                        ***
ID  ***                                                                    ***
ID  ***     4) DO1A2D - Flow Crossing Pima Rd. north of N 91st St.         ***
ID  ***        Based on field observations, it was determined that         ***
ID  ***        flow from subbasin S1A2D crosses Pima Rd. and does          ***
ID  ***        not continue south along Pima Rd.                           ***
ID  ***                                                                    ***
ID  ***     5) DO1A2G - Flow crossing Pima Rd. 250' S. of E. Paraiso Dr.   ***
ID  ***        This diversion accounts for the flow that crosses           ***
ID  ***        Pima Rd. just south of the intersection of Pima Rd.         ***
ID  ***        and E. Paraiso Dr.  based on the FLO-2D Results,            ***
ID  ***        it was determined that a flow split in which                ***
ID  ***        approximately 87% of the flow crosses Pima Rd.              ***
ID  ***        to the west and through the Pinnacle Peak Country           ***
ID  ***        Club subdivision.  The diversion occurs just north          ***
ID  ***        of the concentration point C1A2G, but flow from             ***
ID  ***        subbasin S1A2G would be contributing to the diversion,      ***
ID  ***        therefore the diversion was taken out after the             ***
ID  ***        concentration point.  The remaining 13% of the flow         ***
ID  ***        continues south along Pima Rd.                              ***
ID  ***                                                                    ***
ID  ***     6) DO1B4 - Flow crossing Pima Rd. 1000' N. of Los Gatos Dr.    ***
ID  ***        It was decided for this model that the Los Gatos            ***
ID  ***        wall would be modeled as though it were in place            ***
ID  ***        and no flow would cross it.  Therefore no flow              ***
ID  ***        crosses Pima Rd and enters the Los Gatos subdivision        ***
ID  ***        at this point, instead flow travels south along Pima Rd.    ***
ID  ***                                                                    ***
ID  ***     7) DO1B3 - Flow along Pima Rd. north of Los Gatos Dr.          ***
ID  ***        This diversion occurs along the east side of the            ***
ID  ***        Los Gatos subdivision and Pima Rd. north of Los             ***
ID  ***        Gatos Dr.  This diversion accounts for the flow             ***
ID  ***        that enters through the Los Gatos entrance.  Based          ***
ID  ***        on the FLO-2D model it was determined that all flow         ***
ID  ***        from concentration point C1B3 flows along Pima Rd.          ***
ID  ***        and enters through the Los Gatos entrance.  However,        ***
ID  ***        the flow coming from the east (subbasins S1B1 and S1B2)     ***
ID  ***        does not contribute to flow entering the subdivision        ***
ID  ***        at this location.  Thus this diversion occurs after         ***
ID  ***        the flow has been routed from C1B3 to the Los Gatos         ***
ID  ***        entrance but before the combine with flows from the         ***
ID  ***        east (C1B2).                                                ***
ID  ***                                                                    ***
ID  ***     8) DO1B2 - Flow arriving at the intersection of Los Gatos Dr. & ***
ID  ***                Pima Rd. from the subbasins to the east: S1B2 & S1B1.***
ID  ***        This diversion only considers flow arriving at the          ***
ID  ***        intersection of Pima Rd. and Los Gatos Dr. from the         ***
```



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

ID  ***        east via subbasins S1B2 and S1B1.  It was assumed           ***
ID  ***        that all flow arriving at this intersection from the        ***
ID  ***        north (route R1B3) had already crossed Pima Rd. and         ***
ID  ***        enters the Los Gatos subdivision at Los Gatos Dr.           ***
ID  ***        Based on the results of the Flo-2D analysis flow from       ***
ID  ***        the east does not cross Pima Rd at this intersection,       ***
ID  ***        instead, this flow crosses Los Gatos Dr. and continues      ***
ID  ***        south along Pima Rd. beyond Deer Valley.  This continues    ***
ID  ***        the assumption that the wall along the east side of         ***
ID  ***        the Los Gatos subdivision is in place and withstands        ***
ID  ***        the forces of the flood event.                              ***
ID  ***                                                                    ***
ID  ***     9) D51.1D - Diversion at Pima Rd. and Deer Valley              ***
ID  ***        Based on field observations it was assumed that             ***
ID  ***        flow along Pima Rd. at Deer Valley would not get            ***
ID  ***        into the Deer Valley channel.  Therefore it was             ***
ID  ***        assumed that all flow continues south along Pima Rd.        ***
ID  ***                                                                    ***
ID  ***    10) D52AW - Diversion at Pima Rd and Thompson Peak Parkway
ID  ***
ID  ***                                                                    ***
ID  ***    Modifications made to model:                                    ***
```

```
ID   ***      1) Diversion added after C1A2G:                                  ***
ID   ***          This diversion was added to account for additional flow     ***
ID   ***          that crosses Pima Road prior to the Los Gatos subdivision.  ***
ID   ***          Previous assumptions were that the flow crosses Pima Rd.    ***
ID   ***          and is taken out at the next diversion.  This assumption    ***
ID   ***          was made due to the assumption that the Los Gatos Wall      ***
ID   ***          would not act as a flood wall and would not be modeled,     ***
ID   ***          thus allowing all flow to cross. Based on FLO-2D            ***
ID   ***          modeling results, flow crosses Pima Rd prior to the         ***
ID   ***          Los Gatos subdivision, and approximately 90% of the         ***
ID   ***          flow crosses to the west and 10% stays along Pima Rd.       ***
ID   ***          to the south.                                               ***
ID   ***                                                                      ***
ID   ***      2) Added Concentration Point CD1A2G:                            ***
ID   ***          This concentration point was added to account for the       ***
ID   ***          combine of route RD1A2D and the newly added diversion D1A2G.***
ID   ***                                                                      ***
ID   ***      3) Added Route RD1A2G and Modified Route RD1A2D:                ***
ID   ***          Route RD1A2D was modified to account for the added          ***
ID   ***          concentration point.  It essentially has been truncated     ***
ID   ***          at E. Country Club Trail.  Route RD1A2G picks up after      ***
ID   ***          the combine of the diversion recovery of DO1A2G and routes  ***
ID   ***          the combined routes to Deer Valley.                         ***
ID   ***                                                                      ***
ID   ***      4) Added Diversion D1B3:                                        ***
ID   ***          Added a diversion D1B3 following route R1B3.  This          ***
ID   ***          diversion represents the flow into the Los Gatos            ***
ID   ***          Subdivision entrance from the north.  Through a FLO-2D      ***
ID   ***          analysis it was determined that the majority of the flow    ***
ID   ***          from C1B3crosses Pima Rd. to the west and enters the Los    ***
ID   ***          Gatos subdivision entrance.  The analysis also determined   ***
ID   ***          that minimal flow from the east at the intersection of E.   ***
ID   ***          Los Gatos Dr. crosses Pima Rd at this location, thus all    ***
```



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

ID   ***          flow from here was routed south along Pima Rd.              ***
ID   ***                                                                      ***
ID   ***      5) Added Concentration Point CD1B2:                             ***
ID   ***          Added a concentration Point CD1B2 that combines             ***
ID   ***          the diversion recovery Do1B3 and the diversion              ***
ID   ***          recovery of DO1B2.  This concentration point                ***
ID   ***          represents the total flow entering the Los Gatos            ***
ID   ***          Subdivision entrance and passing through the                ***
ID   ***          wall south of the entrance (if allowed):                    ***
ID   ***          DO1B3 (flow from the north along Pima Rd through entrance)  ***
ID   ***          and DO1B2 (flow from the east of E. Los Gatos Dr.           ***
ID   ***          and crossing the wall to the west).                         ***
ID   ***                                                                      ***
ID   ***                                                                      ***
ID   ******************************************************************************
ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
ID   ******************************************************************************
ID   ***                                                                      ***
ID   ***  Modified:          December 2008                                   ***
ID   ***  Project:           PIMA ROAD                                       ***
ID   ***  Client:            City of Scottsdale                              ***
ID   ***  File Name:         2008-12_Pima_Rd_Combined_100-yr.hc1             ***
ID   ***                                                                      ***
ID   ***  Client Project#:                                                    ***
ID   ***  Entellus Prj#:     410.061                                         ***
ID   ***  Modelers:          RAS                                             ***
ID   ***  Storm:             100-year, 6-hour                                ***
ID   ***  Development Cond:  Existing Conditions                             ***
ID   ***                                                                      ***
ID   ***                                                                      ***
ID   ***                                                                      ***
ID   ***     Reasons for Modifications to model:                              ***
ID   ***                                                                      ***
ID   ***       1) It was determined that the wall along Pima Rd. at           ***
ID   ***          Los Gatos subdivision should be considered.  Doing          ***
ID   ***          this requires routing flow south along Pima Rd.  This       ***
ID   ***          flow will cross Deer Valley Rd and not flow into the        ***
ID   ***          Deer Valley Channel.  To accomplish this the two (2)        ***
ID   ***          HEC-1 models (1. North of Deer Valley and 2. South of       ***
ID   ***          Deer Valley) were combined.  This model combines the        ***
ID   ***          two models.                                                 ***
ID   ***                                                                      ***
ID   ***                                                                      ***
ID   ***     Modifications made to model:                                     ***
```

```
ID   ***       1) The Deer Valley North and Deer Valley South models were      ***
ID   ***          combined.                                                    ***
ID   ***                                                                       ***
ID   ***       2) Modified Diversions D1B4 and D1B2.  It was decided that      ***
ID   ***          no flow will pass through the wall of Los Gatos.  This       ***
ID   ***          diversion has been modified to have all flow continue        ***
ID   ***          south along Pima Rd.                                         ***
ID   ***                                                                       ***
ID   ***       3) Removed subbasins S51.1H, S51.1G and S51.1F.                 ***
ID   ***          These subbasins were replaced by S51.1D which was            ***
ID   ***          modified slightly to include the area all the way            ***
```



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

ID   ***          to E. Los Gatos Dr.                                          ***
ID   ***                                                                       ***
ID   ***       4) Combined routes R1B2, R51.1H, R51.1G and extended to C51.1D. ***
ID   ***          This combined/extended route is called R1B2.                 ***
ID   ***                                                                       ***
ID   ***       5) Removed concentration point C51.1H, C51.1G, C51.1F,          ***
ID   ***          and CEEC13.                                                  ***
ID   ***                                                                       ***
ID   ***       6) Modified NSTPS for all necessary routes.                     ***
ID   ***          Some of the modified NSTPS were for routes taken directly    ***
ID   ***          from other models.  The routes taken from other models       ***
ID   ***          that were updated include: R41, R45, R47, R50.               ***
ID   ***          Other modified NSTPS routes that were nodified are:          ***
ID   ***          RD-R1C, RD36.1, RD34.1, RSP1EX, R51.2A, RSP2EX, RUH2B,       ***
ID   ***          RUH2C, R51.2B, R51.2C, R51.2D, R1B2, R52A1C, RC52, RSP4EX,   ***
ID   ***          RPMA4B, RDVSP, RPMA4A, RUH2A                                 ***
ID   ***                                                                       ***
ID   ******************************************************************************
ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
ID   ******************************************************************************
ID
ID
ID   ------------------------------------------------------------------------------
ID   |////////////////////////////////////////////////////////////////////////////|
ID   |============== BEGIN DEER VALLEY NORTH IDENTIFICATION CARDS ==============|
ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
ID   |----------------------------------------------------------------------------|
ID   |PROJECT:                PIMA ROAD DRAINAGE IMPROVEMENTS:                    |
ID   |                         (DEER VALLEY TO PINNACLE PEAK)                     |
ID   |                                                                            |
ID   |CLIENT:                 City of Scottsdale                                  |
ID   |PREPARED BY:            Entellus, Inc.                                      |
ID   |PROJECT No:                                        Entellus 410.061A        |
ID   |FILE NAME: PIMA_II-100y6h-ex.hc1        CREATED DATE: SEP 14, 2005          |
ID   |                                       MODIFIED DATE: OCT 18, 2005          |
ID   |                                                                            |
ID   |STORM:                                                                      |
ID   |                      100-year 6-hour Storm                                 |
ID   |                                                                            |
ID   |DEVELOPMENT CONDITIONS:                                                     |
ID   |                      Existing Conditions                                   |
ID   |                                                                            |
ID   |MODELING ASSUMPTIONS:                                                       |
ID   |                      The Model base was taken directly from the "Pima      |
ID   |                      Road Three Basins" project as performed by Stantec    |
ID   |                      for the City of Scottsdale: file name FU1100-6.IH1,   |
ID   |                      revised on 01-20-99 by MCG.                           |
ID   |                                                                            |
ID   |                      To reflect existing developed conditions, percent     |
ID   |                      impervious was increased.                             |
ID   |                                                                            |
ID   |                      It was assumed that for all basins that were not      |
ID   |                      subdivided, that the UK and RK records, as used by    |
ID   |                      Stantec were correct.                                 |
ID   |                                                                            |
```



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

ID   |                      It was assumed that the Happy Valley Detention Basin, |
ID   |                      which does not currently exist, was in place and      |
ID   |                      designed to at least meet the 10% design performed    |
ID   |                      by Stantec.                                           |
ID   |                                                                            |
ID   |                                                                            |
ID   |MODELING METHODS:                                                           |
```

```
ID   |                    Field verification was conducted to determine the     |
ID   |                    existing path of flow routes through the study area.  |
ID   |                    This field verification occured on 10-14-2005         |
ID   |                    and included all portions of the study area along     |
ID   |                    Pima Rd south of Happy Valley Rd.                     |
ID   |                                                                          |
ID   |                    Normal Depth Routing was utilized for all new routes. |
ID   |                                                                          |
ID   |                    Kinematic wave was utilized for all subdivided basins.|
ID   |                                                                          |
ID   |--------------------------------------------------------------------------|
ID   |//////////////////////////////////////////////////////////////////////////|
ID   |=============== END DEER VALLEY NORTH IDENTIFICATION CARDS ================|
ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
ID   ---------------------------------------------------------------------------
ID
ID
ID
ID   ---------------------------------------------------------------------------
ID   |//////////////////////////////////////////////////////////////////////////|
ID   |============== BEGIN DEER VALLEY SOUTH IDENTIFICATION CARDS ===============|
ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
ID   |--------------------------------------------------------------------------|
ID   ***************************************************************************
ID   ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS **
ID   ***************************************************************************
ID   ***                                                                     ***
ID   ***  Modified:         NOVEMBER 2008                                   ***
ID   ***  Project:          PIMA ROAD                                       ***
ID   ***  Client:           City of Scottsdale                              ***
ID   ***  File Name:        2008-11_Deer_Valley_to_Thompson_                ***
ID   ***                     Peak-Modifications_100-yr.hc1                  ***
ID   ***  Client Project#:                                                   ***
ID   ***  Entellus Prj#:    410.061                                         ***
ID   ***  Modelers:         RAS                                             ***
ID   ***  Storm:            100-year, 6-hour                                ***
ID   ***  Development Cond: Existing Conditions                             ***
ID   ***                                                                     ***
ID   ***                                                                     ***
ID   ***     Reasons for Modifications to model:                             ***
ID   ***                                                                     ***
ID   ***       1) A small portion of the Pima Road corridor is not included  ***
ID   ***          in either this HEC-1 model or the model for the area       ***
ID   ***          between Pinnacle Peak and Deer Valley Rd.  The area in     ***
ID   ***          question is between Deer Valley and Sierra Pinta and is    ***
ID   ***          along the west side of Pima Rd.                            ***
ID   ***                                                                     ***
ID   ***                                                                     ***
```



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

ID   ***     Modifications made to model:                                     ***
ID   ***                                                                     ***
ID   ***         1) Added subbasin 52A0 (west side of Pima Rd between        ***
ID   ***            Deer Valley and Thompson Peak Parkway).  The subbasin    ***
ID   ***            cards utilized are as follows:                           ***
ID   ***              KK 52A0     SUB                                        ***
ID   ***              KM      RUNOFF FROM SUB-BASIN 52A0                     ***
ID   ***              BA0.0369                                               ***
ID   ***              LS            85                                       ***
ID   ***              UK   100   .2300     .20     100                       ***
ID   ***              RK  2500   .2300    .045            TRAP      20       8 ***
ID   ***                                                                     ***
ID   ***         2) Added subbasin 52B0 (west side of Pima Rd between        ***
ID   ***            Thompson Peak Parkway and Sierra Pinta ).  The subbasin  ***
ID   ***            cards utilized are as follows:                           ***
ID   ***              KK 52B0     SUB                                        ***
ID   ***              KM      RUNOFF FROM SUB-BASIN 52B0                     ***
ID   ***              BA0.0188                                               ***
ID   ***              LS            83                                       ***
ID   ***              UK   100   .2300     .20     100                       ***
ID   ***              RK  2500   .2300    .045            TRAP      20       8 ***
ID   ***                                                                     ***
ID   ***         3) Modified concentration point C52A to include the        ***
ID   ***            newly added subbasin 52A0.  changed HC=2 to HC=3         ***
ID   ***                                                                     ***
ID   ***         4) Modified concentration point 52A2C2 to include the      ***
ID   ***            newly added subbasin 52B0.  changed HC=3 to HC=4         ***
ID   ***                                                                     ***
ID   ***         5) Corrected roughness coefficient for subbasins S53A5      ***
```

```
580          ID   ***            and CPIMA3.  Modified value from 0.013 to 0.13.            ***
581          ID   ***                                                                       ***
582          ID   ******************************************************************************
583          ID   ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS **
584          ID   ******************************************************************************
585          ID
586          ID
587          ID
588          ID
589          ID   ******************************************************************************
590          ID   ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
591          ID   ******************************************************************************
592          ID   ***                                                                       ***
593          ID   ***  Modified:         October 2008                                       ***
594          ID   ***  Project:          Sierra Pinta Storm Drain Outlet                    ***
595          ID   ***  Client:           City of Scottsdale                                 ***
596          ID   ***  File Name:        2008-10_Sierra-Pinta-Modifications.hc1             ***
597          ID   ***  Client Project#:                                                     ***
598          ID   ***  Entellus Prj#:    410.061                                            ***
599          ID   ***  Modelers:         RAS                                                ***
600          ID   ***  Storm:            100-year, 6-hour                                   ***
601          ID   ***  Development Cond: Existing Conditions                                ***
602          ID   ***                                                                       ***
603          ID   ***                                                                       ***
604          ID   ***     Modifications made to model:                                      ***
605          ID   ***                                                                       ***
```



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

606          ID   ***         1) The assumed Sierra Pinta Channel was removed from the      ***
607          ID   ***            model.  This entailed the modification of diversions:      ***
608          ID   ***               - DVSP1                                                 ***
609          ID   ***               - DVSP2                                                 ***
610          ID   ***               - DVSP3                                                 ***
611          ID   ***            These diversions were modified to allow 0.01 cfs to flow to***
612          ID   ***            the alignment of the currently unconstructed channel. The  ***
613          ID   ***            value was set at 0.01 cfs due to errors with the Kinematic ***
614          ID   ***            wave routing when there is 0 cfs in the routing reach.     ***
615          ID   ***                                                                       ***
616          ID   ***         2) The assumption that 2-60" inlet pipes to the Pima Rd       ***
617          ID   ***            stormdrain exists North of Thompson Peak Parkway was       ***
618          ID   ***            maintained.  Additionally, there are other inlets,         ***
619          ID   ***            48" inlets in 2 locations, as well as numerous curb        ***
620          ID   ***            inlets.  It was assumed that the pipe capcity was met.     ***
621          ID   ***            This was done by modifiying diversion PRSDEX to the        ***
622          ID   ***            capacity of 600cfs.                                        ***
623          ID   ***                                                                       ***
624          ID   ***         3) There is a small weir diversion on the west portion of     ***
625          ID   ***            Pima channel where flow overtops the wall.  This only      ***
626          ID   ***            occurs under high flow conditions, and the weir flow       ***
627          ID   ***            out of the system is relatively small.  There is no        ***
628          ID   ***            other flow out of the system besides what was discussed    ***
629          ID   ***            previously between Thompson Peak and Sierra Pinta.         ***
630          ID   ***            Therefore the diversion at Sierra Pinta out of the         ***
631          ID   ***            system was removed.  This was done by modifying diversion  ***
632          ID   ***            D52W and setting equal to 0.                               ***
633          ID   ***                                                                       ***
634          ID   ******************************************************************************
635          ID   ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
636          ID   ******************************************************************************
637          ID
638          ID
639          ID
640          ID    ***********************************************************************
641          ID    **
642          ID    **                        FINAL HYDROLOGY REPORT
643          ID    **                 Pima Road Design Concept Report
644          ID    **        from Thompson Peak Parkway to the Pima Freeway (PRDCR)
645          ID    **
646          ID    **
647          ID    ***********************************************************************
648          ID    Project: Pima Road Design Concept Report (PRDCR)
649          ID    Client: City of Scottsdale
650          ID    Prepared By: Entellus Inc.                    Modelers: J.S. and C.L.
651          ID    Project Number: #2003-114-COS                 Entellus 410.061
652          ID    File Name: EBASE                              Created 01/16/2004
653          ID    Storm: 100 year 6 hour
654          ID    Development Conditions: Existing as of Fall 2003, WITH SIERRA PINTA
655          ID                                                     CHANNEL TO SP1
656          ID    Original Model by ROBERT L. WARD, P.E., CONSULTING ENGINEER
```

```
 657          ID
 658          ID    Original MODEL file DB53RFD5.6I CREATED ON 5/30/02, INCLUDED WOOD PATEL'S
 659          ID    MODEL OF DC RANCH DATED 1/1996
 660          ID
1                                        HEC-1 INPUT                                          PAGE 13

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

 661          ID    NOTE: Entellus developed this model in order to design the following:
 662          ID
 663          ID    1) Pima Realignment Structure#1 (New Bridge at Pima, south of Hualapai)
 664          ID    2) Pima Realignment Structure#2 (Existing Bridge at Downing Olsen and Pima)
 665          ID    3) Pima Drainage Channel from 84" storm drain outlet north of Hualapai-
 666          ID       to Union Hills Interceptor Channel
 667          ID    4) Union Hills Interceptor Channel from New Pima Alignment to future-
 668          ID       channel west of the existing Pima Road Alignment
 669          ID
 670          ID    ***************************************************************************
 671          ID    **  The changes listed below were made to the Ward and
 672          ID    **             DC Ranch models by Entellus in
 673          ID    **         order to develop the hydrology for the PRCDR.
 674          ID    ***************************************************************************
 675          ID    ** 1)The split at Reata Apex was modeled as 50-50 and apex flows routed
 676          ID    **   through DC Ranch per existing conditions as of Fall 2003.
 677          ID    ** 2)Basins 51B and 51C were subdivided in order to model split flows
 678          ID    **   occuring below the apex. 51B was divided into 51B1 through 51B10.
 679          ID    **   51C was divided into 51C1 throught 51C3.
 680          ID    **   The split flows labeled SPLIT1 through SPLIT3 route flow south
 681          ID    **   through DC Ranch.
 682          ID    ** 3)Diversions into a channel along Sierra Pinta were included per COS
 683          ID    **   even though the channel does not exist at the time of this model.
 684          ID    **   2200 cfs capacity assumed.
 685          ID    ** 4)The existing Pima Road Storm Drain system that is currently functional
 686          ID    **   from Thompson Peak Pkwy to Haulapai Road was added to the model.
 687          ID    ** 5)Basin S53A1 was modified in order to determine flow at key points
 688          ID    **   along the project alignment.
 689          ID    **   The basin was subdivided into S53A1 through S53A6
 690          ID    ** 6)Curve numbers and % impervious in DC Ranch were increased to 75
 691          ID    **   and 27% in order to reflect developed conditions,
 692          ID    **   in previously undeveloped watersheds. These values match those
 693          ID    **   used by Wood-Patel in adjacent developed areas.
 694          ID    ** 7)The 50-50 Diversion of flow west of Pima Road modeled by Ward
 695          ID    **   at Hualapai was set to zero because the Pima Rd Channel will
 696          ID    **   itntercept these flows.
 697          ID    ** 8)Line by line changes by Entellus are noted within the model
 698          ID    **
 699          ID    ***************************************************************************
 700          ID
 701          ID    ***************************************************************************
 702          ID    **  The changes below are Ward's changes to his previous model
 703          ID    **  as listed by Ward. The changes were made in order
 704          ID    **  to develop the model DB53RFD5, which was created to design the
 705          ID    **  detention basin 53R.
 706          ID    ***************************************************************************
 707          ID    **
 708          ID    ** STAGE-STORAGE DATA FOR DB53R HAS BEEN REVISED TO REFLECT NEW BRW DATA
 709          ID    ** PROVIDED ON 4/20/02.
 710          ID    **
 711          ID    **STAGE-DISCHARGE DATA HAS BEEN REVISED TO REFLECT LEVEL OUTLET CHANNELS
 712          ID    **
 713          ID    **
 714          ID    ** to THE INVERT ELEVATIONS OF THE PIMA FREEWAY CULVERT INLETS, MAY 2002
 715          ID    **
1                                        HEC-1 INPUT                                          PAGE 14

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

 716          ID    ** REATA PASS DRAINAGE NETWORK INSERTED IN-PLACE OF HDR UD RECORD
 717          ID    ** REATA PASS CURVE NUMBERS HAVE BEEN ADJUSTED TO 6-HOUR VALUES
 718          ID    **
 719          ID    ** DETENTION BASIN DESIGN MODEL
 720          ID    **
 721          ID    ** ALL CORE NORTH/SOUTH CURVE NUMBERS HAVE BEEN SET TO 77.
 722          ID    **
 723          ID    ***************************************************************************
 724          ID   |---------------------------------------------------------------------------|
 725          ID   |///////////////////////////////////////////////////////////////////////////|
 726          ID   |=============== END DEER VALLEY SOUTH IDENTIFICATION CARDS ================|
 727          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
 728          ID   -----------------------------------------------------------------------------
 729          ID
```

```
730          ID
731          ID
732          IT       1                    2000
733          IO       3
             *DIAGRAM
             *
             *
             *
             *
             *
             *  |-----------------------------------------------------------------------|
             *  |///////////////////////////////////////////////////////////////////////|
             *  |===================== BEGIN DEER VALLEY NORTH MODEL ====================|
             *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
             *  -----------------------------------------------------------------------
             *
             *
             *
             * ***************************************************************************
             * *** STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC ***
             * ***************************************************************************
             * ***                          BEGIN STANTEC MODEL                          ***
             * ***                                                                       ***
             * ***          This portion of the Model was taken directly from the        ***
             * ***                          "Pima Road Three Basins"                     ***
             * ***                Project by Stantec for the City of Scottsdale.         ***
             * ***        The File name is "FU1100-6.IH1", revised on 01-20-99 by MCG.   ***
             * ***************************************************************************
             * *** STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC ***
             * ***************************************************************************
             *

734          KK    S30N
735          KM     RUNOFF FROM SUBBASIN 30N
736          KM        ARF BASED ON 14 SQ MILE WATERSHED, WHICH INCLUDES REATA PASS.
737          BA  0.6518
738          PH              14      .74     1.46     2.48     2.79      3.0      3.4
739          LS              82       13               82       13
740          UK     300   0.350     0.13       20
741          UK     300   0.050     0.13       80
742          RK    1550   0.069    0.045   0.0096     TRAP        0       12
```



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

743          RK   10520   0.038    0.040             TRAP       15       15
             *

744          KK    R30N
745          KM     NORMAL DEPTH CHANNEL ROUTE FROM C30N TO C31.1 THROUGH PIMA CHANNEL
746          RS       8    FLOW      -1
747          RC   0.022   0.022    0.022     2470    0.01
748          RX    1000    1012     1020     1028    1036     1044     1052     1064
749          RY     107     104      102      100     100      102      104      107
             *

750          KK   S31.1
751          KM     RUNOFF FROM SUBBASIN 31.1
752          BA  0.2663
753          LS            76.6       13             76.6       13
754          UK     300   0.567     0.13       10
755          UK     300   0.050     0.13       90
756          RK    1950   0.056    0.045   0.0147     TRAP        0       10
757          RK    7600   0.035    0.040             TRAP       22        8
             *

758          KK   C31.1
759          KM     COMBINE ROUTED HYDROGRAPH FROM S30N WITH RUNOFF FROM SUBBASIN 31.1
760          HC       2
             *
             *  R31.1
             *   ****  TOO SHORT TO ROUTE  ****
             *    NORMAL DEPTH CHANNEL ROUTE FROM C31.1 TO C34.1 THROUGH PIMA CHANNEL
             *      1    FLOW      -1
             *  0.022   0.022    0.022     1500    0.01
             *   1000    1012     1020     1028    1048     1056     1064     1076
             *    107     104      102      100     100      102      104      107
             *

761          KK   S34.2
762          KM     RUNOFF FROM SUBBASIN 34.2
```

```
KM        RAINFALL LOSSES FOR GREINER SUBBASINS 31.2 AND 34.1 ARE WEIGHTED BY AREA
BA  0.4441
LS            77.3      12            77.3      12
UK      50    0.10    0.13      10
UK     300   0.040    0.13      90
RK    2200  0.0452   0.045  0.0538    TRAP       0      10
RK    8150  0.0386   0.045            TRAP       0      10
*

KK   C34.2
KM     COMBINE ROUTED HYDROGRAPH FROM C31.1 WITH RUNOFF FROM SUBBASIN 34.2
HC       2
*
```

1 HEC-1 INPUT PAGE 16

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

KK    S35N
KM     RUNOFF FROM SUBBASIN 35N
BA  0.5482
LS              82      13              82      13
UK     300   0.491    0.13      15
UK     300   0.113    0.13      85
RK    2700   0.079   0.045  0.0242    TRAP       3       6
RK    5050   0.028   0.040            TRAP      15      15
*

KK   D35NR
KM     DIVERSION JUST DOWNSTREAM OF THE ALMA SCHOOL ROAD CULVERT
KM        RIGHT BRANCH IS ROUTED TO C36.2
KM        LEFT BRANCH (CODED ON DQ RECORD) IS ROUTED TO C36R1
DT   D35NL
DI       0      10      66     168     343     581     805     977    1168    1320
DQ       0       4      28      73     154     261     360     435     518     575
*

KK   R35NR
KM     NORMAL DEPTH CHANNEL ROUTE FROM S35N TO C36.2
KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
RS      12    FLOW      -1
RC    0.06    0.04    0.06    3500  0.0343
RX    1000    1006    1026    1027    1057    1058    1078    1084
RY     105     103     101     100     100     101     103     105
*

KK   S36.2
KM     RUNOFF FROM SUBBASIN 36.2
BA  0.2087
LS            76.6      13            76.6      13
UK     300   0.580    0.13       5
UK     300   0.100    0.13      95
RK    1800   0.036   0.045  0.0145    TRAP      10      10
RK    3520   0.028   0.040            TRAP      20       6
*

KK   C36.2
KM     COMBINE ROUTED HYDROGRAPH FROM S35N WITH RUNOFF FROM SUBBASIN 36.2
HC       2  0.5411
*

KK  D36.2R
KM     DIVERSION AT DESERT HIGHLANDS DRIVE
KM        RIGHT BRANCH, AT GOLF CART CROSSING IS ROUTED TO C34.1
KM        LEFT BRANCH (CODED ON DQ RECORD) IS ROUTED TO C36R1
DT  D36.2L
DI       0      36     166     288     360     430     538     681     859    1074
DQ       0       0       0       0       0      18      60     123     208     315
*
```

1 HEC-1 INPUT PAGE 17

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

KK  R36.2R
KM     NORMAL DEPTH CHANNEL ROUTE FROM C36.2 TO C34.1
KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
RS      26    FLOW      -1
RC    0.06    0.04    0.06    7800  0.0321
RX    1000    1043    1053    1068    1093    1098    1133    1218
RY   102.6   100.6   100.5     100     100   100.5   100.6   102.6
```

```
*

KK   S34.1
KM  ******************************************************************************
KM  * ENTELLUS COMMENT: THE BASIN AREA FOR SUBBASIN S34.1 WAS CORRECTED TO       *
KM  * ENTELLUS COMMENT: REFLECT GEOMETRY.  AREA CHANGED FROM 1.635 TO 1.170 SQMI *
KM  ******************************************************************************
KM     RUNOFF FROM SUBBASIN 34.1
KM        RAINFALL LOSSES FOR GREINER SUBBASINS 31.2 AND 34.1 ARE WEIGHTED BY AREA
BA  1.1700
LS            77.3      12            77.3      12
UK     300   0.590    0.13      25
UK     300   0.040    0.13      75
RK    2570   0.085   0.045  0.0214    TRAP       0      10
RK    8800  0.0325   0.040            TRAP      20      10
*

KK   C34.1
KM     COMBINE ROUTED HYDROGRAPH FROM C36.2 W/RUNOFF FROM SUBBASIN 34.1
HC       2  1.5423
*
* ****************************************************************************
* * ENTELLUS COMMENT: IT WAS ASSUMED THAT THIS DETENTION BASIN AS DESIGNED TO  *
* * ENTELLUS COMMENT: 10% BY STANTEC WILL BE IN PLACE IN THE FUTURE, ALTHOUGH  *
* * ENTELLUS COMMENT: AT THIS POINT IN TIME (OCTOBER 2005) IT DOES NOT EXIST.  *
* ****************************************************************************
*

KK  HVDB-I
KM     COMBINE HYDROGRAPH FROM C34.2 W/ C34.1
HC       2  2.9029
*

KK  HVDB-O
KM     DETENTION BASIN AT HAPPY VALLEY ROAD - NONREGULATORY STRUCTURE
KM        PRINCIPAL SPILLWAY:  42" x 800' RCP WITH A SLOPE OF 0.5%
KM        11 ACRE-FEET OF STORAGE FOR SEDIMENTAION
RS       1    STOR      -1
SV       0     0.2     0.7     1.8     3.4     5.4    36.3    89.1   151.2   225.3
SV   241.0
SE    2065    2066    2067    2068    2069    2070    2075    2080    2085    2090
SE    2091
SQ       0      10      20      30      40      50      60      70      80      90
SQ     100     110     120     130     140
SE  2065.0 2066.47 2067.13 2067.67 2068.14 2068.58 2069.04 2071.26 2073.33 2075.68
SE  2078.3 2081.19 2084.37 2087.82 2091.54
*
```



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

KK   D34.1
*  ****************************************************************************
*  * ENTELLUS COMMENT: THIS ROUTE WAS REMOVED.  BASED ON A FIELD VISIT ON      *
*  * ENTELLUS COMMENT: 10-14-2005, IT WAS DETERMINED THAT BASED ON EXISTING    *
*  * ENTELLUS COMMENT: CONDITIONS, ALL FLOW CROSSES PIMA RD BETWEEN THE        *
*  * ENTELLUS COMMENT: HAPPY VALLEY RD ADJUSTMENT, AND ALL FLOW ENTERS THE ALTA*
*  * ENTELLUS COMMENT: SONORA SUBDIVISION.  SOME FLOW FLOWS ALONG THE WEST SIDE*
*  * ENTELLUS COMMENT: OF PIMA RD, BUT ENTERS THE ALTA SONORA SUBDIVISION      *
*  * ENTELLUS COMMENT: APPROXIMATELY 100-200 FT SOUTH OF HAPPY VALLEY RD.      *
*  ****************************************************************************
DT  DO34.1
DI       0    5000
DQ       0    5000
*

KK   R34.1
KM     NORMAL DEPTH CHANNEL ROUTE FROM C34.1 TO C36.1 THROUGH PIMA CHANNEL
RS       8    FLOW      -1
RC   0.022   0.022   0.022    2200    0.01
RX    1000    1012    1020    1028    1036    1044    1052    1064
RY     107     104     102     100     100     102     104     107
*
*

KK   S36.1
KM     RUNOFF FROM SUBBASIN 36.1
BA  0.1394
LS            73.4      11
UK     300  0.0420   0.130     100
```

```
867          RK    2330  0.0320   0.045  0.0134    TRAP      10      30
868          RK    3200  0.0270   0.040            TRAP      20      30
             *

869          KK   C36.1
870          KM     COMBINE ROUTED HYDROGRAPH FROM C34.1 WITH RUNOFF FROM SUBBASIN 36.1
871          HC       2
             *

872          KK   D36.1
873          KM   ***************************************************************************
874          KM   * ENTELLUS COMMENT: BASED ON A FIELD VISIT ON 10-14-2005, IT WAS DETERMINED *
875          KM   * ENTELLUS COMMENT: THAT BASED ON EXISTING CONDITIONS, ALL FLOW CROSSES     *
876          KM   * ENTELLUS COMMENT: PIMA RD EITHER JUST NORTH R JUST SOUTH OF               *
877          KM   * ENTELLUS COMMENT: E. De La O Rd. AND ENTERS THE PINNACLE PEAK ESTATES     *
878          KM   * ENTELLUS COMMENT: SUBDIVISION.  IT WAS ASSUMED THAT ALL FLOW ENTERS       *
879          KM   * ENTELLUS COMMENT: BASIN S37A1.                                            *
880          KM   ***************************************************************************
881          DT  DO36.1
882          DI       0    5000
883          DQ       0    5000
             *
```



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

884          KK   R36.1
885          KM       NORMAL DEPTH CHANNEL ROUTE FROM C36.1 TO C36R1 THROUGH PIMA CHANNEL
886          RS       6    FLOW      -1
887          RC   0.022   0.022   0.022    1520    0.01
888          RX    1000    1012    1020    1028    1036    1044    1052    1064
889          RY     107     104     102     100     100     102     104     107
             *
             *

890          KK   B35NL
891          KM     BRING BACK DIVERTED HYDROGRAPH FROM C35N
892          DR   D35NL
             *

893          KK   R35NL
894          KM     NORMAL DEPTH CHANNEL ROUTE FROM S35N TO C36R1
895          KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
896          RS      44    FLOW      -1
897          RC    0.06    0.04    0.06   14480  0.0318
898          RX    1000    1040    1080    1086    1091    1097    1137    1174
899          RY     105     104     103     100     100     103     104     105
             *

900          KK  B36.2L
901          KM     BRING BACK DIVERTED HYDROGRAPH FROM C36.2
902          DR  D36.2L
             *

903          KK  R36.2L
904          KM     NORMAL DEPTH CHANNEL ROUTE FROM C36.2 TO C36R1
905          KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
906          RS      33    FLOW      -1
907          RC    0.06    0.04    0.06   10160  0.0342
908          RX    1000    1030    1060    1066    1076    1082    1112    1142
909          RY     103   102.5     102     100     100     102   102.5     103
             *

910          KK  S36R1A
911          KM     RUNOFF FROM SUBBASIN 36R1A
912          KM        RAINFALL LOSSES FOR GREINER SUBBASINS 36.3, 36R1 AND 35R ARE AREA WEIGHT
913          BA  0.6310
914          LS            74.3      10
915          UK     300   0.020   0.130     100
916          RK    1420   0.032   0.045  0.0061    TRAP       0      13
917          RK   10800   0.033   0.040            TRAP      10       9
             *

918          KK  C36R1A
919          KM   ***************************************************************************
920          KM   * ENTELLUS COMMENT: EXISTING CONDITIONS OF C36R1A WAS CHANGED FROM A HARD   *
921          KM   * ENTELLUS COMMENT: CODED AREA OF 4.0530 SQMILES TO 1.3914 SQMILES          *
922          KM   * ENTELLUS COMMENT:   PREVIOUS MODEL:                                       *
923          KM   * ENTELLUS COMMENT:     (C36.1 + S36R1 + S35N*40% + C36.2*30%)(A=4.0530)    *
924          KM   * ENTELLUS COMMENT:   EXISTING CONDITIONS:                                  *
```

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

 925          KM   * ENTELLUS COMMENT:      (C36.1*0% + S36R1  + S35N*40% + C36.2*30%)(A=1.3914)*
 926          KM   * ENTELLUS COMMENT:        A =   0 + 0.6310 + 0.2193   + 0.5411    =  1.3914 *
 927          KM   ****************************************************************************
 928          HC       4  1.3914
              *
              * ****************************************************************************
              * *** STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC ***
              * ****************************************************************************
              * ***                              END STANTEC MODEL                          ***
              * ****************************************************************************
              * *** STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC**STANTEC ***
              * ****************************************************************************
              *
              *
              * ****************************************************************************
              * *** ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS** ***
              * ****************************************************************************
              * ***                          BEGIN ENTELLUS MODIFICATIONS                   ***
              * ****************************************************************************
              * *** ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS** ***
              * ****************************************************************************
              *

 929          KK  R36R1A
 930          KM     NORMAL DEPTH CHANNEL ROUTE FROM C36R1A TO C36R1C THROUGH PIMA CHANNEL
 931          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
 932          RS       3    FLOW      -1
 933          RC   0.022   0.022   0.022     830  0.0157
 934          RX    1000    1012    1020    1028    1036    1044    1052    1064
 935          RY     107     104     102     100     100     102     104     107
              *

 936          KK  S36R1C
 937          KM     ORIGINAL BASIN S36R1B WAS SUBDIVIDED INTO S36R1C & S36RID
 938          BA  0.0793
 939          LS            74.3      10
 940          UK     300   0.020   0.130     100
 941          RK    4600   0.032   0.045            TRAP      10      18
              *

 942          KK  DS-R1C
 943          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE ALONG PIMA RD
 944          KM   AS SEEN DURING A FIELD VISIT ON 10-14-2005.  THE DIMENSIONS OF THE 2 BASINS
 945          KM   WERE APPROXIMATED AS BEING L=240', W=70' D=5'.  THESE WERE VERIFIED THROUGH
 946          KM   AERIAL PHOTOGRAPHY.  THE TOTAL POSSIBLE STORAGE VOLUME IS APPROXIMATED AS
 947          KM   BEING 3.86 ACRE-FT (1.93 ACRE-FT EACH).  IT IS ASSUMED THAT ALL BASIN FLOW
 948          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
 949          DT  DOSR1C    3.86
 950          DI    1000
 951          DQ    1000
              *
```



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

 952          KK  C36R1C
 953          HC       2
              *
              *

 954          KK  D36R1C
 955          KM   DIVERTS FLOW WEST ACROSS PIMA ROAD JUST NORTH OF PINNACLE PEAK
 956          KM   THROUGH 2-3x4.5" BOXES JUST NORTH OF PINNACLE PEAK
 957          KM        DS INVERT~1982.5'
 958          KM        ~2' OF HEAD ABOVE TOP OF BOX OPENING.
 959          KM   ALL FLOW GOES THROUGH CULVERT UNTIL CAPACITY IS REACHED AT WHICH
 960          KM   POINT FLOW IS ASSUMED TO GO SOUTH ALONG THE EAST SIDE OF PIMA ROAD.
 961          KM   CAPACITY IS ESTIMATED TO BE 234 CFS.
 962          DT  DO361C
 963          DI       0     234     500    5000
 964          DQ       0     234     234     234
              *
              * TOO SHORT TO ROUTE (~200')
              * KKR36R1C
              *
```

```
965          KK  S36R1D
966          BA  0.5049
967          LS            74.3      10
968          UK     300   0.020   0.130     100
969          RK   10500   0.036   0.045            TRAP      10      18
             *

970          KK  DS-R1D
971          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
972          KM   THE PRELIMINARY DRAINAGE REPORT FOR LA MIRADA PINNALCLE PEAK/ PIMA
973          KM   SHOPPING CENTER #7DR-95. BASED ON FIELD OBSERVATIONS THE TOTAL ACTUAL
974          KM   STORAGE IS SLIGHTLY LARGER THAN 4.5 ACRE-FT.  STORAGE IS DIVIDED INTO 3
975          KM   RETENTIN BASINS. 2 OF THESE BASINS (3.86 TOTAL ACRE-FT) WERE TAKEN OUT AT
976          KM   S36R1C. A BASIN AT THE NE CORNER OF PINNACLE PEAK AND PIMA WITH APPROXIMATE
977          KM   DIMENSIONS OF L=200', W=70', D=5'AND STORAGE CAPACITY OF 1.61 ACRE-FT
978          KM   ATTENUATES THE FLOW FROM BASIN S36R1D. IT IS ASSUMED THAT ALL BASIN FLOW
979          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
980          DT  DOSR1D    1.61
981          DI    1000
982          DQ    1000
             *

983          KK  C36R1D
984          HC       2
             *
             *
             *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
             *  *-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD CHANNEL *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
             *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
             *
```



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

985          KK  R36R1D
986          RS       2    FLOW      -1
987          RC   0.045   0.045   0.045     530   0.004
             * *****Channel Assymptions***** *
             * Left Side Slope = 4:1
             * Left Bottom Side Slope = 2%
             * Right Side Slope = 4:1
             * Right Bottom Side Slope = 2%
             * Bottom Width = 12'
             * Channel Depth = 4'
988          RX       0       5      23      45      57      79      97     102
989          RY       5       5    0.44       0       0    0.44       5       5
             *
             *
             * KKR36R1D
             * KM   NORMAL DEPTH CHANNEL ROUTE FROM C36R1D TO C1A2F THROUGH PIMA CHANNEL
             * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
             * RS     2    FLOW      -1
             * RC 0.022   0.022   0.022     530  0.0188
             * RX  1000    1012    1020    1028    1036    1044    1052    1064
             * RY   107     104     102     100     100     102     104     107
             *
             *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
             *  *-*-*-*-*-*-*-*-*-* END PIMA ROAD CHANNEL *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
             *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
             *
             *

990          KK   S1A2F
991          BA  0.0086
992          LS              72      20
993          UK     100   0.045   0.130     100
994          RK     750   0.026   0.017            TRAP      14       7
             *

995          KK   C1A2F
996          KM   COMBINES R36R1D AND S1A2F
997          HC       2
             *
             *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
             *  *-*-*-*-*-*-*-*-*-* BEGIN DEER VALLEY CHANNEL IMPROVEMENTS *-*-*-*-*-*-*-*-*-
             *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
             *

998          KK   D1A2F
999          DT  DO1A2F
```

```
                * This is a diversion from across Pima Road to the west through existing
                * 2-36" culvert.  The diversion was based on a stage discharge relationship
                * of the culvert and the east side of Pima Road as follows:
                *
                *     Stage      Total Q    Pima Rd. Q     Culvert Q
                *       0            0            0            0
                *       1          132          116           16
                *       2          417          377           40
                *       3          835          765           70
                *       4         1375         1275          100
                *
1                                          HEC-1 INPUT                                                    PAGE 23

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

1000            DI       0     132     417     835    1375
1001            DQ       0      16      40      70     100
                *
                *
                *
                * KK D1A2F
                * KM MODIFIED: REMOVED DIVERSION CROSSING PIMA RD
                * KM
                * KM BASED ON FIELD OBSERVATIONS FLOW THAT DOES NOT CROSS PIMA RD
                * KM THROUGH THE 2-36" CULVERTS AT C1A2F WILL CROSS PRIOR TO THE
                * KM FOLLOWING DRIVEWAY.  THUS IT WAS ASSUMED THAT ALL EXISTING CONDTIONS FLOW
                * KM CROSSES PIMA  RD AT C1A2F INTO BASIN SEEC01.
                * DTDO1A2F
                * DI     0    5000
                * DQ     0    5000
                *
                *
                *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                *  *-*-*-*-*-*-*-*-*-*- END DEER VALLEY CHANNEL IMPROVEMENTS -*-*-*-*-*-*-*-*-*-
                *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                *
                *
                *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                *  *-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD CHANNEL *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
                *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                *

1002            KK   R1A2F
1003            RS       3    FLOW      -1
1004            RC   0.045   0.045   0.045     820   0.004
                * *****Channel Assymptions***** *
                * Left Side Slope = 4:1
                * Left Bottom Side Slope = 2%
                * Right Side Slope = 4:1
                * Right Bottom Side Slope = 2%
                * Bottom Width = 12'
                * Channel Depth = 4'
1005            RX       0       5      23      45      57      79      97     102
1006            RY       5       5    0.44       0       0    0.44       5       5
                *
                *
                * KK R1A2F
                * KM   NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
                * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
                * RS     3    FLOW      -1
                * RC 0.022   0.022   0.022     820  0.0195
                * RX  1000    1012    1020    1028    1036    1044    1052    1064
                * RY   107     104     102     100     100     102     104     107
                *
                *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                *  *-*-*-*-*-*-*-*-*-* END PIMA ROAD CHANNEL *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
                *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                *
                *
1                                          HEC-1 INPUT                                                    PAGE 24

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

1007            KK   S1A2E
1008            BA  0.0295
1009            LS              72      20
1010            UK     100   0.045   0.130     100
1011            RK    1400   0.029   0.017            TRAP      14       7
                *
```

```
1012          KK  DS-A2E
1013          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
1014          KM   THE PRELIMINARY DRAINAGE REPORT FOR DESERT VILLAGE RETAIL CENTER #1365
1015          KM   THE TOTAL VOLUME TO STORED IS 3.18 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
1016          KM   STORAGE WILL OCCUR IN BASIN S1A2E BECAUSE THE MAJORITY OF THE COMPLEX IS
1017          KM   LOCATED WITHIN THIS BASIN.  IT IS ASSUMED THAT ALL BASIN FLOW ENTERS THE
1018          KM   RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
              * DTDOSA2E    3.18
1019          DT  DOSA2E0.000001
1020          DI    1000
1021          DQ    1000
              *

1022          KK   C1A2E
1023          HC       2
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-* BEGIN DEER VALLEY CHANNEL IMPROVEMENTS *-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*

1024          KK   D1A2E
1025          KM   MODIFIED: REMOVED DIVERSION CROSSING PIMA RD
1026          KM
1027          KM   BASED ON FIELD OBSERVATIONS ALL FLOW CROSSES PIMA RD AT PARAISO DR.
1028          DT  DO1A2E
1029          DI       0    5000
1030          DQ       0       0
              * DQ     0    5000
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-*- END DEER VALLEY CHANNEL IMPROVEMENTS -*-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD CHANNEL *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *

1031          KK   R1A2E
1032          RS       1    FLOW      -1
1033          RC   0.045   0.045   0.045     350   0.004
              * *****Channel Assymptions***** *
              * Left Side Slope = 4:1
              * Left Bottom Side Slope = 2%
              * Right Side Slope = 4:1
              * Right Bottom Side Slope = 2%
              * Bottom Width = 9'
              * Channel Depth = 4'
```



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

1034          RX       0       5      23      45      54      76      94      99
1035          RY       5       5    0.44       0       0    0.44       5       5
              *
              * KK R1A2E
              * KM   NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
              * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
              * RS     1    FLOW      -1
              * RC 0.022   0.022   0.022     350  0.0198
              * RX  1000    1012    1020    1028    1036    1044    1052    1064
              * RY   107     104     102     100     100     102     104     107
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-* END PIMA ROAD CHANNEL *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
              *

1036          KK   S1A2D
1037          BA  0.0158
1038          LS              72      20
1039          UK     100   0.045   0.130     100
1040          RK    2000   0.032   0.017            TRAP      14       7
              *

1041          KK   C1A2D
1042          KM   COMBINES R1A2E AND S1A2D
1043          HC       2
              *
```

```
                 *
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                 *  *-*-*-*-*-*-*-*-*-* BEGIN DEER VALLEY CHANNEL IMPROVEMENTS *-*-*-*-*-*-*-*-*-
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*

1044             KK   D1A2D
1045             KM   MODIFIED: REMOVED DIVERSION CROSSING PIMA RD
1046             KM
1047             KM   BASED ON A FIELD VISIT IT WAS DETERMINED THAT THE FLOW FROM BASIN S1A2D
1048             KM   CROSSES PIMA ROAD, AND DOES NOT FLOW SOUTH ALONG PIMA ROAD.
1049             DT  DO1A2D
1050             DI       0    5000
1051             DQ       0       0
                 * DQ     0    5000
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                 *  *-*-*-*-*-*-*-*-*-*- END DEER VALLEY CHANNEL IMPROVEMENTS -*-*-*-*-*-*-*-*-*-
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                 *
                 *
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                 *  *-*-*-*-*-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD CHANNEL -*-*-*-*-*-*-*-*-*-*-*-*-*-
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                 *
1                                          HEC-1 INPUT                                        PAGE 26

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


1052             KK   R1A2D
1053             RS       1    FLOW      -1
1054             RC   0.045   0.045   0.045     225   0.004
                 * *****Channel Assymptions***** *
                 * Left Side Slope = 4:1
                 * Left Bottom Side Slope = 2%
                 * Right Side Slope = 4:1
                 * Right Bottom Side Slope = 2%
                 * Bottom Width = 9'
                 * Channel Depth = 4'
1055             RX       0       5      23      45      54      76      94      99
1056             RY       5       5    0.44       0       0    0.44       5       5
                 *
                 *
                 * KK R1A2D
                 * KM   NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
                 * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
                 * RS     1    FLOW      -1
                 * RC 0.022   0.022   0.022     225  0.0177
                 * RX  1000    1012    1020    1028    1036    1044    1052    1064
                 * RY   107     104     102     100     100     102     104     107
                 *
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                 *  *-*-*-*-*-*-*-*-*-*-*-*-*-* END PIMA ROAD CHANNEL *-*-*-*-*-*-*-*-*-*-*-*-*-*-
                 *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                 *
                 *

1057             KK   S1A2A
1058             BA  0.0474
1059             LS              72      20
1060             UK     100   0.045   0.130     100
1061             RK    2200   0.029   0.017            TRAP      14       7
                 *

1062             KK  DS-A2A
1063             KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
1064             KM   THE PRELIMINARY DRAINAGE REPORT FOR MIRAGE VILLAGE #25-DR-96.
1065             KM   THE TOTAL VOLUME TO STORED IS 0.81 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
1066             KM   STORAGE WILL OCCUR IN BASIN S1A2A.  IT IS ASSUMED THAT ALL BASIN FLOW
1067             KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
1068             DT  DOSA2A    0.81
1069             DI    1000
1070             DQ    1000
                 *
                 * TOO SHORT TO ROUTE (~400')
                 * KK R1A2A
                 *
1                                          HEC-1 INPUT                                        PAGE 27

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

```
1071          KK   S1A2B
1072          BA  0.0231
1073          LS              72      20
1074          UK     100   0.045   0.130     100
1075          RK    2100   0.031   0.017            TRAP      14       7
              *

1076          KK   C1A2B
1077          KM   COMBINES R1A2A AND S1A2B
1078          HC       2
              *
              * TOO SHORT TO ROUTE (~200')
              * KK R1A2B
              *

1079          KK   S1A2C
1080          BA  0.0091
1081          LS              72      20
1082          UK     100   0.045   0.130     100
1083          RK    1000   0.031   0.017            TRAP      14       7
              *

1084          KK   C1A2C
1085          KM   COMBINES R1A2D, R1A2C AND S1A2B
1086          HC       3
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD CHANNEL -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *

1087          KK   R1A2C
1088          RS       1    FLOW      -1
1089          RC   0.045   0.045   0.045     450   0.004
              * *****Channel Assymptions***** *
              * Left Side Slope = 4:1
              * Left Bottom Side Slope = 2%
              * Right Side Slope = 4:1
              * Right Bottom Side Slope = 2%
              * Bottom Width = 9'
              * Channel Depth = 4'
1090          RX       0       5      23      45      54      76      94      99
1091          RY       5       5    0.44       0       0    0.44       5       5
              *
              *
              * KK R1A2C
              * KM   NORMAL DEPTH CHANNEL ROUTE FROM C1A2C TO C1A2G THROUGH PIMA CHANNEL
              * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
              * RS     1    FLOW      -1
              * RC 0.022   0.022   0.022     450  0.0225
              * RX  1000    1012    1020    1028    1036    1044    1052    1064
              * RY   107     104     102     100     100     102     104     107
              *
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-*-*-*-* END PIMA ROAD CHANNEL -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
              *
```



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


1092          KK   S1A2G
1093          BA  0.0038
1094          LS              72      20
1095          UK     100   0.045   0.130     100
1096          RK     500   0.027   0.017            TRAP      14       7
              *

1097          KK   C1A2G
1098          KM   COMBINES R1A2C AND S1A2G
1099          HC       2
              *
              * ******************************************************* *
              * ********** Begin Modifications July 16 2009 ********** *
              * ******************************************************* *

1100          KK   D1A2G
1101          KM   This diversion was added to account for additional flow that crosses Pima
```

```
1102           KM   Road prior to the Los Gatos subdivision.  Previous assumptions were that
1103           KM   the flow crosses Pima Rd. and is taken out at the next diversion.  This
1104           KM   assumptions was made due to the assumption that the Los Gatos Wall would
1105           KM   not act as a flood wall and would not be modeled, thus allowing all flow
1106           KM   to cross.
1107           KM   Based on FLO-2D modeling results, flow crosses Pima Rd prior to the
1108           KM   Los gatos subdivision, and approximately 87% of the flow crosses to the
1109           KM   west and 13% stays along Pima Rd. to the south.
1110           DT  DO1A2G
1111           DI       0   10000
1112           DQ       0       0
               * DQ     0    8700
               * ***************************************************** *
               * *********** End Modifications July 16 2009 *********** *
               * ***************************************************** *
               *
               *
               *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
               *  *-*-*-*-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-*-
               *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
               *
               *

1113           KK   DA2G1
1114           DT  DOA2G1
1115           DI       0   10000
1116           DQ       0    5000
               *
               *

1117           KK   RA2G1
1118           KM     KINEMATIC WAVE ROUTE FROM C1B4 TO CR1B4 THROUGH STORMDRAIN PIPE
1119           RK     600    0.01   0.013             CIRC     6.5
               *
               *
1                                           HEC-1 INPUT                                      PAGE 29

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

1120           KK   DA2G1
1121           DR  DOA2G1
               *
               *

1122           KK   RA2G2
1123           KM     KINEMATIC WAVE ROUTE FROM C1B4 TO CR1B4 THROUGH STORMDRAIN PIPE
1124           RK     600    0.01   0.013             CIRC     6.5
               *
               *

1125           KK  CRA2G1
1126           KM   Combines R1A2G1, and R1A2G2
1127           HC       2
               *
               *
               * KK R1A2G
               * KM   NORMAL DEPTH CHANNEL ROUTE FROM C1A2G TO C1B4 THROUGH PIMA CHANNEL
               * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
               * RS      2    FLOW      -1
               * RC 0.022   0.022   0.022     600   0.021
               * RX  1000    1012    1020    1028    1036    1044    1052    1064
               * RY   107     104     102     100     100     102     104     107
               *
               *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
               *  *-*-*-*-*-*-*-*-*-*-*-*-*-* END PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-*-
               *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
               *

1128           KK    S1B4
1129           BA  0.0238
1130           LS             72      12
1131           UK     100   0.045   0.100     100
1132           RK    1400   0.028   0.017             TRAP      15       7
               *

1133           KK  DS-1B4
1134           KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
1135           KM   THE PRELIMINARY DRAINAGE REPORT FOR CANADA VISTAS WP#93075
1136           KM   THE TOTAL VOLUME TO STORED IS 1.67 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
1137           KM   STORAGE WILL OCCUR IN BASIN S1B4.  IT IS ASSUMED THAT ALL BASIN FLOW
```

```
1138          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
              * DTDOSR1D    1.67
1139          DT  DOSR1D0.000001
1140          DI    1000
1141          DQ    1000
              *

1142          KK    C1B4
1143          KM   COMBINES R1A2G AND S1B4
1144          HC       2
              *
              *  ---------------------------------------------------------------------------
              *  |///////////////////////////////////////////////////////////////////////////|
              *  |=============== BEGIN DEER VALLEY NORTH MODEL MODIFICATIONS ===============|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  |---------------------------------------------------------------------------|
1                                          HEC-1 INPUT                                          PAGE 30

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


1145          KK    D1B4
1146          KM   THROUGH A FIELD VISIT IT WAS DETERMINED THAT ALL THE FLOW CROSSES PIMA RD
1147          KM   BY THIS POINT, THEREFORE ALL FLOW WAS ROUTED ACROSS PIMA RD AT THIS POINT
1148          KM
1149          KM   MODIFIED: It was decided that no flow will pass through the wall of
1150          KM   MODIFIED: Los Gatos.  This diversion has been modified to have all flow
1151          KM   MODIFIED: continue south along Pima Rd.
1152          DT   DO1B4
1153          DI       0    5000
1154          DQ       0       0
              * DQ     0    5000 * ORIGINAL DQ CARD
              *  |---------------------------------------------------------------------------|
              *  |///////////////////////////////////////////////////////////////////////////|
              *  |=============== END DEER VALLEY NORTH MODEL MODIFICATIONS ================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  ---------------------------------------------------------------------------
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
              *

1155          KK   DB4_1
1156          DT  DOB4_1
1157          DI       0   10000
1158          DQ       0    5000
              *
              *

1159          KK   RB4_2
1160          KM     KINEMATIC WAVE ROUTE FROM C1B4 TO CR1B4 THROUGH STORMDRAIN PIPE
1161          RK     400   0.022   0.013            CIRC     6.5
              *
              *

1162          KK   DB4_1
1163          DR  DOB4_1
              *
              *

1164          KK   RB4_1
1165          KM     KINEMATIC WAVE ROUTE FROM C1B4 TO CR1B4 THROUGH STORMDRAIN PIPE
1166          RK     400   0.022   0.013            CIRC     6.5
              *
              *

1167          KK   CR1B4
1168          KM   Combines RB4_1, and RB4_2
1169          HC       2
              *
              *
              * KK  R1B4
              * KM   NORMAL DEPTH CHANNEL ROUTE FROM C1B4 TO C1B3 THROUGH PIMA CHANNEL
              * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
              * RS     1    FLOW      -1
              * RC 0.022   0.022   0.022     400  0.0225
              * RX  1000    1012    1020    1028    1036    1044    1052    1064
              * RY   107     104     102     100     100     102     104     107
              *
```

```
                    *
                    *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                    *  *-*-*-*-*-*-*-*-*-*-*-*-*-* END PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-*-*-
                    *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                    *
                    *
1                                        HEC-1 INPUT                                              PAGE 31

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


 1170               KK    S1B3
 1171               BA  0.1438
 1172               LS              72      12
 1173               UK     100   0.045   0.100     100
 1174               RK    6300   0.030   0.017             TRAP      15       7
                    *

 1175               KK    C1B3
 1176               HC       2
                    *
                    *
                    *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                    *  *-*-*-*-*-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-*-
                    *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                    *

 1177               KK   DB3_1
 1178               DT  DOB3_1
 1179               DI       0   10000
 1180               DQ       0    5000
                    *
                    *

 1181               KK   RB3_2
 1182               KM     KINEMATIC WAVE ROUTE FROM C1B3 TO CR1B3 THROUGH STORMDRAIN PIPE
 1183               RK     620   0.022   0.013             CIRC     6.5
                    *
                    *

 1184               KK   DB3_1
 1185               DR  DOB3_1
                    *
                    *

 1186               KK   RB3_1
 1187               KM     KINEMATIC WAVE ROUTE FROM C1B3 TO CR1B3 THROUGH STORMDRAIN PIPE
 1188               RK     620   0.022   0.013             CIRC     6.5
                    *
                    *

 1189               KK   CR1B3
 1190               KM   Combines RB3_1, and RB3_2
 1191               HC       2
                    *
                    *
                    * KK  R1B3
                    * KM   NORMAL DEPTH CHANNEL ROUTE FROM C36R1D TO C1A2F THROUGH PIMA CHANNEL
                    * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
                    * RS      2    FLOW      -1
                    * RC 0.022   0.022   0.022     620  0.0194
                    * RX  1000    1012    1020    1028    1036    1044    1052    1064
                    * RY   107     104     102     100     100     102     104     107
                    *
                    *
                    *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                    *  *-*-*-*-*-*-*-*-*-*-*-*-*-* END PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-*-*-
                    *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                    *
                    *
1                                        HEC-1 INPUT                                              PAGE 32

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


 1192               KK    D1B3
 1193               KM   This is the assumed flow diversion into the Los Gatos subdivision entrance
 1194               DT   DO1B3
 1195               DI       0   10000
 1196               DQ       0       0
                    * DQ     0   10000
```

```
                *

1197            KK    S1B1
1198            BA  0.0319
1199            LS              72      12
1200            UK     100   0.045   0.100     100
1201            RK    1800   0.034   0.017            TRAP      15       7
                *

1202            KK    R1B1
1203            KM   THIS X-SECTION WAS ASSUMED FOR THIS SHORT ROUTE TO PIMA CHANNEL
1204            KM     NORMAL DEPTH CHANNEL ROUTE FROM S1B1 TO C1B2 THROUGH PIMA CHANNEL
1205            KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
1206            RS       2    FLOW      -1
1207            RC   0.022   0.022   0.022     500  0.0256
1208            RX    1000    1012    1020    1028    1036    1044    1052    1064
1209            RY     107     104     102     100     100     102     104     107
                *

1210            KK    S1B2
1211            BA  0.0361
1212            LS              72      12
1213            UK     280   0.045   0.100     100
1214            RK    1700   0.033   0.017            TRAP      15       7
                *

1215            KK    C1B2
1216            KM   COMBINES R1B3, R1B1 AND S1B2
1217            HC       3
                *
                *  ---------------------------------------------------------------------------
                *  |///////////////////////////////////////////////////////////////////////////|
                *  |=============== BEGIN DEER VALLEY NORTH MODEL MODIFICATIONS ===============|
                *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
                *  |---------------------------------------------------------------------------|

1218            KK    D1B2
1219            KM   THROUGH A FIELD VISIT IT WAS DETERMINED THAT ALL THE FLOW CROSSES PIMA RD
1220            KM   BY THIS POINT, THEREFORE ALL FLOW WAS ROUTED ACROSS PIMA RD AT THIS POINT
1221            KM
1222            KM   MODIFIED: It was decided that no flow will pass through the wall of
1223            KM   MODIFIED: Los Gatos.  This diversion has been modified to have all flow
1224            KM   MODIFIED: continue south along Pima Rd.  This was done by changing the
1225            KM   MODIFIED: order of the cards.
1226            DT   DO1B2
1227            DI       0    5000
1228            DQ       0    5000
                *
1                                          HEC-1 INPUT                                          PAGE 33

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


1229            KK   DO1B3
1230            DR   DO1B3
                *

1231            KK  CD1A2G
1232            HC       2
                *

1233            KK   RD1B2
1234            KM   Moved route from the diversion recovery to this point in model
1235            RS       6    FLOW      -1
1236            RC   0.035   0.035   0.035    1900  0.0270
1237            RX      50     100   107.5     115     135   142.5     150     200
1238            RY     101     100    97.5      95      95    97.5     100     101
                *
                * KK  R1B2
                * KM THIS X-SECTION WAS ASSUMED FOR THIS SHORT ROUTE TO PIMA CHANNEL
                * KM   NORMAL DEPTH CHANNEL ROUTE FROM S1B1 TO C1B2 THROUGH PIMA CHANNEL
                * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
                * RS     1    FLOW      -1
                * RC 0.022   0.022   0.022     425  0.0280
                * RX  1000    1012    1020    1028    1036    1044    1052    1064
                * RY   107     104     102     100     100     102     104     107
                *
                * KKS51.1H
                * BA0.0031
                * LS          73.9      12
                * UK   300   0.037   0.130     100
```

```
* RK   300   0.038   0.045            TRAP       0      12
*
* KKC51.1H
* HC     2
*
* KKR51.1H
* KM   NORMAL DEPTH CHANNEL ROUTE FROM C51.1G TO C51.1F THROUGH PIMA CHANNEL
* KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
* RS     1    FLOW      -1
* RC 0.022   0.022   0.022     350   0.025
* RX  1000    1012    1020    1028    1036    1044    1052    1064
* RY   107     104     102     100     100     102     104     107
*
* KKS51.1G
* BA0.0112
* LS          73.9      12
* UK   300   0.037   0.130     100
* RK   900   0.034   0.045            TRAP      12      12
*
* KKC51.1G
* KM COMBINES R51.1H AND S51.1G
* HC     2
*
* KKR51.1G
* KM   NORMAL DEPTH CHANNEL ROUTE FROM C51.1G TO C51.1F THROUGH PIMA CHANNEL
* KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
* RS     2    FLOW      -1
* RC 0.022   0.022   0.022     490   0.017
* RX  1000    1012    1020    1028    1036    1044    1052    1064
* RY   107     104     102     100     100     102     104     107
*
* KKS51.1F
* BA0.0125
* LS          73.9      12
* UK   300   0.037   0.130     100
* RK  1400   0.035   0.045            TRAP       0      12
*
* KKC51.1F
* KM COMBINES R51.1G AND S51.1F
* HC     2
*
* KKD51.1F
* KM THIS DIVERSION IS UTILIZED TO SIMULATE FLOW FROM CP C51.1F
* KM BEING ROUTED TO THE DEER VALLEY DETENTION BASIN.
* DTD0511F
* DI  1000
* DQ     0
*
* KKR51.1F
* KM DEER VALLEY CHANNEL
* KM THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
* KM FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
* RS     2    FLOW      -1
* RC  0.03    0.03    0.03     640    0.01
* RX  1000    1016    1026    1030    1050    1054    1064    1080
* RY     6       2       2       0       0       2       2       6
*
*
*  |-----------------------------------------------------------------------------|
*  |/////////////////////////////////////////////////////////////////////////////|
*  |================ END DEER VALLEY NORTH MODEL MODIFICATIONS ================|
*  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
*  -----------------------------------------------------------------------------
*
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
*  *-*-*-*-*-*-*-*-*-* BEGIN DEER VALLEY CHANNEL IMPROVEMENTS *-*-*-*-*-*-*-*-*-
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
*
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1239          KK    D1B2
1240          KM   RECOVERS DIVERSION FROM C1B2
1241          KM   Diversion recovery moved due to combining of models
1242          DR   DO1B2
              *
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-
```

```
                  *   -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                  *

1243              KK    DB2_1
1244              DT   DOB2_1
1245              DI        0   10000
1246              DQ        0    3333
                  *
                  *

1247              KK    DB2_2
1248              DT   DOB2_2
1249              DI        0   10000
1250              DQ        0    5000
                  *
                  *

1251              KK    RB2_3
1252              KM      KINEMATIC WAVE ROUTE FROM C1B2 TO CR1B2 THROUGH STORMDRAIN PIPE
1253              RK     1300   0.014   0.013             CIRC      6.5
                  *
                  *
                  *

1254              KK    DB2_2
1255              DR   DOB2_2
                  *

1256              KK    RB2_2
1257              KM      KINEMATIC WAVE ROUTE FROM C1B2 TO CR1B2 THROUGH STORMDRAIN PIPE
1258              RK     1300   0.014   0.013             CIRC      6.5
                  *
                  *

1259              KK    DB2_1
1260              DR   DOB2_1
                  *
                  *

1261              KK    RB2_1
1262              KM      KINEMATIC WAVE ROUTE FROM C1B2 TO CR1B2 THROUGH STORMDRAIN PIPE
1263              RK     1300   0.014   0.013             CIRC      6.5
                  *
                  *
1                                            HEC-1 INPUT                                              PAGE 35

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


1264              KK    CR1B2
1265              KM    Combines RB2_1, RB2_2 and RB2_3
1266              HC        3
                  *
                  * KK  R1B2
                  * KM THIS X-SECTION WAS ASSUMED FOR THIS SHORT ROUTE TO PIMA CHANNEL
                  * KM   NORMAL DEPTH CHANNEL ROUTE FROM S1B1 TO C1B2 THROUGH PIMA CHANNEL
                  * KM THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
                  * KM
                  * KM Route moved to follow diversion recovery.  Modified length to 1250 feet
                  * RC 0.022    0.022   0.022     1500  0.0280
                  * RS      4    FLOW      -1
                  * RC 0.022    0.022   0.022     1250  0.0280
                  * RX  1000     1012    1020     1028    1036     1044     1052     1064
                  * RY   107      104     102      100     100      102      104      107
                  *
                  *   -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                  *  *-*-*-*-*-*-*-*-*-*-*-*-* END PIMA ROAD STORMDRAIN *-*-*-*-*-*-*-*-*-*-*-*-*-*-
                  *   -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
                  *
                  *

1267              KK  D51.1D
1268              KM   This is the split at Deer Valley and Pima Roads.
1269              KM   This split was determined based on the existing conditions.
1270              KM   It was assumed that all flow under existing conditions would continue
1271              KM   south along Pima RD.
1272              DT  DO511D
1273              DI        0   10000
1274              DQ        0       0
                  * DQ      0   10000
                  *
```

```
1275          KK  R51.1D
1276          KM   This routes flow from the proposed diversion structure at PIMA Rd
1277          KM   and Deer Valley to the Deer Valley Channel.
1278          KM   The route utilized under previous versions of the model was called R51.1F
1279          KM
1280          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1281          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1282          RS       2    FLOW      -1
1283          RC    0.03    0.03    0.03     640   0.007
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 30'
              * Channel Depth = 5'
1284          RX     100     105     110     120     150     160     165     170
1285          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX  1000    1016    1026    1030    1050    1054    1064    1080
              * RY     6       2       2       0       0       2       2       6
              *
              *
1                                          HEC-1 INPUT                                                    PAGE 36

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


1286          KK  SEEC13
1287          BA  0.0091
1288          LS              74    24.8
1289          UK      61  0.0213   0.100     100
1290          RK     700   0.027   0.045            TRAP       5      50
              *
              * This concentration point was removed due to new ordering of the model.
              * Flow from Pima Rd is no longer assumed to get to this portion of the
              * Deer Valley Channel.

1291          KK  CEEC13
1292          KM   re-added Combine for Deer Valley Split
1293          HC       2
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-*- END DEER VALLEY CHANNEL IMPROVEMENTS -*-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
              *

1294          KK  REEC13
1295          KM   DEER VALLEY CHANNEL
1296          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1297          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1298          RS       1    FLOW      -1
1299          RC    0.03    0.03    0.03     120   0.007
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 30'
              * Channel Depth = 5'
1300          RX     100     105     110     120     150     160     165     170
1301          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1302          KK  SEEC12
1303          BA  0.0013
1304          LS              74    24.8
1305          UK      61  0.0213   0.100     100
1306          RK     300   0.034   0.045            TRAP       5      15
              *

1307          KK  CEEC12
1308          HC       2
              *
1                                          HEC-1 INPUT                                                    PAGE 37

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


1309          KK  REEC12
1310          KM   DEER VALLEY CHANNEL
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1311          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1312          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1313          RS       1    FLOW      -1
1314          RC    0.03    0.03    0.03     160   0.007
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 30'
              * Channel Depth = 5'
1315          RX     100     105     110     120     150     160     165     170
1316          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1317          KK  SEEC11
1318          BA  0.0071
1319          LS              74    24.8
1320          UK      61  0.0213   0.100     100
1321          RK    1200   0.028   0.045            TRAP      10      50
              *

1322          KK  CEEC11
1323          HC       2
              *

1324          KK  REEC11
1325          KM   DEER VALLEY CHANNEL
1326          KM   THIS ROUTE WAS TAKEN FROM THE GRAHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1327          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1328          RS       1    FLOW      -1
1329          RC    0.03    0.03    0.03     110   0.007
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 30'
              * Channel Depth = 5'
1330          RX     100     105     110     120     150     160     165     170
1331          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1332          KK  SEEC10
1333          BA  0.0161
1334          LS              74    24.8
1335          UK      61  0.0213   0.100     100
1336          RK    1900   0.028   0.045            TRAP      10      15
              *
              *  ---------------------------------------------------------------------------
              *  |/////////////////////////////////////////////////////////////////////////|
              *  |=============== BEGIN DEER VALLEY NORTH MODEL MODIFICATIONS ===============|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  |-------------------------------------------------------------------------|
              * Removed Doversion recovery due to reordering of cards
              * KK DO1B2
              * KM RECOVERS DIVERSION FROM C1B2
              * DR DO1B2
              *
              * Moved route to follow
              * KK RD1B2
              * RS     6    FLOW      -1
              * RC 0.035   0.035   0.035    1900  0.0270
              * RX    50     100   107.5     115     135   142.5     150     200
              * RY   101     100    97.5      95      95    97.5     100     101
              *
              *  |-------------------------------------------------------------------------|
              *  |/////////////////////////////////////////////////////////////////////////|
              *  |================ END DEER VALLEY NORTH MODEL MODIFICATIONS ================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  ---------------------------------------------------------------------------
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1337          KK  CEEC10
1338          HC       3
              *
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1339          KK  REEC10
1340          KM   DEER VALLEY CHANNEL
1341          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1342          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1343          RS       1    FLOW      -1
1344          RC    0.03    0.03    0.03     150   0.007
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 30'
              * Channel Depth = 5'
1345          RX     100     105     110     120     150     160     165     170
1346          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1347          KK  SEEC09
1348          BA  0.0234
1349          LS              74    24.8
1350          UK      61  0.0213   0.100     100
1351          RK    2500   0.028   0.045            TRAP      10      15
              *

1352          KK   DO1B4
1353          KM   RECOVERS DIVERSION FROM C1B4
1354          DR   DO1B4
              *
              * KK RD1B4
              * RS     9    FLOW      -1
              * RC 0.035   0.035   0.035    2700  0.0276
              * RX    50     100   107.5     115     135   142.5     150     200
              * RY   101     100    97.5      95      95    97.5     100     101
              *

1355          KK  CEEC09
1356          HC       3
              *

1357          KK  REEC09
1358          KM   DEER VALLEY CHANNEL
1359          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1360          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1361          RS       1    FLOW      -1
1362          RC    0.03    0.03    0.03     350   0.007
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 30'
              * Channel Depth = 5'
```



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

1363          RX     100     105     110     120     150     160     165     170
1364          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1365          KK  SEEC08
1366          BA  0.0293
1367          LS              74    24.8
1368          UK      61  0.0213   0.100     100
1369          RK    3100   0.027  0.045            TRAP      10      15
              *

1370          KK  CEEC08
1371          HC       2
              *

1372          KK  REEC08
1373          KM   DEER VALLEY CHANNEL
1374          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1375          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1376          RS       1    FLOW      -1
1377          RC    0.03    0.03    0.03     310   0.007
              * *****Channel Assumptions***** *
```

```
                * Right Side Slope = 4:1
                * Left Side Slope = 4:1
                * Bottom Width = 30'
                * Channel Depth = 5'
1378            RX     100     105     110     120     150     160     165     170
1379            RY     100    98.8    97.5      95      95    97.5    98.8     100
                * RX     0      16      26      30      50      54      64      80
                * RY     6       2       2       0       0       2       2       6
                *
                *

1380            KK  SEEC07
1381            BA  0.0054
1382            LS              74    24.8
1383            UK      61  0.0213   0.100     100
1384            RK     500   0.028   0.045            TRAP       0     100
                *

1385            KK  CEEC07
1386            HC       2
                *

1387            KK  REEC07
1388            KM   DEER VALLEY CHANNEL
1389            KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1390            KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1391            RS       1    FLOW      -1
1392            RC    0.03    0.03    0.03     200   0.007
                * *****Channel Assumptions***** *
                * Right Side Slope = 4:1
                * Left Side Slope = 4:1
                * Bottom Width = 30'
                * Channel Depth = 5'
```



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

1393            RX     100     105     110     120     150     160     165     170
1394            RY     100    98.8    97.5      95      95    97.5    98.8     100
                * RX     0      16      26      30      50      54      64      80
                * RY     6       2       2       0       0       2       2       6
                *
                *

1395            KK  SEEC06
1396            BA  0.0024
1397            LS              74    24.8
1398            UK      61  0.0213   0.100     100
1399            RK     400   0.025   0.045            TRAP       0     100
                *

1400            KK  CEEC06
1401            HC       2
                *

1402            KK  REEC06
1403            KM   DEER VALLEY CHANNEL
1404            KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1405            KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1406            RS       1    FLOW      -1
1407            RC    0.03    0.03    0.03     390   0.007
                * *****Channel Assumptions***** *
                * Right Side Slope = 4:1
                * Left Side Slope = 4:1
                * Bottom Width = 30'
                * Channel Depth = 5'
1408            RX     100     105     110     120     150     160     165     170
1409            RY     100    98.8    97.5      95      95    97.5    98.8     100
                * RX     0      16      26      30      50      54      64      80
                * RY     6       2       2       0       0       2       2       6
                *
                *

1410            KK  SEEC05
1411            BA  0.0725
1412            LS              74    24.8
1413            UK      61  0.0213   0.100     100
1414            RK    4300   0.025   0.045            TRAP      20      15
                *

1415            KK  DO1A2D
```

```
1416          KM   RECOVERS FLOW FROM C1A2D
1417          DR  DO1A2D
              *
              * ***************************************************** *
              * ********** Begin Modifications July 16 2009 ********** *
              * ***************************************************** *
                                          HEC-1 INPUT                                                    PAGE 41

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


1418          KK  RD1A2D
1419          KM   This route was shortened to account for the addition of the diverted
1420          KM   flow from C1A2G.  The route is later continued as RD1A2G.
1421          RS       3    FLOW      -1
1422          RC   0.035   0.035   0.035    1040  0.0251
1423          RX      50     100   107.5     115     135   142.5     150     200
1424          RY     101     100    97.5      95      95    97.5     100     101
              *

1425          KK  DO1A2G
1426          KM   This recovers the diversion from Pima Rd. just north of the
1427          KM   north Los Gatos property edge.
1428          DR  DO1A2G
              *

1429          KK  CD1A2G
1430          KM   This combines RD1A2D and the recovered diversion DO1A2G
1431          HC       2
              *

1432          KK  RD1A2G
1433          KM   This route is the continuation of RD1A2D and carries the flow
1434          KM   to the Deer valley Channel
1435          RS      12    FLOW      -1
1436          RC   0.035   0.035   0.035    3610  0.0251
1437          RX      50     100   107.5     115     135   142.5     150     200
1438          RY     101     100    97.5      95      95    97.5     100     101
              * ***************************************************** *
              * *********** End Modifications July 16 2009 *********** *
              * ***************************************************** *
              *

1439          KK  CEEC05
1440          HC       3
              *
              *
              * KM ************************************************************************
              * KM * ENTELLUS COMMENT: EXISTING CONDITIONS OF AT DV CHANNEL AND GOLF
              * KM * ENTELLUS COMMENT: COURSE MODIFIED TO SHOW EXISTING CONDITIONS, EASTERN
              * KM * ENTELLUS COMMENT: CHANNEL EMPTIES THROUGH THE CULVERT INTO THE GOLF
              * KM * ENTELLUS COMMENT: COURSE AND THERE IS NO DIVERSION ALONG DEER VALLEY.
              * KM ************************************************************************
              *
1441          KM   Under the proposed conditions a rating curve was created based on the propose
1442          KM   diversion structures in the Deer Valley Channel  This curve is shown below

1443          KK    37AE
1444          DT    37AW
1445          DI       0      20      46      80     118     160     206     721    1308    1969
1446          DI    2704    3519    4413    5390
1447          DQ       0      10      23      40      59      80     103     353     639     961
1448          DQ    1320    1718    2155    2634
              *
              *
              * KK  37AE
              *  *ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS
              *  *
              * KM * THIS DIVERSION IS TAKEN FROM THE GRAYHAWK REPORT.  IT HAS BEEN
              * KM * ALTERED TO DIVERT OUT FLOW GOING SOUTH TO GRAYHAWK DETENTION
              *  *
              *  *ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS*ENTELLUS
              *
              * KM SPLIT FLOWS AT SOUTH BOUNDARY OF SUB 37A FOR ROUTING DETENTION
              * KM BASIN 53R & 38R-1.  THIS DIVERT OPERATION REFLECTS THE BREAK IN THE
              * KM DEER VALLEY ROAD CHANNEL BETWEEN HAYDEN & PIMA ROADS.  THIS SPLIT IS
              * KM BASED ON NEW CORE NORTH PLAN DEVELOPED BY G.W. LARSON & ASSOC., INC.
              * KM DATED 6/16/92. DIVERT RATIO IS BASED ON APPROOXIMATE D.A. FROM SUB 37A
              * KM THAT IS INTERCEPTED BY EACH CHANNEL SEGMENT ALONG DEER VALLEY ROAD.
              * KM
              * KM (THIS SPLIT HAS BEEN UPDATED FROM THE OLP.6 MODEL TO REFLECT A 30% SPLIT
```

```
                * KM TO THE SOUTH AND A 70% SPLIT TO THE WEST FOR THIS STUDY AND IS BASED ON
                * KM UPSTREAM CONTRIBUTING WATERSHED AREA TO THIS CONCENTRATION POINT)
                * DT  37AW
                * DI     0     100     500    1000    1500
                * * ORIGINAL DQ CARD: DQ     0      70     350     700    1050
                * * ORIGINAL DQ DIVERTED FLOW TO THE EAST.  NEW DQ DIVERTS FLOW TO THE SOUTH
                * DQ     0      30     150     300     450
                *
                *
1                                          HEC-1 INPUT                                                    PAGE 42

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


     1449       KK  REEC05
     1450       KM   DEER VALLEY CHANNEL
     1451       KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
     1452       KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
     1453       RS       1    FLOW      -1
     1454       RC    0.03    0.03    0.03     440   0.005
                * *****Channel Assumptions***** *
                * Right Side Slope = 4:1
                * Left Side Slope = 4:1
                * Bottom Width = 44'
                * Channel Depth = 5'
     1455       RX     100     105     110     120     164     174     179     184
     1456       RY     100    98.8    97.5      95      95    97.5    98.8     100
                * RX     0      16      26      30      50      54      64      80
                * RY     6       2       2       0       0       2       2       6
                *
                *

     1457       KK  SEEC04
     1458       BA  0.1265
     1459       LS              74    24.8
     1460       UK      61  0.0213   0.100     100
     1461       RK    5600   0.022   0.045            TRAP      10      15
                *

     1462       KK  DO1A2E
     1463       KM   RECOVERS FLOW CROSSING FLOW AT PARAISO DR.
     1464       DR  DO1A2E
                *

     1465       KK  RD1A2E
     1466       RS      18    FLOW      -1
     1467       RC   0.035   0.035   0.035    5500  0.0233
     1468       RX      50     100   107.5     115     135   142.5     150     200
     1469       RY     101     100    97.5      95      95    97.5     100     101
                *

     1470       KK  CEEC04
     1471       HC       3
                *

     1472       KK  REEC04
     1473       KM   DEER VALLEY CHANNEL
     1474       KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
     1475       KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
     1476       RS       1    FLOW      -1
     1477       RC    0.03    0.03    0.03     140   0.005
                * *****Channel Assumptions***** *
                * Right Side Slope = 4:1
                * Left Side Slope = 4:1
                * Bottom Width = 44'
                * Channel Depth = 5'
     1478       RX     100     105     110     120     164     174     179     184
     1479       RY     100    98.8    97.5      95      95    97.5    98.8     100
                * RX     0      16      26      30      50      54      64      80
                * RY     6       2       2       0       0       2       2       6
                *
                *
1                                          HEC-1 INPUT                                                    PAGE 43

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


     1480       KK  SEEC03
     1481       BA  0.0057
     1482       LS              74    24.8
     1483       UK      61  0.0213   0.100     100
```

```
1484          RK    1600   0.023   0.045            TRAP      10      50
              *

1485          KK  CEEC03
1486          HC       2
              *

1487          KK  REEC03
1488          KM   DEER VALLEY CHANNEL
1489          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1490          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1491          RS       1    FLOW      -1
1492          RC    0.03    0.03    0.03     320   0.005
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 44'
              * Channel Depth = 5'
1493          RX     100     105     110     120     164     174     179     184
1494          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1495          KK  SEEC02
1496          BA  0.0105
1497          LS              74    24.8
1498          UK      61  0.0213   0.100     100
1499          RK     700   0.022   0.045            TRAP      10      50
              *

1500          KK  CEEC02
1501          HC       2
              *

1502          KK  REEC02
1503          KM   DEER VALLEY CHANNEL
1504          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1505          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1506          RS       1    FLOW      -1
1507          RC    0.03    0.03    0.03     150   0.005
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 44'
              * Channel Depth = 5'
1508          RX     100     105     110     120     164     174     179     184
1509          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *
```



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

1510          KK  SEEC01
1511          BA  0.1869
1512          LS              74    24.8
1513          UK      61  0.0213   0.100     100
1514          RK    6600   0.022   0.045            TRAP      20      15
              *

1515          KK  DO1A2F
1516          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT C1A2F
1517          DR  DO1A2F
              *

1518          KK  RD1A2F
1519          RS      23    FLOW      -1
1520          RC   0.035   0.035   0.035    6900  0.0218
1521          RX      50     100   107.5     115     135   142.5     150     200
1522          RY     101     100    97.5      95      95    97.5     100     101
              *

1523          KK  CEEC01
1524          HC       3
              *
```

```
1525          KK  REEC01
1526          KM   DEER VALLEY CHANNEL
1527          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1528          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1529          RS       4    FLOW      -1
1530          RC    0.03    0.03    0.03    1260   0.005
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 44'
              * Channel Depth = 5'
1531          RX     100     105     110     120     164     174     179     184
1532          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1533          KK   S37A3
1534          BA  0.1211
1535          LS              74    24.8
1536          UK      61   .0213     .10     100
1537          RK    3400   0.024    .045            TRAP      10      50
              *

1538          KK   C37A3
1539          HC       2
              *
1                                   HEC-1 INPUT                                          PAGE 45

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


1540          KK   R37A3
1541          KM   DEER VALLEY CHANNEL
1542          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1543          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1544          RS       2    FLOW      -1
1545          RC    0.03    0.03    0.03     600   0.005
              * *****Channel Assumptions***** *
              * Right Side Slope = 4:1
              * Left Side Slope = 4:1
              * Bottom Width = 44'
              * Channel Depth = 5'
1546          RX     100     105     110     120     164     174     179     184
1547          RY     100    98.8    97.5      95      95    97.5    98.8     100
              * RX     0      16      26      30      50      54      64      80
              * RY     6       2       2       0       0       2       2       6
              *
              *

1548          KK   S37A2
1549          BA  0.0842
1550          LS              74    24.8
1551          UK      61   .0213     .10     100
1552          RK    6100   0.023    .045            TRAP      10      50
              *

1553          KK   C37A2
1554          HC       2
              *
              *

1555          KK  D37A2
1556          KM   This is stage-Storage-Discharge for the Deer Valley Detention Basin along
1557          KM   the grayhawk property. The elevation and area data are based on survey
1558          KM   conducted in April of 2009 by Entellus.  It is an online retention basin
1559          KM   and no outlet was found by survey.  If one exists it is at this time buried.
1560          KM   It was assumed that all flow enters the basin, and once the basin is
1561          KM   full flow will bypass the basin without additional storage occuring.
1562          KM   Storage volume was calculated utilizing the conic method.
1563          RS       1    STOR
1564          SV       0    0.04    0.23    0.37    1.33    2.12    3.02    4.04 4.04001
1565          SQ       0  0.0001  0.0002  0.0003  0.0004  0.0005  0.0006  0.0007   10000
1566          SE    1784    1785    1786    1787    1788    1789    1790    1791 1791.01
              *
              *

1567          KK   R37A2
1568          KM   DEER VALLEY CHANNEL
1569          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
```

```
1570          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1571          RS       2    FLOW      -1
1572          RC    0.03    0.03    0.03     650    0.01
1573          RX       0      16      26      30      50      54      64      80
1574          RY       6       2       2       0       0       2       2       6
              *
                                          HEC-1 INPUT                                                    PAGE 46

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


1575          KK   S37A1
1576          BA  0.3955
1577          LS              74    24.8
1578          UK      61   .0213     .10     100
1579          RK    9000   0.022    .045            TRAP      10      50
              *

1580          KK  DO361C
1581          DR  DO361C
              *

1582          KK  RD-R1C
1583          RS      26    FLOW      -1
1584          RC   0.035   0.035   0.035    9100  0.0212
1585          RX      50     100   107.5     115     135   142.5     150     200
1586          RY     101     100    97.5      95      95    97.5     100     101
              *

1587          KK  D036.1
1588          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT De La O RD
1589          DR  DO36.1
              *

1590          KK  RD36.1
1591          RS      30    FLOW      -1
1592          RC   0.035   0.035   0.035   10700  0.0226
1593          RX      50     100   107.5     115     135   142.5     150     200
1594          RY     101     100    97.5      95      95    97.5     100     101
              *
              *

1595          KK  DO34.1
1596          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT HAPPY VALLEY INTERSECTION
1597          DR  DO34.1
              *

1598          KK  RD34.1
1599          RS      37    FLOW      -1
1600          RC   0.035   0.035   0.035   13300  0.0218
1601          RX      50     100   107.5     115     135   142.5     150     200
1602          RY     101     100    97.5      95      95    97.5     100     101
              *

1603          KK   C37A1
1604          HC       5
              *
              *
              *  |-----------------------------------------------------------------------|
              *  |///////////////////////////////////////////////////////////////////////|
              *  |====================== END DEER VALLEY NORTH MODEL ======================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  -------------------------------------------------------------------------
              *
              *
              *
              *
              *  |-----------------------------------------------------------------------|
              *  |///////////////////////////////////////////////////////////////////////|
              *  |===================== BEGIN DEER VALLEY SOUTH MODEL ======================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  -------------------------------------------------------------------------
              *
              *
              *
              *
              *   *****  BEGIN DC RANCH WATERSHED WITHIN WARD'S MODEL  ******************
              *
              *       THE DC RANCH HEC-1 MODEL WAS DEVELOPED BY WOOD/PATEL ASSOCIATES
              *           WOOD/PATEL FILE NAME:  DC0721C.DAT
              *           MODEL DATE:            4 JANUARY 96
```

```
                    * ************************************************************************
1                                          HEC-1 INPUT                                          PAGE 47

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

1605                KK   52C13
1606                KM   RUNOFF FROM SUBBASIN 52C13
1607                BA    .023
1608                LS              75      31
1609                UK     100     .02     .10     100
1610                RK     950    .040    .045            TRAP      30      10
                    *

1611                KK  2C13DV
1612                KM   DIVERT FIRST 40 CFS INTO STORM DRAIN; REMAINDER FLOWS OVER ROAD
1613                DT   STORM
1614                DI       0      40    1000
1615                DQ       0      40      40
                    *

1616                KK  52C13R
1617                KM   ROUTE 52C13 THROUGH SUBBASIN 52C15 TO CP 52C15C1
1618                RK    1800    .035    .045            TRAP      10      10
                    *

1619                KK   52C15
1620                KM   RUNOFF FROM SUBBASIN 52C15
1621                BA    .046
1622                LS              75    64.4
1623                UK     100     .02     .10     100
1624                RK    2050    .036    .045            TRAP      30      10
                    *

1625                KK  52C14A
1626                KM   RUNOFF FROM SUBBASIN 52C14A
1627                BA    .041
1628                LS              75    67.7
1629                UK     100     .02     .10     100
1630                RK    2050    .031    .045            TRAP      30      10
                    *

1631                KK     SP1
1632                KM   COMBINE 52C14A, 52C15 AND 52C13R AT BEGINNING OF SIERRA PINTA CHANNEL
1633                HC       3
                    *
                    * ************************************************************************
                    *
                    *                                STOP DC RANCH MODEL
                    *
                    * ************************************************************************
                    *
                    *  ***************************************************************************
                    *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
                    *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
                    *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
                    *  ***************************************************************************
                    *
1                                          HEC-1 INPUT                                          PAGE 48

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

1634                KK   SP1EX     DIV
1635                KM   DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT SP1
1636                KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION TO REFLECT MAX CHANNEL
1637                KM   CAPACITY OF 1328CFS.
1638                KM   The point 100/99.99 was utilized to allow the kinematic wave routing
1639                KM   procedure to work during smaller storm events.
1640                DT   DVSP1
1641                DI       0     100     200     500    1328   10000
1642                DQ       0   99.99     200     500    1328    1328
                    *
                    * KM DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT SP1
                    * KM ENTELLUS ADDED THIS SPLIT FLOW DIVERSION TO REFLECT MAX CHANNEL
                    * KM CAPACITY OF 2200CFS.
                    * DI     0     100     200     500    2200   10000
                    * DQ     0     100     200     500    2200    2200
                    *
                    *  ***************************************************************************
                    *  **      END     *      END     *      END     *      END     *      END     *
```

```
*  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
*  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
*  ***************************************************************************
*

KK  RSP1EX
KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
KM   THROUGH PIMA ACRES, EAST OF 92ND
KM   Modified x-section 12/2008
RS       7    FLOW      -1
RC   0.055    0.04   0.055    2310   .0264
RX       0       5      10   12.25    12.5      15      19    23.5
RY       4       2       1      .5      .5       1       2       4
* RY     3       2       1      .5      .5       1       2       3
*
*
* ***************************************************************************
*                                RETURN TO WARD'S MODEL
*                       BEGIN REATA PASS WATERSHED MODEL ABOVE APEX
*
* ***************************************************************************
*
*

KK      39     SUB
KM        RUNOFF FROM SUB-BASIN 39
BA  1.8807
LS            87.7
UK     330   .0433     .20     100
RK   11240   .0253    .045            TRAP      30       3
```



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

KK      40     SUB
KM        RUNOFF FROM SUB-BASIN 40
BA   .5844
LS             86
UK     160   .0627     .20     100
RK    7000   .0350    .045            TRAP      20       3

KK     C40
KM        COMBINE HYDROGRAPHS SUB 39 & SUB 40
HC       2

KK     R41
KM        ROUTE C40 TO D.S. END OF SUB 41
RS      26    FLOW      -1
RC    .055    .040    .055    9400   .0282
RX       0       1     101     107     157     163     263     264
RY      10       8       3       0       0       3       8      10

KK      41     SUB
KM        RUNOFF FROM SUB-BASIN 41
BA   .8270
LS            77.8
UK     280   .2386     .20     100
RK    9400   .0282    .045            TRAP      50       3

KK     C41
KM        COMBINE HYDROGRAPHS R41 & SUB 41
HC       2

KK      42     SUB
KM        RUNOFF FROM SUB-BASIN 42
BA   .5844
LS            81.1
UK     280   .2386     .20     100
RK    8750   .0573    .045            TRAP      20       3

KK      43     SUB
KM        RUNOFF FROM SUB-BASIN 43
BA  1.0665
LS            87.7
UK     260   .0515     .20     100
RK    7400   .0255    .045            TRAP      25       3

KK      44     SUB
KM        RUNOFF FROM SUB-BASIN 44
BA   .8389
```

```
1696          LS            87.7
1697          UK     260   .0515     .20     100
1698          RK    9840   .0622    .045            TRAP      25       3
1                                          HEC-1 INPUT                                                          PAGE 50

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


1699          KK     C44
1700          KM        COMBINE HYDROGRAPHS SUB 43 & SUB 44
1701          HC       2

1702          KK     R45
1703          KM        ROUTE C44 TO D.S. END OF SUB 45
1704          RS      10    FLOW      -1
1705          RC    .055    .040    .055    3600   .0366
1706          RX       0       1     101     107     137     143     243     244
1707          RY      10       8       3       0       0       3       8      10

1708          KK      45     SUB
1709          KM        RUNOFF FROM SUB-BASIN 45
1710          BA   .2037
1711          LS             84
1712          UK     125   .1166     .20     100
1713          RK    3600   .0366    .045            TRAP      30       3

1714          KK     C45
1715          KM        COMBINE HYDROGRAPHS R45 & SUB 45
1716          HC       2

1717          KK     45A     SUB
1718          KM        RUNOFF FROM SUB-BASIN 45A
1719          BA   .1720
1720          LS            88.5
1721          UK     275   .2200     .20     100
1722          RK    5400   .0411    .045            TRAP      15       3

1723          KK      46     SUB
1724          KM        RUNOFF FROM SUB-BASIN 46
1725          BA   .9268
1726          LS            88.5
1727          UK     265   .4958     .20     100
1728          RK    3300   .2271    .045    .111    TRAP      10       3
1729          RK    7100   .0535    .045            TRAP      25       3

1730          KK     C46
1731          KM        COMBINE HYDROGRAPHS C45, SUB 45A, & SUB 46
1732          HC       3

1733          KK     R47
1734          KM        ROUTE C46 TO D.S. END OF SUB 47
1735          RS      21    FLOW      -1
1736          RC    .055    .040    .055    7600   .0268
1737          RX       0       1     101     109     159     167     267     268
1738          RY      10       9       4       0       0       4       9      10

1739          KK      47     SUB
1740          KM        RUNOFF FROM SUB-BASIN 47
1741          BA   .3757
1742          LS            80.2
1743          UK     375   .1000     .20     100
1744          RK    9300   .0357    .045            TRAP      50       3
1                                          HEC-1 INPUT                                                          PAGE 51

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


1745          KK   C47.1
1746          KM        COMBINE HYDROGRAPHS SUB 47 & R47
1747          HC       2

1748          KK   C47.2
1749          KM        COMBINE HYDROGRAPHS C47.1, C41 & SUB 42
1750          HC       3

1751          KK     R50
1752          KM        ROUTE C47.2 TO D.S. END OF SUB 50 (BEGINNING OF REATA DESERT
1753          KM        GREENBELT CHANNEL)
1754          RS       3    FLOW      -1
1755          RC    .055    .040    .055    1000   .0200
1756          RX       0      35     135     150     225     240     340     375
```

```
1757          RY      10       3       3       0       0       3       3      10

1758          KK      50     SUB
1759          KM        RUNOFF FROM SUB-BASIN 50
1760          BA   .4052
1761          LS             86
1762          UK     300   .3555     .20     100
1763          RK     730   .1506    .045    .036    TRAP      10       3
1764          RK    6400   .0453    .045            TRAP      25       3

1765          KK     C50
1766          KM        COMBINE HYDROGRAPHS OF SUB 50 AND R50
1767          KM        THIS IS THE TOTAL DISCHARGE TO THE REATA PASS ALLUVIAL FAN APEX
1768          HC       2
              *
              * ***************************************************************************
              *
              *                      END REATA PASS WATERSHED MODEL ABOVE APEX
              *                   BEGIN ENTELLUS MODIFICATIONS TO ROUTE APEX FLOW
              *
              * ***************************************************************************
              *

1769          KK  APEXSW     DIV
1770          KM   50-50 FLOW SPLIT AT REATA PASS APEX
1771          DT  APEXSO
1772          DI       0   10000
1773          DQ       0    5000
              *

1774          KK  R51.2A
1775          KM   ROUTE HYDROGRAPH FROM THE REATA PASS WASH FAN APEX THROUGH SUB S51.1A
1776          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING THE ORIGINAL ROUTE 51.2
1777          RS       4    FLOW      -1
1778          RC   0.055    0.04   0.055    1524   .0338
1779          RX       0       1     101     107     137     143     243     244
1780          RY      10       8       3       0       0       3       8      10
              *
              *
```



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

1781          KK  S51.1A
1782          KM   RUNOFF FROM SUBBASIN 51.1A
1783          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
1784          KM   ENTELLUS CHANGED THE RUNOFF CURVE TO 75
1785          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1786          BA   .0690
1787          LS             75      27
1788          UK     300   0.037   0.130     100
1789          RK    1800   0.038   0.045  0.0161    TRAP       0      12
1790          RK    3037   0.032   0.040            TRAP      40      15
              *
              *
              *

1791          KK  C51.1A      CP
1792          KM   COMBINE SUB S51.1A and R51.2A
1793          HC       2
              *
              *

1794          KK  SPT1SO     DIV
1795          KM   DIVERSION OF SPLIT FLOW FROM C51.1A TO C51B9
1796          KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1797          DT  SPT1SW
1798          DI       0   10000
1799          DQ       0    2900
              *

1800          KK   R51B9
1801          KM   ROUTE SPLIT FROM C51.1A TO C51B9
1802          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
1803          RK     975   .0300    .045            TRAP      50      25
              *
              *

1804          KK    51B9     SUB
1805          KM   RUNOFF FROM SUB 51B9
```

```
1806          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1807          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1808          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1809          BA   .0237
1810          LS             75      27
1811          UK     100   .0213     .10     100
1812          RK     975   .0300    .045            TRAP      50      25
              *
              *
              *

1813          KK   C51B9
1814          KM   COMBINE BASIN 51B9 AND R51B9
1815          HC       2
              *
1                                   HEC-1 INPUT                                                    PAGE 53

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


1816          KK  SPT2SO     DIV
1817          KM   DIVERSION OF SPLIT FLOW FROM C51B9 TO C51B2
1818          KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1819          DT  SPT2SW
1820          DI       0   10000
1821          DQ       0    3200
              *

1822          KK   R51B2
1823          KM   ROUTE SPLIT FROM C51B9 TO C51B2
1824          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
1825          RK    3261   .0300    .045            TRAP      50      25
              *

1826          KK    51B2     SUB
1827          KM   RUNOFF FROM SUB 51B2
1828          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1829          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1830          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1831          BA   .0623
1832          LS             75      27
1833          UK     100   .0213     .10     100
1834          RK    3261   .0300    .045            TRAP      50      25
              *
              *

1835          KK   C51B2
1836          KM   COMBINE 51B2R AND 52C8
1837          HC       2
              *
              * ************************************************************************
              *
              *                   RETURN TO WOOD PATELS DC RANCH MODEL
              *                   WITH ENTELLUS MODIFICATIONS
              * ************************************************************************
              *
              *

1838          KK   51B2R
1839          KM   ROUTE C51B2 THROUGH SUBBASIN 52C8 TO CP 52C8C
1840          RK     750    .034    .045            TRAP      10      10
              *

1841          KK    52C8
1842          KM   RUNOFF FROM SUBBASIN 52C8
1843          BA    .008
1844          LS             75      27
1845          UK     100     .02     .10     100
1846          RK     750    .034    .045            TRAP      30      10
              *
1                                   HEC-1 INPUT                                                    PAGE 54

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


1847          KK   52C8C
1848          KM   COMBINE 51B2R AND 52C8
1849          HC       2
              *

1850          KK   52C8R
```

```
1851          KM   ROUTE 52C8C THROUGH SUBBASIN 52C9 TO CP 52C9C1
1852          RK    1100    .036    .045            TRAP      10       10
              *

1853          KK    51C3     SUB
1854          KM   RUNOFF FROM SUB 51C3
1855          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51C
1856          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1857          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1858          BA   .0151
1859          LS              75      27
1860          UK     100   .0213     .10     100
1861          RK    1962   .0375    .045            TRAP      30       10
              *

1862          KK   51C3R
1863          KM   ROUTE 51C3 THROUGH SUBBASIN 52C7 TO CP 52C7C
1864          RK     700    .040    .045            TRAP      10       10
              *

1865          KK    51B1     SUB
1866          KM   RUNOFF FROM SUB 51B1
1867          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1868          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1869          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1870          BA   .0148
1871          LS              75      27
1872          UK     100   .0213     .10     100
1873          RK    1211   .0300    .045            TRAP      50       25
              *
              *

1874          KK   51B1R
1875          KM    ROUTE 51B1D THROUGH SUBBASIN 52C7 TO CP 52C7C
1876          RK     450     .04    .045            TRAP      10       10
              *

1877          KK    52C7
1878          KM   RUNOFF FROM SUBBASIN 52C7
1879          BA    .006
1880          LS              75      27
1881          UK     100     .02     .10     100
1882          RK     550     .04    .045            TRAP      30       10
              *
```



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

1883          KK   52C7C
1884          KM   COMBINE 51B1R, 51C3R, AND 52C7
1885          HC       3
              *

1886          KK   52C7R
1887          KM   ROUTE 52C7C THROUGH SUBBASIN 52C9 TO CP 52C9C1
1888          RK    1550    .036    .045            TRAP      10       10
              *

1889          KK  52C9C1
1890          KM   COMBINE 52C7R AND 52C8R
1891          HC       2
              *

1892          KK  52C9R1
1893          KM   ROUTE 52C9C1 THROUGH SUBBASIN 52C9 TO CP 52C9C2
1894          RK    1050    .036    .045            TRAP      10       10
              *

1895          KK    52C9
1896          KM   RUNOFF FROM SUBBASIN 52C9
1897          BA    .069
1898          LS              75   31.85
1899          UK     100     .02     .10     100
1900          RK    3150    .036    .045            TRAP      30       10
              *

1901          KK  52C9C2
1902          KM   COMBINE 52C9R1 AND 52C9
1903          HC       2
              *
```

```
1904          KK  52C9R2
1905          KM   ROUTE 52C9C2 THROUGH SUBBASIN 52C10 TO CP 52C10C1
1906          RK     500    .032    .045            TRAP      10      10
              *
              *

1907          KK    51C2     SUB
1908          KM   RUNOFF FROM SUB 51C2
1909          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51C
1910          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1911          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1912          BA   .0423
1913          LS              75      27
1914          UK     100   .0213     .10     100
1915          RK    3309   .0375    .045            TRAP      30      10
              *
              *
1                                   HEC-1 INPUT                                          PAGE 56

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


1916          KK   51C2R
1917          KM   ROUTE 51C2D THROUGH SUBBASIN 52C5 TO CP 52C5C
1918          RK     700    .030    .045            TRAP      10      10
              *

1919          KK    52C5
1920          KM   RUNOFF FROM SUBBASIN 52C5
1921          BA    .016
1922          LS              75      27
1923          UK     100     .02     .10     100
1924          RK    1200     .03    .045            TRAP      30      10
              *

1925          KK   52C5C
1926          KM   COMBINE 51C2R AND 52C5
1927          HC       2
              *

1928          KK   52C5R
1929          KM   ROUTE 52C5C THROUGH SUBBASIN 52C6 TO CP 52C6C
1930          RK    3100    .035    .045            TRAP      10      10
              *

1931          KK    52C6
1932          KM   RUNOFF FROM SUBBASIN 52C6
1933          BA    .036
1934          LS              75    31.4
1935          UK     100     .02     .10     100
1936          RK    3100    .035    .045            TRAP      30      10
              *

1937          KK   52C6C
1938          KM   COMBINE 52C5R AND 52C6
1939          HC       2
              *

1940          KK   52C6R
1941          KM   ROUTE 52C6C THROUGH SUBBASIN 52C10 TO CP 52C10C2
1942          RK     450    .032    .045            TRAP      10      10
              *
              *

1943          KK  2C10C1
1944          KM   COMBINE 52C9R2 AND 52C6R
1945          HC       2
              *

1946          KK  2C10R1
1947          KM   ROUTE 52C10C1 THROUGH SUBBASIN 52C10 TO CP 52C10C2
1948          RK     300    .032    .045            TRAP      10      10
              *
1                                   HEC-1 INPUT                                          PAGE 57

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


1949          KK   52C10
1950          KM   RUNOFF FROM SUBBASIN 52C10
```

```
1951          BA    .014
1952          LS              75    7.85
1953          UK     100     .02     .10     100
1954          RK     800    .032    .045            TRAP      30      10
              *

1955          KK  2C10C2
1956          KM   COMBINE 52C10R1 AND 52C10
1957          HC       2
              *

1958          KK   52C11
1959          KM   RUNOFF FROM SUBBASIN 52C11
1960          BA   .0425
1961          LS              75      27
1962          UK     100     .02     .10     100
1963          RK    2800    .031    .045            TRAP      30      10
              *

1964          KK  2C11R1
1965          KM   PIPE ROUTE 52C11 TO CP 52C11C
1966          RK     650     .02    .045            CIRC       3
              *

1967          KK  52C13D
1968          KM   RETRIEVE DIVERTED FLOW
1969          DR   STORM
              *

1970          KK  52C11C
1971          KM   COMBINE 52C13D AND 52C11R1
1972          HC       2
              *

1973          KK  2C11CR
1974          KM   PIPE ROUTE 52C11C TO CP 52C11C2
1975          RK     750     .02    .045            CIRC       3
              *

1976          KK  2C11C2
1977          KM   COMBINE 52C11CR AND 52C10C2
1978          HC       2
              *

1979          KK  2C11R2
1980          KM   ROUTE 52C11C2 THROUGH SUBBASIN 52C12 TO CP 52C12C
1981          RK     700     .03    .045            TRAP      10      10
              *
1                                        HEC-1 INPUT                                                    PAGE 58

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

1982          KK   52C12
1983          KM   RUNOFF FROM SUBBASIN 52C12
1984          BA    .023
1985          LS              75      85
1986          UK     100     .02     .10     100
1987          RK     900     .03    .045            TRAP      30      10
              *

1988          KK  52C12C
1989          KM   COMBINE 52C11R2 AND 52C12
1990          HC       2
              *

1991          KK  52C12R
1992          KM   ROUTE 52C12C THROUGH SUBBASIN 52C14 TO CP 52C14C1
1993          RK    1150    .029    .045            TRAP      10      10
              *

1994          KK  52C14B
1995          KM   RUNOFF FROM SUBBASIN 52C14B
1996          BA    .021
1997          LS              75      60
1998          UK     100     .02     .10     100
1999          RK    1250    .029    .045            TRAP      30      10
              *

2000          KK   DVSP1
2001          KM   RETRIEVE DIVERTED FLOW FROM SIERRA PINTA CHANNEL
```

```
2002          DR   DVSP1
              *

2003          KK  RDVSP1
2004          KM    ROUTE FLOW FROM SP1 TO SP2 VIA SIERRA PINTA CHANNEL
2005          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED MY WARD
2006          RK     624   .0143    .035            TRAP      50       4
              *

2007          KK     SP2
2008          KM   COMBINE 52C14B AND 52C12R
2009          HC       3
              *
              *  ******************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *

2010          KK    DSP2     DIV
2011          KM   DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT 52C14BC1
2012          KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
2013          KM   The point 100/99.99 was utilized to allow the kinematic wave routing
2014          KM   procedure to work during smaller storm events.
2015          DT   DVSP2
1                                   HEC-1 INPUT                                          PAGE 59

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

2016          DI       0     100     200     500    1328   10000
2017          DQ       0   99.99     200     500    1328    1328
              *
              * KM DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT 52C14BC1
              * KM ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
              * DI     0     100     200     500    2200   10000
              * DQ     0     100     200     500    2200    2200
              *
              *  ******************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *
              *
              * ***************************************************************************
              *
              *                                STOP DC RANCH MODEL
              *
              * ***************************************************************************
              *

2018          KK  RSP2EX
2019          KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
2020          KM   THROUGH PIMA ACRES EAST OF 92ND
2021          KM   Modified X-section 12/2008
2022          RS       6    FLOW      -1
2023          RC   0.055    0.04   0.055    2028   .0256
2024          RX       0      15      20      30      35      45      50      60
2025          RY     6.5       2       1      .5      .5       1       2     6.5
              * RX     0       5      10      18      22      32      36      42
              * RY   2.5       2       1      .5      .5       1       2     2.5
              *
              *
              * ***************************************************************************
              * Deer Valley Detention Basin Removed by HDR 12/00 (Same as Ward's Model)
              * ***************************************************************************
              * KKDVDB-O
              * KM   DETENTION BASIN AT DEER VALLEY ROAD
              * KM   PRINCIPAL SPILLWAY:  54" CONDUIT THAT TIES INTO THE PIMA ROAD STORM DRAIN
              * KM      STAGE-DISCHARGE RATING CURVE REFLECTS NO CLOGGING OF THE TRASHRACK
              * KM      2 ACRE-FEET OF STORAGE FOR SEDIMENTAION
              * KM
              * RS     1    STOR      -1
              * SV     0    0.54    0.96    1.18    1.68    2.09    3.72     6.3     9.8   14.
              * SV 19.23   24.78   30.93   34.23   37.69    41.3   45.08   49.03   57.33   61.
              * SQ     0       3      15      28      51      81     143     183     204     2
              * SQ   224     232     240     243     246     248     251     253     256     2
              * SE  1855    1856    1857    1858    1859    1860    1862    1864    1866    18
              * SE  1870    1872    1874    1875    1876    1877    1878    1879    1880    18
              *
```

```
*  R51.1
*    DEER VALLEY BASIN OUTLET CONDUIT TO THOMPSON PEAK PARKWAY
*    NO ROUTING THROUGH CONDUIT.
*       L = 2820 feet
*
*
* ************************************************************************
*
*                RETURN TO WOOD PATEL DC RANCH MODEL
*                    WITH ENTELLUS MODIFICATIONS
* ************************************************************************
*
1                                HEC-1 INPUT                                                    PAGE 60

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

2026          KK    51B3     SUB
2027          KM   RUNOFF FROM SUB 51B3
2028          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2029          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2030          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2031          BA   .0242
2032          LS              75      27
2033          UK     100   .0213     .10     100
2034          RK    3003   .0300    .045            TRAP      50      25
              *
              *

2035          KK   51B3R
2036          KM   ROUTE 51B3D THROUGH SUBBASIN 52B1 TO CP 52B1C
2037          RK     600    .039    .045            TRAP      10      10
              *

2038          KK    52B1
2039          KM   RUNOFF FROM SUBBASIN 52B1
2040          BA    .003
2041          LS              75      27
2042          UK     100     .02     .10     100
2043          RK     600    .039    .045            TRAP      30      10
              *

2044          KK   52B1C
2045          KM   COMBINE 51B3R AND 52B1
2046          HC       2
              *

2047          KK   52B1R
2048          KM   ROUTE 52B1C THROUGH SUBBASIN 52B2 TO CP 52B2C1
2049          RK     930    .037    .045            TRAP      10      10
              *
              *
              * ************************************************************************
              *
              *                              STOP DC RANCH MODEL
              *
              * ************************************************************************

2050          KK  SPT2SW
2051          KM   RETRIEVE DIVERTED SPLIT FLOW FROM C51B9
2052          DR  SPT2SW
              *

2053          KK  R51B10
2054          KM   ROUTE SPLIT FROM C51B9 TO C51B10
2055          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
2056          RK    1587   .0300    .045            TRAP      50      25
              *
              *
1                                HEC-1 INPUT                                                    PAGE 61

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

2057          KK   51B10     SUB
2058          KM   RUNOFF FROM SUB 51B10
2059          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2060          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2061          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2062          BA   .0238
2063          LS              75      27
```

```
2064          UK     100   .0213     .10     100
2065          RK    1587   .0300    .045            TRAP      50      25
              *
              *

2066          KK  C51B10
2067          KM   COMBINE BASIN 51B10 AND R51B10
2068          HC       2
              *
              *

2069          KK  SPT3SO     DIV
2070          KM   SPLIT FLOW AT C51B10
2071          KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERISON
2072          DT  SPT3SW
2073          DI       0   10000
2074          DQ       0    4000
              *
              *

2075          KK   R51B4
2076          KM   ROUTE SPLIT FROM C51B10 TO C51B4
2077          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
2078          RK    2053   .0300    .045            TRAP      50      25
              *
              *

2079          KK   51B4     SUB
2080          KM   RUNOFF FROM SUB 51B4
2081          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2082          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2083          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2084          BA   .0243
2085          LS             75      27
2086          UK     100   .0213     .10     100
2087          RK    2053   .0300    .045            TRAP      50      25
              *
              *

2088          KK   C51B4
2089          KM   COMBINE BASIN 51B4 AND R51B4
2090          HC       2
              *
              * ***********************************************************************
              *
              *                 RETURN TO WOOD PATEL DC RANCH MODEL
              *                      WITH ENTELLUS MODIFICATIONS
              * ***********************************************************************
              *
1                                   HEC-1 INPUT                                          PAGE 62

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


2091          KK  51B4R1
2092          KM   ROUTE C51B4 THROUGH SUBBASIN 52B2 TO CP 52B2C1
2093          RK    1350    .037    .045            TRAP      10      10
              *

2094          KK  52B2C1
2095          KM   COMBINE 51B4R1 AND 52B1R
2096          HC       2
              *

2097          KK  52B2R1
2098          KM   ROUTE 52B2R1 THROUGH SUBBASIN 52B2 TO CP 52B2C2
2099          RK    1000    .037    .045            TRAP      10      10
              *

2100          KK    52B2
2101          KM   RUNOFF FROM SUBBASIN 52B2
2102          BA    .032
2103          LS             75      17
2104          UK     100     .02     .10     100
2105          RK    2350    .037    .045            TRAP      30      10
              *

2106          KK  52B2C2
2107          KM   COMBINE 52B2 AND 52B2R1
2108          HC       2
              *
```

```
2109          KK  52B2R2
2110          KM   ROUTE 52B2C2 THROUGH SUBBASIN 52B3 TO CP 52B3C2
2111          RK     850    .026    .045            TRAP      10      10
              *

2112          KK  52B3R1
2113          KM   ROUTE 52B3C1 THROUGH SUBBASIN 52B3 TO CP 52B3C2
2114          RK     500    .024    .045            TRAP      10      10
              *

2115          KK    52B3
2116          KM   RUNOFF FROM SUBBASIN 52B3
2117          BA    .062
2118          LS              75    31.8
2119          UK     100     .02     .10     100
2120          RK    3450    .030    .045            TRAP      30      10
              *

2121          KK  52B3C2
2122          KM   COMBINE 52B3 AND 52B3R1
2123          HC       2
              *
1                                   HEC-1 INPUT                                                    PAGE 63

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


2124          KK  52B3R2
2125          KM   ROUTE 52B3C2 THROUGH 52B4 TO CP 52B4C
2126          RK    1700    .024    .045            TRAP      10      10
              *

2127          KK    52B4
2128          KM   RUNOFF FROM SUBBASIN 52B4
2129          BA    .026
2130          LS              75      62
2131          UK     100     .02     .10     100
2132          RK    1700    .024    .045            TRAP      30      10
              *

2133          KK   52B4C
2134          KM   COMBINE 52B4 AND 52B3R2
2135          HC       2
              *

2136          KK   52B4R
2137          KM   ROUTE 52B4C THROUGH SUBBASIN 52B5 TO CP SP3
2138          RK     550    .027    .045            TRAP      10      10
              *

2139          KK    52B5
2140          KM   RUNOFF FROM SUBBASIN 52B5
2141          BA    .021
2142          LS              75    56.9
2143          UK     100     .02     .10     100
2144          RK    1400     .03    .045            TRAP      30      10
              *
              *

2145          KK   DVSP2
2146          KM   RETRIEVE DIVERTED FLOW FROM SIERRA PINTA CHANNEL
2147          DR   DVSP2
              *

2148          KK  RDVSP2
2149          KM    ROUTE FLOW FROM SP2 TO SP3 VIA SIERRA PINTA CHANNEL
2150          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED BY WARD
2151          RK     597   .0143    .035            TRAP      50       4
              *

2152          KK     SP3
2153          KM   COMBINE 52B5 AND 52B4R AND RDVSP2
2154          HC       3
              *
              *  ******************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2155          KK    DSP3     DIV
2156          KM   DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT SP3
2157          KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
2158          KM   The point 100/99.99 was utilized to allow the kinematic wave routing
2159          KM   procedure to work during smaller storm events.
2160          DT   DVSP3
2161          DI       0     100     200     500    1328   10000
2162          DQ       0   99.99     200     500    1328    1328
              *
              * KM DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT SP3
              * KM ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
              * DI     0     100     200     500    2200   10000
              * DQ     0     100     200     500    2200    2200
              *
              *  ******************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *
              *
              * ***************************************************************************
              *
              *                                STOP DC RANCH MODEL
              *
              * ***************************************************************************
              *

2163          KK  RSP3EX
2164          KM   ROUTE SP3 THROUGH S53A1 INTO C53A1
2165          KM   ENTELLUS CREATED THIS ROUTE
2166          RK    1773   .0237    0.04            TRAP      37      30
              *
              *

2167          KK   CSPEX
2168          KM   COMBINE RSPEX1, RSPEX2 AND RSPEX3
2169          HC       3
              *
              *

2170          KK   R53A1
2171          KM   ROUTE SP3 THROUGH S53A1 INTO C53A1
2172          KM   ENTELLUS CREATED THIS ROUTE
2173          RK     969   .0217    0.04            TRAP      37      30
              *
              *

2174          KK   S53A1
2175          KM   RUNOFF FROM SUB S53A1
2176          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2177          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2178          KM   ENTELLLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2179          KM   ENTELLLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
```



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

2180          KM   ENTELLLUS REMOVED THE FIRST OVERLAND FLOW CATACHMENT,
2181          KM   (IT REPRESENTED IRONWOOD VILLAGE WHICH IS NOT A PART OF THIS BASIN)
2182          BA   .1845
2183          LS              77      27
2184          UK     300   0.022    0.13     100
2185          RK    1250   0.023   0.045  0.0087    TRAP       4       5
2186          RK    2742   .0170    0.04            TRAP      37      30
              *
              *

2187          KK   C53A1
2188          KM   COMBINE S53A1 AND RSPEX
2189          HC       2
              *
              *

2190          KK  RPIMA2
2191          KM   ROUTE C53A1 THROUGH S53A3 INTO CPIMA2
```

```
KM   ROUTE FROM PROJECT STRUCTURE #1 TO PROPOSED PIMA RD DRAINAGE CHANNEL
KM   THE ROUTE GEOMETRY WAS FOUND USING MAPPING AND AERIALS FROM THE
KM   CITY OF SCOTTSDALE.
RK    1831    .018    0.04            TRAP      57       4
*
*

KK   S53A3
KM   RUNOFF FROM SUBBASIN S53A3
KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
KM   ENTELLLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
KM   ENTELLLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT,
KM   (IT REPRESENTED PIMA ACRES WHICH IS NOT A PART OF THIS BASIN)
BA   .0720
LS              77      30
UK     150   0.027    0.13     100
RK    1250   0.023   0.045  0.0087    TRAP       4       5
RK    1831    .018    0.04            TRAP      57       4
*
*  **************************
*  PROJECT STRUCTURE #2
*
*  **************************
*

KK  CPIMA2      CP
KM   COMBINE SUB S53A3 AND RPIMA2 (EXISTING BRIDGE ADJACENT TO IRONWOOD VILLAGE)
HC       2
*
*

KK   RUH2B
KM   ROUTE CPIMA2 TO CUH2
KM   ENTELLUS CREATED THIS ROUTE
KM   Modified x-section 12/2008
RS       4    FLOW      -1
RC   0.055    0.04   0.055    1453   .0096
```



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

RX       0      14      21      32      80      94     100     107
RY       7       3       2       1       1       3       4       7
* RY     5       3       2       1       1       3       4       5
*
*

KK   S53A6
KM   RUNOFF FROM SUBBASIN S53A6, ORIGINAL BASIN S53A1
KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
KM   ENTELLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
KM   ENTELLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT
KM   (IT REPRSENTED PIMA ACRES WHICH IS NOT PART OF THIS BASIN)
BA   .0261
LS              77      30
UK     150   0.027    0.13     100
RK     669   .0179    0.04            TRAP      10    5.25
*

KK   RUH2C
KM   ROUTE S53A6 TO CUH2
KM   EAST SEGMENT OF PROPOSED UNION HILLS INTERCEPTOR CHANNEL BETWEEN PIMA RD
KM   ALIGNMENT AND PROPOSED PIMA RD DRAINAGE CHANNEL
RS       3    FLOW      -1
RC    .055     .04    .055     993    .088
RX       0      10      22      32      33      34      35      36
RY     2.5       0       0     2.5     2.5     2.5     2.5     2.5
*
*
*
*
* ***************************************************************************
* ********** NOVEMBER 2008 *** NOVEMBER 2008 **********************************
* ***************************************************************************
* *** CORRECTED roughness coefficient to be 0.13, from of 0.013 ***************
* ***************************************************************************

KK   S53A5
KM   RUNOFF FROM SUBBASIN S53A5, ORIGINAL BASIN S53A1
KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
```

```
2240          KM   ENTELLUS MODIFIED THE CATCHMENT PARAMETERS
2241          KM   ENTELLUS NOV 2008: CORRECTED N VALUE TO BE 0.13, NOT 0.013
2242          BA   .0222
2243          LS              77      27
2244          UK     100   0.027     .13     100
2245          RK     993   0.017    0.04            TRAP      35       5
              *
              *
              *  **************************
              *  UNION HILLS INTERCEPTOR CHANNEL
              *          SEGMENT 1
              *  **************************
              *
1                                          HEC-1 INPUT                                                    PAGE 67

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

2246          KK   UHIC1      CP
2247          KM   COMBINE S53A6 AND S53A5 (UNION HILLS INTERCEPTOR CHANNEL SEGMENT 1)
2248          HC       2
              *
              *

2249          KK  SPT1SW
2250          KM   RETRIEVE DIVERTED SPILT FLOW FROM C51.1A
2251          DR  SPT1SW
              *

2252          KK  R51.2B
2253          KM   ROUTE C51.1A to C51.1B
2254          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING ROUTE 51.2
2255          RS       5    FLOW      -1
2256          RC   0.055    0.04   0.055    1666   .0338
2257          RX       0       1     101     107     137     143     243     244
2258          RY      10       8       3       0       0       3       8      10
              *

2259          KK  S51.1B
2260          KM   RUNOFF FROM SUBBASIN 51.1B
2261          KM   ENTELLUS CREATED THIS BASIN BY MODIFYING BASIN S51.1
2262          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2263          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2264          BA   .0496
2265          LS              75      27
2266          UK     300   0.037   0.130     100
2267          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2268          RK    3350   0.032   0.040            TRAP      40      15
              *
              *

2269          KK  C51.1B      CP
2270          KM        COMBINE SUB S51.1B and R51.2B
2271          HC       2
              *

2272          KK  R51.2C
2273          KM   ROUTE C51.1B to C51.1C
2274          KM   ENTELLUS CREATED THIS ROUTE BY MODIFIYING ROUTE 51.2
2275          RS       5    FLOW      -1
2276          RC   0.055    0.04   0.055    1742   .0338
2277          RX       0       1     101     107     137     143     243     244
2278          RY      10       8       3       0       0       3       8      10
              *

2279          KK  S51.1C
2280          KM   RUNOFF FROM SUBBASIN 51.1C
2281          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
2282          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2283          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2284          BA   .0965
2285          LS              75      27
1                                          HEC-1 INPUT                                                    PAGE 68

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

2286          UK     300   0.037   0.130     100
2287          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2288          RK    5833   0.032   0.040            TRAP      40      15
              *
              *
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2289          KK  C51.1C      CP
2290          KM        COMBINE SUB S51.1C and R51.2C
2291          HC       2
              *

2292          KK  R51.2D
2293          KM   ROUTE C51.1C to C51.1D
2294          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING ROUTE 51.2
2295          RS       9    FLOW      -1
2296          RC   0.055    0.04   0.055    3123   .0338
2297          RX       0       1     101     107     137     143     243     244
2298          RY      10       8       3       0       0       3       8      10
              *
              *  ---------------------------------------------------------------------------
              *  |/////////////////////////////////////////////////////////////////////////|
              *  |=============== BEGIN DEER VALLEY SOUTH MODEL MODIFICATIONS ===============|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  |---------------------------------------------------------------------------|
              *
              *   These modifications were made to combine the two models.  In particular,
              *   these cards connect the two models with the flow continuing south along
              *   Pima Rd. past Deer Valley.
              *

2299          KK  S51.1D
2300          KM   RUNOFF FROM SUBBASIN 51.1D
2301          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
2302          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2303          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2304          KM
2305          KM   Modified basin area to include all the way to E. Los Gatos Dr.
              * BA .8980 * Original Basin Area
2306          BA  0.9015
2307          LS              75      27
2308          UK     300   0.037   0.130     100
2309          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2310          RK   14557   0.032   0.040            TRAP      40      15
              *

2311          KK  D51.1D
2312          KM   This diversion recovery was too short to route (200 ft +-)
2313          DR  DO511D
              *
1                                        HEC-1 INPUT                                    PAGE 69

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


2314          KK  C51.1D      CP
2315          KM        COMBINE SUB S51.1D and R51.2D
2316          KM   HC modified to include R1B2
2317          HC       3
              *

2318          KK  DETPDV
2319          KM   DET = Detention Basin
2320          KM   P = Pima Rd.
2321          KM   DV = Deer Valley
2322          KM   STO = Stored
2323          KM   This is the DC Ranch Detention basin on the corner of Pima Rd.
2324          KM   and Deer Valley.  It was assumed that the detention basin was online.
2325          KM   The stage storage was determined by field survey of the detention
2326          KM   basin (12/15/2008).
2327          DT  STOPDV     4.5
2328          DI       0   10000
2329          DQ       0   10000
              *
              *  |---------------------------------------------------------------------------|
              *  |/////////////////////////////////////////////////////////////////////////|
              *  |=============== END DEER VALLEY SOUTH MODEL MODIFICATIONS ================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  ---------------------------------------------------------------------------
              *

2330          KK  R52A1C
2331          KM   ROUTE C51.1D THROUGH 52A1 INTO 52A1C
2332          KM   ROUTE OF FLOW ALONG EAST SIDE OF PIMA RD AND WEST SIDE OF DC RANCH
2333          KM   BETWEEN DEER VALLEY AND THOMPSON PEAK
2334          KM   ENTELLUS CREATED THIS ROUTE USING THE TYPICAL SECTIONS DETAIL SHEET
2335          KM   OF THE PIMA ROAD PAVING PLANS BY JMI AND ASSOCIATES
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2336          RS       7    FLOW      -1
2337          RC    .045    .014    .045    2636   .0262
2338          RX       0      .1       4       7    7.25      11      27      95
2339          RY       2       0       0      10       0       0       2     4.5
              *

2340          KK    51B8     SUB
2341          KM   RUNOFF FROM SUB 51B8
2342          KM   ENTELLUS CREATED THIS BASIN BY MODIFYING BASIN 51B
2343          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2344          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2345          BA   .0397
2346          LS              75      27
2347          UK     100   .0213     .10     100
2348          RK    3891   .0300    .045            TRAP      50      25
              *
              * ***************************************************************************
              *
              *                                BEGIN DC RANCH MODEL
              *
              * ***************************************************************************
1                                          HEC-1 INPUT                                                          PAGE 70

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


2349          KK   51B8R
2350          KM   ROUTE 51B7DV THROUGH SUBBASIN 52A1 TO CP 52A1C
2351          RK    3400    .033    .045            TRAP      10      10
              *

2352          KK    52A1
2353          KM   RUNOFF FROM SUBBASIN 52A1
2354          BA    .130
2355          LS              75   32.25
2356          UK     100     .02     .10     100
2357          RK    3400    .033    .045            TRAP      30      10
              *

2358          KK   52A1C
2359          KM   COMBINE 52A1, 51B8R
2360          HC       2
              *
              *
              * ***************************************************************************
              * ******************** NOVEMBER 2008 *** NOVEMBER 2008 ************************
              * ***************************************************************************
              * ********** ADDED SUBBASIN 52A0, MODIFIED C52A from HC=2 to HC=3 *************
              * ***************************************************************************
              *

2361          KK    C52A      CP
2362          KM        COMBINE CP 52A1C & 51.6
2363          KM   ENTELLUS NOVEMBER 2008: MODIFIED HC=2 to HC=3 TO INCLUDE THE NEWLY
2364          KM   ENTELLUS NOVEMBER 2008: ADDED SUBBASIN 52A0
2365          HC       2
              *
              *

2366          KK    52A0
2367          KM   ENTELLUS NOVEMBER 2008: SUBBASIN 52A0 WAS ADDED TO THE MODEL TO ACCOUNT FOR
2368          KM   ENTELLUS NOVEMBER 2008: FLOW ALONG THE WEST SIDE OF PIMA RD BETWEEN DEER
2369          KM   ENTELLUS NOVEMBER 2008: VALLEY AND THOMPSON PEAK PARKWAY
2370          KM        RUNOFF FROM SUB-BASIN 52A0
2371          BA  0.0369
2372          LS              85
2373          UK     100   .2300     .20     100
2374          RK    2500   .2300    .045            TRAP      20       8
              *
              *

2375          KK  C52A.1      CP
2376          KM        COMBINE CP 52A & BASIN 52A0
2377          KM   ENTELLUS NOVEMBER 2008: MODIFIED HC=2 to HC=3 TO INCLUDE THE NEWLY
2378          KM   ENTELLUS NOVEMBER 2008: ADDED SUBBASIN 52A0
2379          HC       2
              *
1                                          HEC-1 INPUT                                                          PAGE

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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2380          KK   D52AW     DIV
2381          KM   SPLIT FLOW AT ITXN OF PIMA ROAD AND THOMPSON PEAK PKWY
2382          KM   THIS DIVERSION REPRESENTS FLOW ON THE WEST SIDE OF PIMA ROAD
2383          KM   THAT HEADS WEST
2384          DT  DV52AW
2385          DI       0     100     250     375     501     625     750     875    1000    1125
2386          DI    1250    1375    1501    1750    2000    2501    2750    2875    3000    3500
2387          DQ       0       1       4       6      13      22      41      63      82      96
2388          DQ     109     124     137     161     186     238     256     259     255     280
              * DI     0   10000
              * DQ     0    3000
              *
              *
              *  ******************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *

2389          KK  PRSDEX     DIV
2390          KM   DIVERT FLOW INTO 2 60" PIPES AT THOMPSON PEAK PKY AND PIMA
2391          KM   ENTELLUS ADDED THIS DIVERSION, 265 CFS IS FROM STANTEC'S REPORT
2392          KM   Additionally, it was assumed that the additional 2-48" culverts and
2393          KM   numerous curb inlets are able to fully utilize the stormdrains capacity of:
2394          KM   600cfs
2395          DT    PRSD
              * DI     0     255   10000
              * DQ     0     255     255
2396          DI       0     600   10000
2397          DQ       0     600     600
              *
              *  ******************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *
              *
              *

2398          KK    RC52      CP
2399          KM   ROUTE C52A TO C52(SP4)
2400          KM   ROUTE ALONG PIMA RD BETWEEN THOMPSON PEAK AND SIERRA PINTA
2401          KM   THE ROUTE GEOMOETRY WAS TAKEN FROM THE TYPICAL SECTIONS DETAIL SHEET
2402          KM   OF THE PIMA RD PAVING PLANS BY JMI AND ASSOCIATES.
2403          RS       8    FLOW      -1
2404          RC    .045    .014    .045    2763   .0232
2405          RX       0       6      36      76      96     136     236     237
2406          RY      10       0       2       2       2       2       2      10
              *
1                                          HEC-1 INPUT                                          PAGE 72

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

2407          KK    51B5     SUB
2408          KM   RUNOFF FROM SUB 51B5
2409          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2410          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2411          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2412          BA   .0043
2413          LS              75      27
2414          UK     100   .0213     .10     100
2415          RK     719   .0300    .045            TRAP      50      25
              *
              *

2416          KK   51B5R
2417          KM   ROUTE 51B5 THROUGH SUBBASIN 52B6 TO CP 51B7C
2418          RK    1250    .035    .045            TRAP      10      10
              *
              *

2419          KK  SPT3SW
2420          KM   RETRIEVE DIVERTED SPILT FLOW FROM C51B10
2421          DR  SPT3SW
              *
              *
```

```
2422          KK   R51B6
2423          KM   ROUTE C51B10 TO C51B6
2424          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
2425          RK    2481   .0300    .045            TRAP      50      25
              *
              *

2426          KK    51B6     SUB
2427          KM   RUNOFF FROM SUB 51B6
2428          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2429          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2430          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2431          BA   .0446
2432          LS              75      27
2433          UK     100   .0213     .10     100
2434          RK    2481   .0300    .045            TRAP      50      25
              *

2435          KK   C51B6
2436          KM   COMBINE BASIN 51B6 AND R51B6
2437          HC       2
              *
              *

2438          KK   51B6R
2439          KM   ROUTE C51B6 THROUGH SUBBASIN 52B6 TO CP 51B7C
2440          RK     925    .033    .045            TRAP      10      10
              *
              *
```



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

2441          KK    51B7     SUB
2442          KM   RUNOFF FROM SUB 51B7
2443          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2444          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2445          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2446          BA    .027
2447          LS              75      27
2448          UK     100   .0213     .10     100
2449          RK    2451   .0300    .045            TRAP      50      25
              *
              *

2450          KK  51B7R1
2451          KM   ROUTE 51B7D THROUGH SUBBASIN 52B6 TO CP 51B7C
2452          RK     530    .033    .045            TRAP      10      10
              *

2453          KK   51B7C
2454          KM   COMBINE 51B7R1, 51B5R, AND 51B6R
2455          HC       3
              *

2456          KK  51B7R2
2457          KM   ROUTE 51B7C THROUGH SUBBASIN 52B6 TO CP 52B6C
2458          RK    2300    .033    .045            TRAP      10      10
              *

2459          KK    52B6
2460          KM   RUNOFF FROM SUBBASIN 52B6
2461          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2462          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2463          BA    .096
2464          LS              75      27
2465          UK     100     .02     .10     100
2466          RK    3200    .033    .045            TRAP      30      10
              *

2467          KK   52B6C
2468          KM   COMBINE 51B7R2 AND 52B6
2469          HC       2
              *

2470          KK   52B6R
2471          KM   ROUTE 52B6C THROUGH SUBBASIN 52B7 TO CP 52B7C1
2472          RK    2750    .028    .045            TRAP      10      10
              *
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```
2473          KK    52B7
2474          KM   RUNOFF FROM SUBBASIN 52B7
2475          BA    .080
2476          LS              75   78.45
2477          UK     100     .02     .10     100
2478          RK    2750    .028    .045            TRAP      30      10
              *
1                                   HEC-1 INPUT                                                          PAGE 74

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


2479          KK  52B7C1
2480          KM   COMBINE 52B7 AND 52B6R
2481          HC       2
              *
              *

2482          KK    52A2
2483          KM   RUNOFF FROM SUBBASIN 52A2
2484          BA    .065
2485          LS              75    88.8
2486          UK     100     .02     .10     100
2487          RK    2900    .023    .045            TRAP      30      10
              *
              * ***************************************************************************
              * ******************** NOVEMBER 2008 *** NOVEMBER 2008 ************************
              * ***************************************************************************
              * ********** ADDED SUBBASIN 52B0, MODIFIED 52A2C2 from HC=3 to HC=4 ***********
              * ***************************************************************************

2488          KK    52B0     SUB
2489          KM        RUNOFF FROM SUB-BASIN 52B0
2490          KM   ENTELLUS NOVEMBER 2008: SUBBASIN 52B0 WAS ADDED TO THE MODEL TO ACCOUNT FOR
2491          KM   ENTELLUS NOVEMBER 2008: FLOW ALONG THE WEST SIDE OF PIMA RD BETWEEN THOMPSON
2492          KM   ENTELLUS NOVEMBER 2008: PEAK PARKWAY AND SIERRA PINTA
2493          BA  0.0188
2494          LS              83
2495          UK     100   .2300     .20     100
2496          RK    2500   .2300    .045            TRAP      20       8
              *

2497          KK  52A2C2
2498          KM   COMBINE 52B7C2 AND 52A2 and 52B0
2499          KM   ENTELLUS NOVEMBER 2008: MODIFIED HC=3 to HC=4 TO INCLUDE THE NEWLY
2500          KM   ENTELLUS NOVEMBER 2008: ADDED SUBBASIN 52B0
2501          HC       4
              *
              *
              *  ***************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ***************************************************************************
              *

2502          KK    D52W     DIV
2503          KM   It was determined that this split does not exist under existing conditions.
              * KM SPLIT FLOW FROM WEST SIDE OF PIMA RD BETWEEN SIERRA PINTA
              * KM AND THOMPSON PEAK
2504          DT   DV52W
              * DI     0   10000
              * DQ     0    3000
2505          DI       0   10000
2506          DQ       0    0.01
              *
              *  ***************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ***************************************************************************
              *
              *
              * ********************************************************************
              *
              *                          END DC RANCH MODEL
              *  BEGIN SIERRA PINTA ROUTING THROUGH PIMA ACRES TO PROJECT STRUCTURES
              *                            BY ENTELLUS
              * ********************************************************************
              *
1                                   HEC-1 INPUT                                                          PAGE 75
```

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

2507          KK   DVSP3
2508          KM    RETRIEVE FLOW FROM SIERRA PINTA CHANNEL
2509          DR   DVSP3
              *

2510          KK  RDVSP3
2511          KM    ROUTE FLOW FROM SP3 TO C52(SP4) VIA SIERRA PINTA CHANNEL
2512          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED BY WOOD-PATEL
2513          RK    1530   .0143    .035            TRAP      50       4
              *

2514          KK  C52SP4      CP
2515          KM     COMBINE CP521 AND FLOW FROM SIERRA PINTA CHANNEL
2516          HC       2
              *
              *  ******************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *

2517          KK    DSP4     DIV
2518          KM    FLOW FROM SIERRA PINTA DIVERTED INTO 2-96 PIPES TO CROSS PIMA
2519          KM   ENTELLUS CREATED THIS DIVERSION
2520          KM   The point 100/99.99 was utilized to allow the kinematic wave routing
2521          KM   procedure to work during smaller storm events.
2522          DT   DVSP4
2523          DI       0     100     200     500    1328   10000
2524          DQ       0   99.99     200     500    1328    1328
              *
              *  ******************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *
              *
              *

2525          KK  RSP4EX     CP
2526          KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
2527          KM   THROUGH PIMA ACRES ALONG PIMA ROAD TO PROJECT STRUCTURE #1
2528          RS       9    FLOW      -1
2529          RC    .045    .014    .045    3366   .0214
2530          RX       0       6      36      76      96     136     236     237
2531          RY      10       0       2       2       2       2       2      10
              *
1                                          HEC-1 INPUT                                          PAGE 76

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

2532          KK    53PS     DIV
2533          KM    ALLOCATE FLOW BETWEEN PIMA ROAD AND HUALAPAI DRIVE
2534          KM    ENTELLUS CHANGED THIS DIVERSION TO ZERO PER FIELD INVESTIGATIONS
2535          KM   THIS DIVERSION REPRESENTS FLOWS HEADING WEST ON HUALAPAI FORM THE
2536          KM   WEST SIDE OF PIMA ROAD BUT WAS SET TO ZERO BECAUSE THE PIMA ROUTE CHANNEL
2537          KM   WILL INTERCEPT THESE FLOWS
2538          DT    53HW
2539          DI       0   10000
2540          DQ       0       0
              *

2541          KK    S53A
2542          KM   RUNOFF FROM SUBBASIN S53A
2543          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2544          BA   .1250
2545          LS              77      27
2546          UK     300   0.022    0.13     100
2547          RK    1475   0.026   0.045  0.0111    TRAP       3       5
2548          RK    2625   0.021    0.04            TRAP      25       5
              *
              *
              *  **************************
              *  PROJECT STRUCTURE #1
              *
```

```
                 *  *************************
                 *

2549             KK  CPIMA1
2550             KM     COMBINE R53A WITH RUNOFF FROM SUBBASIN S53A
2551             HC       2
                 *
                 *

2552             KK  RPMA4B      CP
2553             KM   ROUTE CPIMA1 TO CPCH2 (ACROSS PIMA ROAD)
2554             KM   ROUTE FROM PROJECT STRUCTURE#1 TO PROPOSED PIMA RD CHANNEL
2555             KM   THE ROUTE GEOMETRY WAS TAKEN FROM THE TYPICAL SECTIONS DETAIL SHEET
2556             KM   OF THE PIMA RD PAVING PLANS BY JMI AND ASSOCIATES.
2557             RS       2    FLOW      -1
2558             RC     .04    .014     .04     631   .0206
2559             RX       0       6      36      76      96     136     236     237
2560             RY      10       0       2       2       2       2       2      10
                 *
                 *

2561             KK    PRSD
2562             KM   RETRIEVE FLOW DIVERTED INTO PIPE AT THOMPSON PEAK
2563             DR    PRSD
                 *
                 *
```



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

2564             KK  RDPSD1
2565             KM   ROUTE FLOW THROUGH PIMA STORM DRAIN TO BEARDSLEY
2566             KM   ENTELLUS CREATED THIS ROUTE
2567             RS       1    FLOW      -1
2568             RK    1570    .022    .015            CIRC     5.5
                 *
                 *

2569             KK  RDPSD2
2570             KM   ROUTE FLOW THROUGH PIMA STORM DRAIN TO OUTLET NORTH OF HAULAPAI
2571             KM   ENTELLUS CREATED THIS ROUTE
2572             RS       1    FLOW      -1
2573             RK     970    .022    .015            CIRC       6
                 *

2574             KK   DVSP4
2575             KM    RETRIEVE SIERRA PINTA CHANNEL FLOW AND ROUTE ALONG WEST SIDE OF PIMA RD
2576             DR   DVSP4
                 *

2577             KK   RDVSP
2578             KM   OUTFLOW FROM SIERRA PINTA CHANNEL ALONG THE WEST SIDE OF PIMA RD BETWEEN
2579             KM   SIERRA PINTA AND THE PROPOSED PIMA RD DRAINAGE CHANNEL
2580             RS       5    FLOW      -1
2581             RC    .045    .014    .045    1873   .0219
2582             RX       0      .1       1       2      20      37      38      90
2583             RY       6       1       2       2       0       2       2       3
                 *

2584             KK   CPCH1
2585             KM     COMBINE FLOW FROM 84" PIPE OUTLET WITH FLOW FROM SP CHANNEL
2586             HC       2
                 *

2587             KK  RPMA4A
2588             KM   ROUTE CHANNEL FLOW TO CPCH2
2589             KM   NORTH SEGMENT OF PROPOSED PIMA RD DRAINAGE CHANNEL BETWEEN DOWNING OLSEN
2590             KM   AND PIMA RD STORM DRAIN OUTLET
2591             RS       6    FLOW      -1
2592             RC    .035    .035    .035    2080   .0183
2593             RX       0      24      64      88      89      90      91      92
2594             RY       6       0       0       6       6       6       6       6
                 *
                 *

2595             KK   S53A2
2596             KM   RUNOFF FROM SUBBASIN S53A2
2597             KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2598             BA   .0544
2599             LS             77      27
```

```
2600          UK     100   0.022    0.13     100
2601          RK    2080   0.021    0.04            TRAP      25       5
              *
              *
              *  **************************
              *  PIMA ROAD DRAINAGE CHANNEL
              *          SEGMENT 1
              *  **************************
              *
              *
1                                          HEC-1 INPUT                                                    PAGE 78

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


2602          KK   CPCH2
2603          KM     COMBINE RPMA4A WITH S53A2 (PIMA ROAD DRAINAGE CHANNEL SEGMENT 1)
2604          HC       2
              *
              *

2605          KK   CPCH3
2606          KM     COMBINE RPMA4A, RPMA4B AND S53A2
2607          HC       2
              *
              *

2608          KK   RUH2A
2609          KM   ROUTE CHANNEL FROM CPCH2 TO CUH2
2610          KM   SOUTH SEGMENT OF PROPOSED PIMA RD DRAINAGE CHANNEL BETWEEN UNION HILLS
2611          KM   AND DOWNING-OLSEN
2612          RS       4    FLOW      -1
2613          RC    .035    .035    .035    1389   .0158
2614          RX       0      28      78     106     107     108     109     110
2615          RY       7       0       0       7       7       7       7       7
              *

2616          KK   S53A4
2617          KM   RUNOFF FROM SUBBASIN S53A4
2618          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2619          KM   THE FIRST OVERLAND FLOW CATACHMENT WAS REMOVED
2620          KM   IT REPRESENTED PIMA ACRES WHICH IS NOT PART OF THIS BASIN
2621          BA   .0528
2622          LS              77      30
2623          UK     150   0.027    0.13     100
2624          RK    1621   0.017    0.04            TRAP      35       5
              *

2625          KK   CPCH4      CP
2626          KM   COMBINE SUB S53A4 AND RUH2A
2627          HC       2
              *
              *
              *  **************************
              *  UNION HILLS INTERCEPTOR CHANNEL
              *          SEGMENT 2
              *  **************************
              *
              *

2628          KK   UHIC2      CP
2629          KM    UNION HILLS INTERCEPTOR CHANNEL SEGMENT 2
2630          HC       3
              *
              *
              * ******************************************************************************
              * ********** NOVEMBER 2008 *** NOVEMBER 2008 **********************************
              * ******************************************************************************
              * *** CORRECTED roughness coefficient to be 0.13, from 0.013 ******************
              * ******************************************************************************
1                                          HEC-1 INPUT                                                    PAGE 79

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


2631          KK  CPIMA3
2632          KM   RUNOFF FROM SUBBASIN S53A5, ORIGINAL BASIN S53A1
2633          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2634          KM   THE PERCENT IMPERVIOUS WAS ESTIMATED USING A B-C SOIL
2635          KM   ENTELLUS MODIFIED THE CATACHMENT PARAMETERS
2636          KM   ENTELLUS NOV 2008: CORRECTED N VALUE TO BE 0.13, NOT 0.013
```

```
2637          BA   .0669
2638          LS              77      65
2639          UK     300   0.027     .13     100
2640          RK    2100   0.017    0.04            TRAP      10       6
              *
              *  |-----------------------------------------------------------------------------|
              *  |/////////////////////////////////////////////////////////////////////////////|
              *  |======================= END DEER VALLEY SOUTH MODEL ======================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  ------------------------------------------------------------------------------
2641          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   734        S30N
                V
                V
   744        R30N
                .
                .
   750          .       S31.1
                .           .
                .           .
   758      C31.1............
                .
                .
   761          .       S34.2
                .           .
                .           .
   770      C34.2............
                .
                .
   773          .        S35N
                .           .
                .           .
   785          .           .-------->   D35NL
   781          .       D35NR
                .           V
                .           V
   788          .       R35NR
                .           .
                .           .
   795          .           .       S36.2
                .           .           .
                .           .           .
   803          .       C36.2............
                .           .
                .           .
   810          .           .-------->  D36.2L
   806          .      D36.2R
                .           V
                .           V
   813          .      R36.2R
                .           .
                .           .
   820          .           .       S34.1
                .           .           .
                .           .           .
   833          .       C34.1............
                .           .
                .           .
   836      HVDB-I............
                V
                V
   839      HVDB-O
                .
                .
   853          .-------->  DO34.1
   852      D34.1
                V
                V
   856      R34.1
                .
                .
   862          .       S36.1
                .           .
                .           .
```

```
 869      C36.1............
              .
              .
 881          .-------> DO36.1
 872      D36.1
              V
              V
 884      R36.1
              .
              .
 892          .           .<-------   D35NL
 890          .       B35NL
              .           V
              .           V
 893          .       R35NL
              .           .
              .           .
 902          .           .           .<-------  D36.2L
 900          .           .      B36.2L
              .           .           V
              .           .           V
 903          .           .      R36.2L
              .           .           .
              .           .           .
 910          .           .           .      S36R1A
              .           .           .           .
              .           .           .           .
 918     C36R1A...................................
              V
              V
 929     R36R1A
              .
              .
 936          .      S36R1C
              .           .
              .           .
 949          .           .-------> DOSR1C
 942          .      DS-R1C
              .           .
              .           .
 952     C36R1C............
              .
              .
 962          .-------> DO361C
 954     D36R1C
              .
              .
 965          .      S36R1D
              .           .
              .           .
 980          .           .-------> DOSR1D
 970          .      DS-R1D
              .           .
              .           .
 983     C36R1D............
              V
              V
 985     R36R1D
              .
              .
 990          .       S1A2F
              .           .
              .           .
 995      C1A2F............
              .
              .
 999          .-------> DO1A2F
 998      D1A2F
              V
              V
1002      R1A2F
              .
              .
1007          .       S1A2E
              .           .
              .           .
1019          .           .-------> DOSA2E
1012          .      DS-A2E
              .           .
              .           .
1022      C1A2E............
```

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                .
                .
1028            .-------> DO1A2E
1024        D1A2E
                V
                V
            R1A2E
                .
                .
1036            .       S1A2D
                .           .
                .           .
1041        C1A2D............
                .
                .
1049            .-------> DO1A2D
1044        D1A2D
                V
                V
1052        R1A2D
                .
                .
1057            .       S1A2A
                .           .
                .           .
1068            .           .-------> DOSA2A
1062            .      DS-A2A
                .           .
                .           .
1071            .           .       S1A2B
                .           .           .
                .           .           .
1076            .       C1A2B............
                .           .
                .           .
1079            .           .       S1A2C
                .           .           .
                .           .           .
1084        C1A2C........................
                V
                V
            R1A2C
                .
                .
1092            .       S1A2G
                .           .
                .           .
1097        C1A2G............
                .
                .
1110            .-------> DO1A2G
1100        D1A2G
                .
                .
1114            .-------> DOA2G1
1113        DA2G1
                V
                V
1117        RA2G1
                .
                .
1121            .           .<-------  DOA2G1
1120            .       DA2G1
                .           V
                .           V
1122            .       RA2G2
                .           .
                .           .
1125       CRA2G1............
                .
                .
1128            .        S1B4
                .           .
                .           .
1139            .           .-------> DOSR1D
1133            .      DS-1B4
                .           .
                .           .
1142         C1B4............
                .
                .
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```
1152          .------->   DO1B4
1145       D1B4
              .
              .
1156          .------->  DOB4_1
1155      DB4_1
              V
              V
1159      RB4_2
              .
              .
1163          .           .<-------  DOB4_1
1162          .       DB4_1
              .           V
              .           V
1164          .       RB4_1
              .           .
              .           .
1167      CR1B4............
              .
              .
1170          .        S1B3
              .           .
              .           .
1175       C1B3............
              .
              .
1178          .------->  DOB3_1
1177      DB3_1
              V
              V
1181      RB3_2
              .
              .
1185          .           .<-------  DOB3_1
1184          .       DB3_1
              .           V
              .           V
1186          .       RB3_1
              .           .
              .           .
1189      CR1B3............
              .
              .
1194          .------->   DO1B3
1192       D1B3
              .
              .
1197          .        S1B1
              .           V
              .           V
1202          .        R1B1
              .           .
              .           .
1210          .           .        S1B2
              .           .           .
              .           .           .
1215       C1B2........................
              .
              .
1226          .------->   DO1B2
1218       D1B2
              .
              .
1230          .           .<-------   DO1B3
1229          .       DO1B3
              .           .
              .           .
1231     CD1A2G............
              V
              V
1233      RD1B2
              .
              .
1242          .           .<-------   DO1B2
1239          .        D1B2
              .           .
              .           .
1244          .           .------->  DOB2_1
1243          .       DB2_1
              .           .
```

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          .           .
1248      .           .-------> DOB2_2
1247      .       DB2_2
          .           V
          .           V
          .       RB2_3
          .           .
          .           .
1255      .           .           .<-------  DOB2_2
1254      .           .       DB2_2
          .           .           V
          .           .           V
1256      .           .       RB2_2
          .           .           .
          .           .           .
1260      .           .           .           .<-------  DOB2_1
1259      .           .           .       DB2_1
          .           .           .           V
          .           .           .           V
1261      .           .           .       RB2_1
          .           .           .           .
          .           .           .           .
1264      .       CR1B2.......................
          .           .
          .           .
1272      .           .-------> DO511D
1267      .      D51.1D
          .           V
          .           V
1275      .      R51.1D
          .           .
          .           .
1286      .           .      SEEC13
          .           .           .
          .           .           .
1291      .      CEEC13............
          .           V
          .           V
1294      .      REEC13
          .           .
          .           .
          .           .      SEEC12
          .           .           .
          .           .           .
1307      .      CEEC12............
          .           V
          .           V
1309      .      REEC12
          .           .
          .           .
1317      .           .      SEEC11
          .           .           .
          .           .           .
1322      .      CEEC11............
          .           V
          .           V
1324      .      REEC11
          .           .
          .           .
1332      .           .      SEEC10
          .           .           .
          .           .           .
1337     CEEC10........................
              V
              V
1339     REEC10
              .
              .
1347          .      SEEC09
              .           .
              .           .
1354          .           .           .<-------   DO1B4
1352          .           .       DO1B4
              .           .           .
              .           .           .
         CEEC09........................
              V
              V
1357     REEC09
              .
              .
```

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1365          .      SEEC08
              .           .
              .           .
1370      CEEC08............
              V
              V
1372      REEC08
              .
              .
1380          .      SEEC07
              .           .
              .           .
1385      CEEC07............
              V
              V
1387      REEC07
              .
              .
1395          .      SEEC06
              .           .
              .           .
1400      CEEC06............
              V
              V
1402      REEC06
              .
              .
1410          .      SEEC05
              .           .
              .           .
1417          .           .           .<-------  DO1A2D
1415          .           .      DO1A2D
              .           .           V
              .           .           V
1418          .           .      RD1A2D
              .           .           .
              .           .           .
1428          .           .           .           .<-------  DO1A2G
1425          .           .           .      DO1A2G
              .           .           .           .
              .           .           .           .
1429          .           .      CD1A2G............
              .           .           V
              .           .           V
1432          .           .      RD1A2G
              .           .           .
              .           .           .
1439      CEEC05........................
              .
              .
1444          .------->    37AW
1443        37AE
              V
              V
1449      REEC05
              .
              .
1457          .      SEEC04
              .           .
              .           .
1464          .           .           .<-------  DO1A2E
1462          .           .      DO1A2E
              .           .           V
              .           .           V
1465          .           .      RD1A2E
              .           .           .
              .           .           .
1470      CEEC04........................
              V
              V
1472      REEC04
              .
              .
1480          .      SEEC03
              .           .
              .           .
1485      CEEC03............
              V
              V
1487      REEC03
              .
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                .
1495            .      SEEC02
                .           .
                .           .
1500      CEEC02............
                V
                V
1502      REEC02
                .
                .
1510            .      SEEC01
                .           .
                .           .
1517            .           .           .<-------  DO1A2F
1515            .           .      DO1A2F
                .           .           V
                .           .           V
1518            .           .      RD1A2F
                .           .           .
                .           .           .
1523      CEEC01........................
                V
                V
1525      REEC01
                .
                .
1533            .       S37A3
                .           .
                .           .
1538       C37A3............
                V
                V
1540       R37A3
                .
                .
1548            .       S37A2
                .           .
                .           .
1553       C37A2............
                V
                V
1565      D37A2
                V
                V
1567       R37A2
                .
                .
1575            .       S37A1
                .           .
                .           .
1581            .           .           .<-------  DO361C
1580            .           .      DO361C
                .           .           V
                .           .           V
1582            .           .      RD-R1C
                .           .           .
                .           .           .
1589            .           .           .           .<-------  DO36.1
1587            .           .           .      D036.1
                .           .           .           V
                .           .           .           V
1590            .           .           .      RD36.1
                .           .           .           .
                .           .           .           .
1597            .           .           .           .           .<-------  DO34.1
1595            .           .           .           .      DO34.1
                .           .           .           .           V
                .           .           .           .           V
1598            .           .           .           .      RD34.1
                .           .           .           .           .
                .           .           .           .           .
1603       C37A1.............................................
                .
                .
1605            .       52C13
                .           .
                .           .
1613            .           .-------->  STORM
1611            .      2C13DV
                .           V
                .           V
```

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1616          .      52C13R
              .           .
              .           .
1619          .           .       52C15
              .           .           .
              .           .           .
1625          .           .           .      52C14A
              .           .           .           .
              .           .           .           .
1631          .         SP1.......................
              .           .
              .           .
1640          .           .------->   DVSP1
1634          .       SP1EX
              .           V
              .           V
1643          .      RSP1EX
              .           .
              .           .
1651          .           .          39
              .           .           .
              .           .           .
1657          .           .           .          40
              .           .           .           .
              .           .           .           .
1663          .           .         C40............
              .           .           V
              .           .           V
1666          .           .         R41
              .           .           .
              .           .           .
1672          .           .           .          41
              .           .           .           .
              .           .           .           .
1678          .           .         C41............
              .           .           .
              .           .           .
1681          .           .           .          42
              .           .           .           .
              .           .           .           .
1687          .           .           .           .          43
              .           .           .           .           .
              .           .           .           .           .
1693          .           .           .           .           .          44
              .           .           .           .           .           .
              .           .           .           .           .           .
1699          .           .           .           .         C44............
              .           .           .           .           V
              .           .           .           .           V
1702          .           .           .           .         R45
              .           .           .           .           .
              .           .           .           .           .
1708          .           .           .           .           .          45
              .           .           .           .           .           .
              .           .           .           .           .           .
1714          .           .           .           .         C45............
              .           .           .           .           .
              .           .           .           .           .
1717          .           .           .           .           .         45A
              .           .           .           .           .           .
              .           .           .           .           .           .
1723          .           .           .           .           .           .          46
              .           .           .           .           .           .           .
              .           .           .           .           .           .           .
1730          .           .           .           .         C46........................
              .           .           .           .           V
              .           .           .           .           V
1733          .           .           .           .         R47
              .           .           .           .           .
              .           .           .           .           .
1739          .           .           .           .           .          47
              .           .           .           .           .           .
              .           .           .           .           .           .
1745          .           .           .           .       C47.1............
              .           .           .           .           .
              .           .           .           .           .
1748          .           .       C47.2........................
              .           .           V
              .           .           V
1751          .           .         R50
              .           .           .
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                    .          .          .
1758                .          .          .          50
                    .          .          .           .
                    .          .          .           .
1765                .          .        C50...........
                    .          .          .
                    .          .          .
1771                .          .          .-------> APEXSO
1769                .          .     APEXSW
                    .          .          V
                    .          .          V
1774                .          .     R51.2A
                    .          .          .
                    .          .          .
1781                .          .          .      S51.1A
                    .          .          .           .
                    .          .          .           .
1791                .          .     C51.1A...........
                    .          .          .
                    .          .          .
1797                .          .          .-------> SPT1SW
1794                .          .     SPT1SO
                    .          .          V
                    .          .          V
1800                .          .      R51B9
                    .          .          .
                    .          .          .
1804                .          .          .        51B9
                    .          .          .           .
                    .          .          .           .
1813                .          .      C51B9...........
                    .          .          .
                    .          .          .
1819                .          .          .-------> SPT2SW
1816                .          .     SPT2SO
                    .          .          V
                    .          .          V
1822                .          .      R51B2
                    .          .          .
                    .          .          .
[illegible]26       .          .          .        51B2
                    .          .          .           .
                    .          .          .           .
1835                .          .      C51B2...........
                    .          .          V
                    .          .          V
1838                .          .      51B2R
                    .          .          .
                    .          .          .
1841                .          .          .        52C8
                    .          .          .           .
                    .          .          .           .
1847                .          .      52C8C...........
                    .          .          V
                    .          .          V
1850                .          .      52C8R
                    .          .          .
                    .          .          .
1853                .          .          .        51C3
                    .          .          .           V
                    .          .          .           V
1862                .          .          .       51C3R
                    .          .          .           .
                    .          .          .           .
1865                .          .          .           .        51B1
                    .          .          .           .           V
                    .          .          .           .           V
1874                .          .          .           .       51B1R
                    .          .          .           .           .
                    .          .          .           .           .
1877                .          .          .           .           .        52C7
                    .          .          .           .           .           .
                    .          .          .           .           .           .
1883                .          .          .       52C7C.......................
                    .          .          .           V
                    .          .          .           V
[illegible]6        .          .          .       52C7R
                    .          .          .           .
                    .          .          .           .
1889                .          .     52C9C1...........
                    .          .          V
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                 .          .          V
1892             .          .     52C9R1
                 .          .          .
                 .          .          .
1895             .          .          .        52C9
                 .          .          .           .
                 .          .          .           .
1901             .          .     52C9C2............
                 .          .          V
                 .          .          V
1904             .          .     52C9R2
                 .          .          .
                 .          .          .
1907             .          .          .        51C2
                 .          .          .           V
                 .          .          .           V
1916             .          .          .       51C2R
                 .          .          .           .
                 .          .          .           .
1919             .          .          .           .        52C5
                 .          .          .           .           .
                 .          .          .           .           .
1925             .          .          .       52C5C............
                 .          .          .           V
                 .          .          .           V
1928             .          .          .       52C5R
                 .          .          .           .
                 .          .          .           .
1931             .          .          .           .        52C6
                 .          .          .           .           .
                 .          .          .           .           .
1937             .          .          .       52C6C............
                 .          .          .           V
                 .          .          .           V
1940             .          .          .       52C6R
                 .          .          .           .
                 .          .          .           .
1943             .          .     2C10C1............
                 .          .          V
                 .          .          V
1946             .          .     2C10R1
                 .          .          .
                 .          .          .
1949             .          .          .       52C10
                 .          .          .           .
                 .          .          .           .
1955             .          .     2C10C2............
                 .          .          .
                 .          .          .
1958             .          .          .       52C11
                 .          .          .           V
                 .          .          .           V
1964             .          .          .      2C11R1
                 .          .          .           .
                 .          .          .           .
1969             .          .          .           .           .<-------   STORM
1967             .          .          .           .      52C13D
                 .          .          .           .           .
                 .          .          .           .           .
1970             .          .          .      52C11C............
                 .          .          .           V
                 .          .          .           V
1973             .          .          .      2C11CR
                 .          .          .           .
                 .          .          .           .
1976             .          .     2C11C2............
                 .          .          V
                 .          .          V
1979             .          .     2C11R2
                 .          .          .
                 .          .          .
1982             .          .          .       52C12
                 .          .          .           .
                 .          .          .           .
1988             .          .     52C12C............
                 .          .          V
                 .          .          V
1991             .          .     52C12R
                 .          .          .
                 .          .          .
1994             .          .          .      52C14B
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                                                  .<-------   DVSP1
2002                                                  .
2000                                              DVSP1
                                                      V
                                                      V
                                                  RDVSP1
                                                      .
                                                      .
2007                                  SP2.......................
                                                  .
                                                  .
2015                                              .------->   DVSP2
2010                                          DSP2
                                                 V
                                                 V
2018                                      RSP2EX
                                                  .
                                                  .
2026                                              .        51B3
                                                  .           V
                                                  .           V
2035                                              .       51B3R
                                                  .           .
                                                  .           .
2038                                              .           .        52B1
                                                  .           .           .
                                                  .           .           .
2044                                              .       52B1C............
                                                  .           V
                                                  .           V
2047                                              .       52B1R
                                                  .           .
                                                  .           .
2052                                              .           .           .<-------  SPT2SW
2050                                              .           .      SPT2SW
                                                  .           .           V
                                                  .           .           V
2053                                              .           .      R51B10
                                                  .           .           .
                                                  .           .           .
                                                  .           .           .       51B10
                                                  .           .           .           .
                                                  .           .           .           .
2066                                              .           .      C51B10............
                                                  .           .           .
                                                  .           .           .
2072                                              .           .           .-------> SPT3SW
2069                                              .           .      SPT3SO
                                                  .           .           V
                                                  .           .           V
2075                                              .           .       R51B4
                                                  .           .           .
                                                  .           .           .
2079                                              .           .           .       51B4
                                                  .           .           .           .
                                                  .           .           .           .
2088                                              .           .       C51B4............
                                                  .           .           V
                                                  .           .           V
2091                                              .           .      51B4R1
                                                  .           .           .
                                                  .           .           .
2094                                              .       52B2C1............
                                                  .           V
                                                  .           V
2097                                              .       52B2R1
                                                  .           .
                                                  .           .
2100                                              .           .        52B2
                                                  .           .           .
                                                  .           .           .
2106                                              .       52B2C2............
                                                  .           V
                                                  .           V
2109                                              .       52B2R2
                                                  .           V
                                                  .           V
2112                                              .       52B3R1
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2115          .           .           .           .       52B3
              .           .           .           .          .
              .           .           .           .          .
2121          .           .           .     52B3C2............
              .           .           .           V
              .           .           .           V
2124          .           .           .     52B3R2
              .           .           .           .
              .           .           .           .
2127          .           .           .           .       52B4
              .           .           .           .          .
              .           .           .           .          .
2133          .           .           .      52B4C............
              .           .           .           V
              .           .           .           V
2136          .           .           .      52B4R
              .           .           .           .
              .           .           .           .
2139          .           .           .           .       52B5
              .           .           .           .          .
              .           .           .           .          .
2147          .           .           .           .          .          .<-------   DVSP2
2145          .           .           .           .          .      DVSP2
              .           .           .           .          .          V
              .           .           .           .          .          V
2148          .           .           .           .          .     RDVSP2
              .           .           .           .          .          .
              .           .           .           .          .          .
2152          .           .           .        SP3........................
              .           .           .           .
              .           .           .           .
2160          .           .           .           .-------->   DVSP3
2155          .           .           .       DSP3
              .           .           .           V
              .           .           .           V
2163          .           .           .     RSP3EX
              .           .           .           .
              .           .           .           .
2167          .      CSPEX........................
              .          V
              .          V
2170          .      R53A1
              .          .
              .          .
2174          .          .      S53A1
              .          .          .
              .          .          .
2187          .      C53A1............
              .          V
              .          V
2190          .     RPIMA2
              .          .
              .          .
2196          .          .      S53A3
              .          .          .
              .          .          .
2207          .     CPIMA2............
              .          V
              .          V
2210          .      RUH2B
              .          .
              .          .
2218          .          .      S53A6
              .          .          V
              .          .          V
2228          .          .      RUH2C
              .          .          .
              .          .          .
2236          .          .          .      S53A5
              .          .          .          .
              .          .          .          .
2246          .          .      UHIC1............
              .          .          .
              .          .          .
2251          .          .          .           .<-------  SPT1SW
2249          .          .          .     SPT1SW
              .          .          .           V
              .          .          .           V
2252          .          .          .     R51.2B
              .          .          .           .
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2259                                  .      S51.1B
                                      .          .
                                      .          .
2269                            C51.1B............
                                     V
                                     V
                                R51.2C
                                      .
                                      .
2279                                  .      S51.1C
                                      .          .
                                      .          .
2289                            C51.1C............
                                     V
                                     V
2292                            R51.2D
                                      .
                                      .
2299                                  .      S51.1D
                                      .          .
                                      .          .
2313                                  .          .          .<-------  DO511D
2311                                  .          .     D51.1D
                                      .          .          .
                                      .          .          .
2314                            C51.1D........................
                                      .
                                      .
2327                                  .-------> STOPDV
2318                            DETPDV
                                     V
                                     V
2330                            R52A1C
                                      .
                                      .
2340                                  .        51B8
                                      .          V
                                      .          V
2349                                  .       51B8R
                                      .          .
                                      .          .
                                      .          .        52A1
                                      .          .          .
                                      .          .          .
2358                                  .       52A1C............
                                      .          .
                                      .          .
2361                              C52A............
                                      .
                                      .
2366                                  .        52A0
                                      .          .
                                      .          .
2375                            C52A.1............
                                      .
                                      .
2384                                  .-------> DV52AW
2380                              D52AW
                                      .
                                      .
2395                                  .------->    PRSD
2389                            PRSDEX
                                     V
                                     V
2398                              RC52
                                      .
                                      .
2407                                  .        51B5
                                      .          V
                                      .          V
2416                                  .       51B5R
                                      .          .
                                      .          .
2421                                  .          .          .<-------  SPT3SW
2419                                  .          .     SPT3SW
                                      .          .          V
                                      .          .          V
2422                                  .          .      R51B6
                                      .          .          .
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2426                                  .          .          .        51B6
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2435            .         .         .         .         .      C51B6.........
                .         .         .         .         .         V
                .         .         .         .         .         V
2438            .         .         .         .         .      51B6R
                .         .         .         .         .         .
                .         .         .         .         .         .
2441            .         .         .         .         .         .       51B7
                .         .         .         .         .         .          V
                .         .         .         .         .         .          V
2450            .         .         .         .         .         .     51B7R1
                .         .         .         .         .         .          .
                .         .         .         .         .         .          .
2453            .         .         .         .      51B7C.......................
                .         .         .         .         V
                .         .         .         .         V
2456            .         .         .         .     51B7R2
                .         .         .         .         .
                .         .         .         .         .
2459            .         .         .         .         .       52B6
                .         .         .         .         .         .
                .         .         .         .         .         .
2467            .         .         .         .      52B6C...........
                .         .         .         .         V
                .         .         .         .         V
2470            .         .         .         .      52B6R
                .         .         .         .         .
                .         .         .         .         .
2473            .         .         .         .         .       52B7
                .         .         .         .         .         .
                .         .         .         .         .         .
2479            .         .         .         .     52B7C1...........
                .         .         .         .         .
                .         .         .         .         .
2482            .         .         .         .         .       52A2
                .         .         .         .         .         .
                .         .         .         .         .         .
2488            .         .         .         .         .         .       52B0
                .         .         .         .         .         .          .
                .         .         .         .         .         .          .
2497            .         .         .    52A2C2.....................................
                .         .         .         .
                .         .         .         .
2504            .         .         .         .-------->   DV52W
2502            .         .         .      D52W
                .         .         .         .
                .         .         .         .
2509            .         .         .         .         .<-------   DVSP3
2507            .         .         .         .      DVSP3
                .         .         .         .         V
                .         .         .         .         V
2510            .         .         .         .     RDVSP3
                .         .         .         .         .
                .         .         .         .         .
2514            .         .         .    C52SP4............
                .         .         .         .
                .         .         .         .
2522            .         .         .         .-------->   DVSP4
2517            .         .         .      DSP4
                .         .         .         V
                .         .         .         V
2525            .         .         .    RSP4EX
                .         .         .         .
                .         .         .         .
2538            .         .         .         .-------->    53HW
2532            .         .         .      53PS
                .         .         .         .
                .         .         .         .
2541            .         .         .         .        S53A
                .         .         .         .         .
                .         .         .         .         .
2549            .         .         .    CPIMA1............
                .         .         .         V
                .         .         .         V
2552            .         .         .    RPMA4B
                .         .         .         .
                .         .         .         .
2563            .         .         .         .         .<-------    PRSD
2561            .         .         .         .        PRSD
                .         .         .         .         V
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                 .         .         .         .         V
  2564           .         .         .         .     RDPSD1
                 .         .         .         .         V
                 .         .         .         .         V
  2569           .         .         .         .     RDPSD2
                 .         .         .         .         .
                 .         .         .         .         .
  2576           .         .         .         .         .          .<-------   DVSP4
  2574           .         .         .         .         .      DVSP4
                 .         .         .         .         .          V
                 .         .         .         .         .          V
  2577           .         .         .         .         .      RDVSP
                 .         .         .         .         .          .
                 .         .         .         .         .          .
  2584           .         .         .         .     CPCH1............
                 .         .         .         .         V
                 .         .         .         .         V
  2587           .         .         .         .     RPMA4A
                 .         .         .         .         .
                 .         .         .         .         .
  2595           .         .         .         .         .      S53A2
                 .         .         .         .         .          .
                 .         .         .         .         .          .
  2602           .         .         .         .     CPCH2............
                 .         .         .         .         .
                 .         .         .         .         .
  2605           .         .         .     CPCH3............
                 .         .         .         V
                 .         .         .         V
  2608           .         .         .     RUH2A
                 .         .         .         .
                 .         .         .         .
  2616           .         .         .         .     S53A4
                 .         .         .         .         .
                 .         .         .         .         .
  2625           .         .         .     CPCH4............
                 .         .         .         .
                 .         .         .         .
  2628           .     UHIC2........................
                 .         .
                 .         .
  [illegible]1   .         .     CPIMA3
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S30N	1087.	3.33	127.	32.	23.	.65		
+	ROUTED TO	R30N	1083.	3.37	127.	32.	23.	.65		
+									103.69	3.37
+	HYDROGRAPH AT	S31.1	358.	3.35	43.	11.	8.	.27		
+	2 COMBINED AT	C31.1	1436.	3.37	170.	43.	31.	.92		
+	HYDROGRAPH AT	S34.2	619.	3.33	72.	18.	13.	.44		
+	2 COMBINED AT	C34.2	2042.	3.35	242.	61.	44.	1.36		
+	HYDROGRAPH AT	S35N	1181.	3.22	107.	27.	19.	.55		
+	DIVERSION TO	D35NL	523.	3.22	47.	12.	9.	.55		

```
          HYDROGRAPH AT
+                         D35NR      658.    3.22         60.         15.         11.        .55

          ROUTED TO
+                         R35NR      642.    3.30         60.         15.         11.        .55
+                                                                                                    101.90
3.30

          HYDROGRAPH AT
+                         S36.2      352.    3.23         34.          8.          6.        .21

          2 COMBINED AT
+                         C36.2      952.    3.28         94.         24.         17.        .76

          DIVERSION TO
+                        D36.2L      255.    3.28          9.          2.          2.        .76

          HYDROGRAPH AT
+                        D36.2R      698.    3.28         85.         21.         15.        .76

          ROUTED TO
+                        R36.2R      633.    3.62         85.         21.         15.        .76
+                                                                                                    101.39
3.62

          HYDROGRAPH AT
+                         S34.1     1721.    3.30        191.         48.         35.       1.17

          2 COMBINED AT
+                         C34.1     1730.    3.30        275.         70.         50.       1.93

          2 COMBINED AT
+                        HVDB-I     3688.    3.32        517.        131.         94.       3.29

          ROUTED TO
+                        HVDB-O      133.    6.65        131.        114.         94.       3.29
+                                                                                                   2089.05
6.65

          DIVERSION TO
+                       DO34.1       133.     .00        131.        114.         94.       3.29

          HYDROGRAPH AT
+                         D34.1        0.     .00          0.          0.          0.       3.29

          ROUTED TO
+                         R34.1        0.     .00          0.          0.          0.       3.29
+                                                                                                    100.00
.00

          HYDROGRAPH AT
+                         S36.1      147.    3.42         19.          5.          4.        .14

          2 COMBINED AT
+                         C36.1      147.    3.42         19.          5.          4.       3.43

          DIVERSION TO
+                       DO36.1       147.     .00         19.          5.          4.       3.43

          HYDROGRAPH AT
+                         D36.1        0.     .00          0.          0.          0.       3.43

          ROUTED TO
+                         R36.1        0.     .00          0.          0.          0.       3.43
+                                                                                                    100.00
.00

          HYDROGRAPH AT
+                         B35NL      523.    3.22         47.         12.          9.        .00

          ROUTED TO
+                         R35NL      441.    3.67         47.         12.          9.        .00
+                                                                                                    103.37
3.67

          HYDROGRAPH AT
+                        B36.2L      255.    3.28          9.          2.          2.        .00

          ROUTED TO
+                        R36.2L      209.    3.57          9.          2.          2.        .00
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+                                                                                                101.72
3.57

          HYDROGRAPH AT
+                          S36R1A      618.   3.47        89.        23.        16.       .63

          4 COMBINED AT
+                          C36R1A     1141.   3.57       144.        36.        26.      4.06

          ROUTED TO
+                          R36R1A     1140.   3.58       144.        36.        26.      4.06
+                                                                                                103.41
3.58

          HYDROGRAPH AT
+                          S36R1C       84.   3.37        11.         3.         2.       .08

          DIVERSION TO
+                          DOSR1C       84.   4.07         8.         2.         1.       .08

          HYDROGRAPH AT
+                          DS-R1C       18.   4.07         4.         1.         1.       .08

          2 COMBINED AT
+                          C36R1C     1140.   3.58       148.        37.        27.      4.14

          DIVERSION TO
+                          DO361C      234.   3.58        88.        22.        16.      4.14

          HYDROGRAPH AT
+                          D36R1C      906.   3.58        60.        15.        11.      4.14

          HYDROGRAPH AT
+                          S36R1D      466.   3.47        71.        18.        13.       .50

          DIVERSION TO
+                          DOSR1D      153.   3.47         3.         1.         1.       .50

          HYDROGRAPH AT
+                          DS-R1D      466.   3.47        68.        17.        12.       .50

          2 COMBINED AT
+                          C36R1D     1300.   3.57       129.        32.        23.      4.64

          ROUTED TO
+                          R36R1D     1288.   3.60       129.        32.        23.      4.64
+                                                                                                  4.06
3.60

          HYDROGRAPH AT
+                           S1A2F       19.   3.08         1.         0.         0.       .01

          2 COMBINED AT
+                           C1A2F     1291.   3.60       130.        33.        24.      4.65

          DIVERSION TO
+                          DO1A2F       95.   3.60        12.         3.         2.      4.65

          HYDROGRAPH AT
+                           D1A2F     1195.   3.60       118.        30.        21.      4.65

          ROUTED TO
+                           R1A2F     1180.   3.63       118.        30.        21.      4.65
+                                                                                                  3.88
3.63

          HYDROGRAPH AT
+                           S1A2E       65.   3.08         5.         1.         1.       .03

          DIVERSION TO
+                          DOSA2E        0.   3.08         0.         0.         0.       .03

          HYDROGRAPH AT
+                          DS-A2E       65.   3.08         5.         1.         1.       .03

          2 COMBINED AT
+                           C1A2E     1188.   3.63       122.        31.        22.      4.68

          DIVERSION TO
+                          DO1A2E        0.   3.63         0.         0.         0.      4.68
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          HYDROGRAPH AT
+                         D1A2E     1188.   3.63        122.        31.        22.       4.68

          ROUTED TO
+                         R1A2E     1181.   3.65        122.        31.        22.       4.68
+                                                                                                  3.99
3.65

          HYDROGRAPH AT
+                         S1A2D       33.   3.10          2.         1.         0.        .02

          2 COMBINED AT
+                         C1A2D     1185.   3.65        124.        31.        23.       4.70

          DIVERSION TO
+                        DO1A2D        0.   3.65          0.         0.         0.       4.70

          HYDROGRAPH AT
+                         D1A2D     1185.   3.65        124.        31.        23.       4.70

          ROUTED TO
+                         R1A2D     1185.   3.65        124.        31.        23.       4.70
+                                                                                                  4.00
3.65

          HYDROGRAPH AT
+                         S1A2A      101.   3.08          7.         2.         1.        .05

          DIVERSION TO
+                        DOSA2A       78.   3.08          2.         0.         0.        .05

          HYDROGRAPH AT
+                        DS-A2A      101.   3.08          6.         1.         1.        .05

          HYDROGRAPH AT
+                         S1A2B       49.   3.10          4.         1.         1.        .02

          2 COMBINED AT
+                         C1A2B      150.   3.10          9.         2.         2.        .07

          HYDROGRAPH AT
+                         S1A2C       20.   3.08          1.         0.         0.        .01

          3 COMBINED AT
+                         C1A2C     1206.   3.65        135.        34.        25.       4.78

          ROUTED TO
+                         R1A2C     1198.   3.67        135.        34.        25.       4.78
+                                                                                                  4.02
3.67

          HYDROGRAPH AT
+                         S1A2G        8.   3.08          1.         0.         0.        .00

          2 COMBINED AT
+                         C1A2G     1199.   3.67        135.        34.        25.       4.78

          DIVERSION TO
+                        DO1A2G        0.   3.67          0.         0.         0.       4.78

          HYDROGRAPH AT
+                         D1A2G     1199.   3.67        135.        34.        25.       4.78

          DIVERSION TO
+                        DOA2G1      600.   3.67         68.        17.        12.       4.78

          HYDROGRAPH AT
+                         DA2G1      600.   3.67         68.        17.        12.       4.78

          ROUTED TO
+                         RA2G1      599.   3.67         68.        17.        12.       4.78

          HYDROGRAPH AT
+                         DA2G1      600.   3.67         68.        17.        12.        .00

          ROUTED TO
+                         RA2G2      599.   3.67         68.        17.        12.        .00

          2 COMBINED AT
+                        CRA2G1     1197.   3.67        135.        34.        25.       4.78
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                HYDROGRAPH AT
+                       S1B4      47.   3.08       3.       1.       1.      .02
                DIVERSION TO
+                      DOSR1D      0.   3.08       0.       0.       0.      .02
                HYDROGRAPH AT
+                      DS-1B4      47.   3.08       3.       1.       1.      .02
                2 COMBINED AT
+                       C1B4    1202.   3.67     138.      35.      25.     4.80
                DIVERSION TO
+                      DO1B4       0.   3.67       0.       0.       0.     4.80
                HYDROGRAPH AT
+                       D1B4    1202.   3.67     138.      35.      25.     4.80
                DIVERSION TO
+                     DOB4_1     601.   3.67      69.      18.      13.     4.80
                HYDROGRAPH AT
+                      DB4_1     601.   3.67      69.      18.      13.     4.80
                ROUTED TO
+                      RB4_2     600.   3.67      69.      18.      13.     4.80
                HYDROGRAPH AT
+                      DB4_1     601.   3.67      69.      18.      13.      .00
                ROUTED TO
+                      RB4_1     600.   3.67      69.      18.      13.      .00
                2 COMBINED AT
+                      CR1B4    1201.   3.67     138.      35.      25.     4.80
                HYDROGRAPH AT
+                       S1B3     239.   3.13      19.       5.       4.      .14
                2 COMBINED AT
+                       C1B3    1241.   3.67     157.      40.      29.     4.95
                DIVERSION TO
+                     DOB3_1     621.   3.67      79.      20.      14.     4.95
                HYDROGRAPH AT
+                      DB3_1     621.   3.67      79.      20.      14.     4.95
                ROUTED TO
+                      RB3_2     620.   3.67      79.      20.      14.     4.95
                HYDROGRAPH AT
+                      DB3_1     621.   3.67      79.      20.      14.      .00
                ROUTED TO
+                      RB3_1     620.   3.67      79.      20.      14.      .00
                2 COMBINED AT
+                      CR1B3    1239.   3.67     158.      40.      29.     4.95
                DIVERSION TO
+                      DO1B3       0.   3.67       0.       0.       0.     4.95
                HYDROGRAPH AT
+                       D1B3    1239.   3.67     158.      40.      29.     4.95
                HYDROGRAPH AT
+                       S1B1      64.   3.08       4.       1.       1.      .03
                ROUTED TO
+                       R1B1      63.   3.10       4.       1.       1.      .03
+                                                                                 100.75
3.10

                HYDROGRAPH AT
+                       S1B2      56.   3.13       5.       1.       1.      .04
                3 COMBINED AT
+                       C1B2    1258.   3.67     167.      42.      30.     5.02
                DIVERSION TO
```

```
+                        DO1B2      1258.     .00        167.        42.        30.       5.02

         HYDROGRAPH AT
+                         D1B2         0.     .00          0.         0.         0.       5.02

         HYDROGRAPH AT
+                        DO1B3         0.     .00          0.         0.         0.        .00

         2 COMBINED AT
+                       CD1A2G         0.     .00          0.         0.         0.       5.02

         ROUTED TO
+                        RD1B2         0.     .00          0.         0.         0.       5.02
+                                                                                                95.00
.00

         HYDROGRAPH AT
+                         D1B2      1258.    3.67        167.        42.        30.        .00

         DIVERSION TO
+                       DOB2_1       419.    3.67         56.        14.        10.        .00

         HYDROGRAPH AT
+                        DB2_1       838.    3.67        111.        28.        20.        .00

         DIVERSION TO
+                       DOB2_2       419.    3.67         56.        14.        10.        .00

         HYDROGRAPH AT
+                        DB2_2       419.    3.67         56.        14.        10.        .00

         ROUTED TO
+                        RB2_3       419.    3.68         56.        14.        10.        .00

         HYDROGRAPH AT
+                        DB2_2       419.    3.67         56.        14.        10.        .00

         ROUTED TO
+                        RB2_2       419.    3.68         56.        14.        10.        .00

         HYDROGRAPH AT
+                        DB2_1       419.    3.67         56.        14.        10.        .00

         ROUTED TO
+                        RB2_1       419.    3.68         56.        14.        10.        .00

         3 COMBINED AT
+                        CR1B2      1257.    3.68        167.        42.        30.        .00

         DIVERSION TO
+                       DO511D         0.    3.68          0.         0.         0.        .00

         HYDROGRAPH AT
+                       D51.1D      1257.    3.68        167.        42.        30.        .00

         ROUTED TO
+                       R51.1D      1254.    3.70        167.        42.        30.        .00
+                                                                                                98.44
3.70

         HYDROGRAPH AT
+                       SEEC13        22.    3.10          2.         0.         0.        .01

         2 COMBINED AT
+                       CEEC13      1256.    3.70        168.        43.        31.        .01

         ROUTED TO
+                       REEC13      1257.    3.70        168.        43.        31.        .01
+                                                                                                98.45
3.70

         HYDROGRAPH AT
+                       SEEC12         3.    3.07          0.         0.         0.        .00

         2 COMBINED AT
+                       CEEC12      1257.    3.70        168.        43.        31.        .01

         ROUTED TO
+                       REEC12      1257.    3.70        168.        43.        31.        .01
+                                                                                                98.45
3.70
```

```
                HYDROGRAPH AT
+                               SEEC11      15.   3.13        1.        0.        0.      .01
                2 COMBINED AT
+                               CEEC11    1259.   3.70      169.       43.       31.      .02
                ROUTED TO
+                               REEC11    1258.   3.70      169.       43.       31.      .02
+                                                                                          98.45
3.70

                HYDROGRAPH AT
+                               SEEC10      33.   3.13        3.        1.        1.      .02
                3 COMBINED AT
+                               CEEC10    1263.   3.70      172.       44.       32.     5.05
                ROUTED TO
+                               REEC10    1262.   3.70      172.       44.       32.     5.05
+                                                                                          98.45
3.70

                HYDROGRAPH AT
+                               SEEC09      44.   3.17        4.        1.        1.      .02
                HYDROGRAPH AT
+                                DO1B4       0.    .00        0.        0.        0.      .00
                3 COMBINED AT
+                               CEEC09    1270.   3.70      176.       45.       32.     5.07
                ROUTED TO
+                               REEC09    1269.   3.72      176.       45.       32.     5.07
+                                                                                          98.46
3.72

                HYDROGRAPH AT
+                               SEEC08      34.   3.37        5.        1.        1.      .03
                2 COMBINED AT
+                               CEEC08    1284.   3.72      181.       46.       33.     5.10
                ROUTED TO
+                               REEC08    1283.   3.72      181.       46.       33.     5.10
+                                                                                          98.48
3.72

                HYDROGRAPH AT
+                               SEEC07      13.   3.08        1.        0.        0.      .01
                2 COMBINED AT
+                               CEEC07    1284.   3.72      182.       46.       33.     5.11
                ROUTED TO
+                               REEC07    1283.   3.72      182.       46.       33.     5.11
+                                                                                          98.48
3.72

                HYDROGRAPH AT
+                               SEEC06       6.   3.08        0.        0.        0.      .00
                2 COMBINED AT
+                               CEEC06    1283.   3.72      183.       46.       33.     5.11
                ROUTED TO
+                               REEC06    1283.   3.73      183.       46.       33.     5.11
+                                                                                          98.48
3.73

                HYDROGRAPH AT
+                               SEEC05     114.   3.22       13.        3.        2.      .07
                HYDROGRAPH AT
+                               DO1A2D      0.    .00        0.        0.        0.      .00
                ROUTED TO
+                               RD1A2D      0.    .00        0.        0.        0.      .00
+                                                                                          95.00
.00
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```
          HYDROGRAPH AT
+                        DO1A2G        0.     .00          0.          0.          0.        .00
          2 COMBINED AT
+                        CD1A2G        0.     .00          0.          0.          0.        .00
          ROUTED TO
+                        RD1A2G        0.     .00          0.          0.          0.        .00
+                                                                                                    95.00
.00

          3 COMBINED AT
+                        CEEC05     1308.    3.73        195.         50.         36.       5.18
          DIVERSION TO
+                          37AW      639.    3.73         96.         24.         18.       5.18
          HYDROGRAPH AT
+                          37AE      669.    3.73         99.         25.         18.       5.18
          ROUTED TO
+                        REEC05      667.    3.75         99.         25.         18.       5.18
+                                                                                                    97.29
3.75

          HYDROGRAPH AT
+                        SEEC04      184.    3.27         22.          6.          4.        .13
          HYDROGRAPH AT
+                        DO1A2E        0.     .00          0.          0.          0.        .00
          ROUTED TO
+                        RD1A2E        0.     .00          0.          0.          0.        .00
+                                                                                                    95.00
.00

          3 COMBINED AT
+                        CEEC04      712.    3.73        121.         31.         22.       5.31
          ROUTED TO
+                        REEC04      712.    3.75        121.         31.         22.       5.31
+                                                                                                    97.38
3.75

          HYDROGRAPH AT
+                        SEEC03        9.    3.20          1.          0.          0.        .01
          2 COMBINED AT
+                        CEEC03      714.    3.75        122.         31.         22.       5.32
          ROUTED TO
+                        REEC03      713.    3.75        122.         31.         22.       5.32
+                                                                                                    97.38
3.75

          HYDROGRAPH AT
+                        SEEC02       26.    3.10          2.          0.          0.        .01
          2 COMBINED AT
+                        CEEC02      715.    3.75        123.         31.         23.       5.33
          ROUTED TO
+                        REEC02      715.    3.77        123.         31.         23.       5.33
+                                                                                                    97.39
3.77

          HYDROGRAPH AT
+                        SEEC01      254.    3.28         33.          8.          6.        .19
          HYDROGRAPH AT
+                        DO1A2F       95.    3.60         12.          3.          2.        .00
          ROUTED TO
+                        RD1A2F       91.    3.85         12.          3.          2.        .00
+                                                                                                    95.80
3.85

          3 COMBINED AT
+                        CEEC01      866.    3.77        167.         43.         31.       5.51
          ROUTED TO
```

+		REEC01	859.	3.82	167.	43.	31.	5.51	
+									97.63
3.82									
	HYDROGRAPH AT								
+		S37A3	204.	3.20	21.	5.	4.	.12	
	2 COMBINED AT								
+		C37A3	994.	3.30	188.	48.	35.	5.63	
	ROUTED TO								
+		R37A3	990.	3.32	188.	48.	35.	5.63	
+									97.83
3.32									
	HYDROGRAPH AT								
+		S37A2	89.	3.43	15.	4.	3.	.08	
	2 COMBINED AT								
+		C37A2	1074.	3.32	203.	52.	37.	5.72	
	ROUTED TO								
+		D37A2	1074.	3.32	198.	50.	36.	5.72	
+									1791.00
3.27									
	ROUTED TO								
+		R37A2	1071.	3.33	198.	50.	36.	5.72	
+									3.36
3.33									
	HYDROGRAPH AT								
+		S37A1	412.	3.45	69.	17.	13.	.40	
	HYDROGRAPH AT								
+		DO361C	234.	3.28	88.	22.	16.	.00	
	ROUTED TO								
+		RD-R1C	234.	3.72	88.	22.	16.	.00	
+									96.39
3									
	HYDROGRAPH AT								
+		D036.1	147.	3.42	19.	5.	4.	.00	
	ROUTED TO								
+		RD36.1	132.	3.78	19.	5.	4.	.00	
+									95.98
3.78									
	HYDROGRAPH AT								
+		DO34.1	133.	6.65	131.	114.	94.	.00	
	ROUTED TO								
+		RD34.1	133.	7.05	131.	114.	94.	.00	
+									96.00
7.05									
	5 COMBINED AT								
+		C37A1	1545.	3.83	485.	205.	162.	6.11	
	HYDROGRAPH AT								
+		52C13	62.	3.08	4.	1.	1.	.02	
	DIVERSION TO								
+		STORM	40.	3.08	4.	1.	1.	.02	
	HYDROGRAPH AT								
+		2C13DV	22.	3.08	0.	0.	0.	.02	
	ROUTED TO								
+		52C13R	20.	3.20	0.	0.	0.	.02	
	HYDROGRAPH AT								
+		52C15	155.	3.10	12.	3.	2.	.05	
	HYDROGRAPH AT								
+		52C14A	139.	3.10	11.	3.	2.	.04	
	3 COMBINED AT								
+		SP1	294.	3.10	24.	6.	4.	.11	

```
          DIVERSION TO
+                        DVSP1      294.   2.98        24.        6.        4.       .11
          HYDROGRAPH AT
+                        SP1EX        0.   2.98         0.        0.        0.       .11
          ROUTED TO
+                       RSP1EX        0.   3.78         0.        0.        0.       .11
+                                                                                          .50
3.85

          HYDROGRAPH AT
+                           39     3982.   3.23       411.      103.       75.      1.88
          HYDROGRAPH AT
+                           40     1473.   3.15       120.       30.       22.       .58
          2 COMBINED AT
+                          C40     5122.   3.22       531.      133.       96.      2.47
          ROUTED TO
+                          R41     4955.   3.38       531.      133.       96.      2.47
+                                                                                          4.79
3.38

          HYDROGRAPH AT
+                           41     1050.   3.28       117.       29.       21.       .83
          2 COMBINED AT
+                          C41     5754.   3.38       647.      163.      117.      3.29
          HYDROGRAPH AT
+                           42     1118.   3.18        97.       24.       17.       .58
          HYDROGRAPH AT
+                           43     2606.   3.18       234.       59.       42.      1.07
          HYDROGRAPH AT
+                           44     2032.   3.18       184.       46.       33.       .84
          2 COMBINED AT
+                          C44     4638.   3.18       418.      105.       76.      1.91
          ROUTED TO
+                          R45     4547.   3.25       418.      105.       76.      1.91
+                                                                                          5.22
3.25

          HYDROGRAPH AT
+                           45      544.   3.12        38.       10.        7.       .20
          2 COMBINED AT
+                          C45     4822.   3.25       456.      114.       83.      2.11
          HYDROGRAPH AT
+                          45A      489.   3.15        39.       10.        7.       .17
          HYDROGRAPH AT
+                           46     2927.   3.13       211.       53.       38.       .93
          3 COMBINED AT
+                          C46     6999.   3.22       706.      177.      128.      3.21
          ROUTED TO
+                          R47     6883.   3.33       706.      177.      128.      3.21
+                                                                                          5.89
3.33

          HYDROGRAPH AT
+                           47      451.   3.38        59.       15.       11.       .38
          2 COMBINED AT
+                        C47.1     7310.   3.33       765.      192.      138.      3.58
          3 COMBINED AT
+                        C47.2    13518.   3.35      1508.      379.      273.      7.46
          ROUTED TO
+                          R50    13489.   3.37      1508.      379.      273.      7.46
```

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+                                                                                                  5.81
3.37

                HYDROGRAPH AT
+                                50      1064.   3.15        83.       21.       15.       .41

                2 COMBINED AT
+                                C50    13910.   3.37      1591.      400.      288.      7.87

                DIVERSION TO
+                               APEXSO   6955.   3.37       795.      200.      144.      7.87

                HYDROGRAPH AT
+                               APEXSW   6955.   3.37       795.      200.      144.      7.87

                ROUTED TO
+                               R51.2A   6923.   3.40       795.      200.      144.      7.87
+                                                                                                  6.31
3.40

                HYDROGRAPH AT
+                               S51.1A    113.   3.28        13.        3.        2.       .07

                2 COMBINED AT
+                               C51.1A   7009.   3.40       807.      203.      146.      7.93

                DIVERSION TO
+                               SPT1SW   2033.   3.40       234.       59.       42.      7.93

                HYDROGRAPH AT
+                               SPT1SO   4977.   3.40       573.      144.      104.      7.93

                ROUTED TO
+                               R51B9    4966.   3.40       573.      144.      104.      7.93

                HYDROGRAPH AT
+                                51B9      59.   3.10         4.        1.        1.       .02

                2 COMBINED AT
+                               C51B9    4982.   3.40       577.      145.      105.      7.96

                DIVERSION TO
+                               SPT2SW   1594.   3.40       185.       47.       34.      7.96

                HYDROGRAPH AT
+                               SPT2SO   3388.   3.40       393.       99.       71.      7.96

                ROUTED TO
+                               R51B2    3372.   3.47       392.       99.       71.      7.96

                HYDROGRAPH AT
+                                51B2     109.   3.20        11.        3.        2.       .06

                2 COMBINED AT
+                               C51B2    3418.   3.47       402.      102.       73.      8.02

                ROUTED TO
+                               51B2R    3410.   3.48       403.      102.       73.      8.02

                HYDROGRAPH AT
+                                52C8      20.   3.10         1.        0.        0.       .01

                2 COMBINED AT
+                               52C8C    3415.   3.48       404.      102.       74.      8.03

                ROUTED TO
+                               52C8R    3412.   3.48       404.      102.       74.      8.03

                HYDROGRAPH AT
+                                51C3      32.   3.15         3.        1.        1.       .02

                ROUTED TO
+                               51C3R     32.   3.17         3.        1.        1.       .02

                HYDROGRAPH AT
+                                51B1      34.   3.13         3.        1.        0.       .01

                ROUTED TO
+                               51B1R     33.   3.15         3.        1.        0.       .01

                HYDROGRAPH AT
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```
+                    52C7      16.   3.08        1.        0.        0.      .01

     3 COMBINED AT
+                   52C7C      75.   3.15        7.        2.        1.      .04

     ROUTED TO
+                   52C7R      74.   3.20        7.        2.        1.      .04

     2 COMBINED AT
+                  52C9C1    3439.   3.48      410.      104.       75.     8.06

     ROUTED TO
+                  52C9R1    3437.   3.50      410.      104.       75.     8.06

     HYDROGRAPH AT
+                    52C9     151.   3.15       13.        3.        2.      .07

     2 COMBINED AT
+                  52C9C2    3478.   3.50      423.      107.       77.     8.13

     ROUTED TO
+                  52C9R2    3473.   3.50      423.      107.       77.     8.13

     HYDROGRAPH AT
+                    51C2      81.   3.18        8.        2.        1.      .04

     ROUTED TO
+                   51C2R      80.   3.20        8.        2.        1.      .04

     HYDROGRAPH AT
+                    52C5      38.   3.12        3.        1.        1.      .02

     2 COMBINED AT
+                   52C5C     107.   3.17       11.        3.        2.      .06

     ROUTED TO
+                   52C5R     107.   3.28       11.        3.        2.      .06

     HYDROGRAPH AT
+                    52C6      72.   3.18        7.        2.        1.      .04

     2 COMBINED AT
+                   52C6C     159.   3.25       18.        4.        3.      .09

     ROUTED TO
+                   52C6R     159.   3.27       18.        4.        3.      .09

     2 COMBINED AT
+                  2C10C1    3557.   3.50      440.      112.       80.     8.23

     ROUTED TO
+                  2C10R1    3552.   3.50      440.      112.       80.     8.23

     HYDROGRAPH AT
+                   52C10      27.   3.10        2.        0.        0.      .01

     2 COMBINED AT
+                  2C10C2    3559.   3.50      442.      112.       81.     8.24

     HYDROGRAPH AT
+                   52C11      85.   3.17        8.        2.        1.      .04

     ROUTED TO
+                  2C11R1      85.   3.18        8.        2.        1.      .04

     HYDROGRAPH AT
+                  52C13D      40.   3.05        4.        1.        1.      .00

     2 COMBINED AT
+                  52C11C     124.   3.17       12.        3.        2.      .04

     ROUTED TO
+                  2C11CR     122.   3.18       12.        3.        2.      .04

     2 COMBINED AT
+                  2C11C2    3600.   3.50      453.      115.       83.     8.28

     ROUTED TO
+                  2C11R2    3596.   3.52      454.      115.       83.     8.28

     HYDROGRAPH AT
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+                    52C12      100.   3.07        7.        2.        1.      .02
     2 COMBINED AT
+                    52C12C    3611.   3.52      460.      117.       84.     8.31
     ROUTED TO
+                    52C12R    3605.   3.53      460.      117.       84.     8.31
     HYDROGRAPH AT
+                    52C14B      70.   3.08        5.        1.        1.      .02
     HYDROGRAPH AT
+                     DVSP1     294.   3.10       24.        6.        4.      .00
     ROUTED TO
+                    RDVSP1     291.   3.12       24.        6.        4.      .00
     3 COMBINED AT
+                       SP2    3673.   3.53      487.      125.       90.     8.33
     DIVERSION TO
+                     DVSP2    1328.   3.53      370.       95.       69.     8.33
     HYDROGRAPH AT
+                      DSP2    2345.   3.53      117.       29.       21.     8.33
     ROUTED TO
+                    RSP2EX    2335.   3.55      117.       29.       21.     8.33
+                                                                                   5.22
3.55

     HYDROGRAPH AT
+                      51B3      38.   3.25        4.        1.        1.      .02
     ROUTED TO
+                     51B3R      38.   3.27        4.        1.        1.      .02
     HYDROGRAPH AT
+                      52B1       7.   3.10        1.        0.        0.      .00
     2 COMBINED AT
                     52B1C      41.   3.27        5.        1.        1.      .03
     ROUTED TO
+                    52B1R      41.   3.30        5.        1.        1.      .03
     HYDROGRAPH AT
+                   SPT2SW    1594.   3.40      185.       47.       34.      .00
     ROUTED TO
+                   R51B10    1589.   3.43      185.       46.       34.      .00
     HYDROGRAPH AT
+                    51B10      52.   3.13        4.        1.        1.      .02
     2 COMBINED AT
+                   C51B10    1604.   3.43      189.       48.       34.      .02
     DIVERSION TO
+                   SPT3SW     642.   3.43       75.       19.       14.      .02
     HYDROGRAPH AT
+                   SPT3SO     963.   3.43      113.       29.       21.      .02
     ROUTED TO
+                    R51B4     960.   3.48      113.       29.       21.      .02
     HYDROGRAPH AT
+                     51B4      47.   3.17        4.        1.        1.      .02
     2 COMBINED AT
+                    C51B4     975.   3.48      117.       30.       21.      .05
     ROUTED TO
+                   51B4R1     973.   3.50      117.       30.       21.      .05
     2 COMBINED AT
+                   52B2C1     997.   3.50      122.       31.       22.      .08
     ROUTED TO
+                   52B2R1     995.   3.52      122.       31.       22.      .08
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                HYDROGRAPH AT
+                         52B2      59.   3.15       5.       1.       1.      .03

                2 COMBINED AT
+                       52B2C2    1012.   3.52     127.      32.      23.      .11

                ROUTED TO
+                       52B2R2    1011.   3.53     127.      32.      23.      .11

                ROUTED TO
+                       52B3R1    1009.   3.55     127.      32.      23.      .11

                HYDROGRAPH AT
+                         52B3     125.   3.18      12.       3.       2.      .06

                2 COMBINED AT
+                       52B3C2    1045.   3.55     139.      35.      25.      .17

                ROUTED TO
+                       52B3R2    1043.   3.57     139.      35.      25.      .17

                HYDROGRAPH AT
+                         52B4      83.   3.12       7.       2.       1.      .03

                2 COMBINED AT
+                         52B4C   1057.   3.57     145.      37.      27.      .20

                ROUTED TO
+                         52B4R   1056.   3.58     145.      37.      27.      .20

                HYDROGRAPH AT
+                         52B5      68.   3.10       5.       1.       1.      .02

                HYDROGRAPH AT
+                         DVSP2   1328.   3.38     370.      95.      69.      .00

                ROUTED TO
+                       RDVSP2    1328.   3.40     370.      95.      69.      .00

                3 COMBINED AT
+                           SP3   2395.   3.58     520.     134.      96.      .22

                DIVERSION TO
+                         DVSP3   1328.   3.58     445.     115.      83.      .22

                HYDROGRAPH AT
+                         DSP3    1067.   3.58      75.      19.      14.      .22

                ROUTED TO
+                       RSP3EX    1062.   3.63      76.      19.      14.      .22

                3 COMBINED AT
+                         CSPEX   3324.   3.58     193.      48.      35.     8.65

                ROUTED TO
+                         R53A1   3315.   3.60     194.      48.      35.     8.65

                HYDROGRAPH AT
+                         S53A1    317.   3.28      36.       9.       6.      .18

                2 COMBINED AT
+                         C53A1   3448.   3.60     229.      57.      41.     8.84

                ROUTED TO
+                       RPIMA2    3439.   3.62     230.      58.      42.     8.84

                HYDROGRAPH AT
+                         S53A3    159.   3.18      14.       4.       3.      .07

                2 COMBINED AT
+                       CPIMA2    3479.   3.62     244.      61.      44.     8.91

                ROUTED TO
+                         RUH2B   3457.   3.65     244.      61.      44.     8.91
+                                                                                  5.75
3.65

                HYDROGRAPH AT
+                         S53A6      68.   3.10       5.       1.       1.      .03
```

```
                ROUTED TO
+                          RUH2C      66.   3.13       5.       1.       1.      .03
+                                                                                          .73
3.13

                HYDROGRAPH AT
+                          S53A5      58.   3.10       4.       1.       1.      .02

                2 COMBINED AT
+                          UHIC1     123.   3.12      10.       2.       2.      .05

                HYDROGRAPH AT
+                          SPT1SW    2033.  3.40     234.      59.      42.      .00

                ROUTED TO
+                          R51.2B    2028.  3.42     234.      59.      42.      .00
+                                                                                          3.68
3.42

                HYDROGRAPH AT
+                          S51.1B      77.  3.32       9.       2.       2.      .05

                2 COMBINED AT
+                          C51.1B    2091.  3.42     243.      61.      44.      .05

                ROUTED TO
+                          R51.2C    2083.  3.45     243.      61.      44.      .05
+                                                                                          3.72
3.45

                HYDROGRAPH AT
+                          S51.1C     129.  3.40      18.       4.       3.      .10

                2 COMBINED AT
+                          C51.1C    2206.  3.45     260.      66.      47.      .15

                ROUTED TO
+                          R51.2D    2194.  3.50     260.      66.      47.      .15
+                                                                                          3.81
3.50

                HYDROGRAPH AT
+                          S51.1D    1035.  3.50     165.      42.      30.      .90

                HYDROGRAPH AT
+                          D51.1D       0.   .00       0.       0.       0.      .00

                3 COMBINED AT
+                          C51.1D    3229.  3.50     424.     108.      78.     1.05

                DIVERSION TO
+                          STOPDV     246.  3.50       9.       2.       2.     1.05

                HYDROGRAPH AT
+                          DETPDV    3229.  3.50     418.     105.      76.     1.05

                ROUTED TO
+                          R52A1C    3215.  3.53     418.     105.      76.     1.05
+                                                                                          5.48
3.53

                HYDROGRAPH AT
+                           51B8      58.  3.28       7.       2.       1.      .04

                ROUTED TO
+                          51B8R      58.  3.43       7.       2.       1.      .04

                HYDROGRAPH AT
+                           52A1     294.  3.13      26.       6.       5.      .13

                2 COMBINED AT
+                          52A1C     297.  3.15      33.       8.       6.      .17

                2 COMBINED AT
+                           C52A    3337.  3.53     448.     114.      82.     1.22

                HYDROGRAPH AT
+                           52A0     118.  3.08       7.       2.       1.      .04

                2 COMBINED AT
+                          C52A.1    3355.  3.53     455.     115.      83.     1.25
```

```
                DIVERSION TO
+                          DV52AW      273.   3.53        29.        7.        5.     1.25

                HYDROGRAPH AT
+                          D52AW     3083.   3.53       427.      108.       78.     1.25

                DIVERSION TO
+                           PRSD      600.   3.53       252.       65.       47.     1.25

                HYDROGRAPH AT
+                         PRSDEX     2483.   3.53       175.       44.       31.     1.25

                ROUTED TO
+                           RC52     2469.   3.58       175.       44.       31.     1.25
+                                                                                          2.94
3.58

                HYDROGRAPH AT
+                           51B5       10.   3.12         1.        0.        0.      .00

                ROUTED TO
+                          51B5R       10.   3.20         1.        0.        0.      .00

                HYDROGRAPH AT
+                         SPT3SW      642.   3.43        75.       19.       14.      .00

                ROUTED TO
+                          R51B6      639.   3.52        75.       19.       14.      .00

                HYDROGRAPH AT
+                           51B6       86.   3.18         8.        2.        1.      .04

                2 COMBINED AT
+                          C51B6      665.   3.52        83.       21.       15.      .04

                ROUTED TO
+                          51B6R      665.   3.53        83.       21.       15.      .04

                HYDROGRAPH AT
+                           51B7       49.   3.20         5.        1.        1.      .03

                ROUTED TO
+                         51B7R1       49.   3.22         5.        1.        1.      .03

                3 COMBINED AT
+                          51B7C      685.   3.53        89.       23.       16.      .08

                ROUTED TO
+                         51B7R2      683.   3.57        89.       23.       16.      .08

                HYDROGRAPH AT
+                           52B6      202.   3.15        18.        4.        3.      .10

                2 COMBINED AT
+                          52B6C      730.   3.57       106.       27.       19.      .17

                ROUTED TO
+                          52B6R      728.   3.63       106.       27.       20.      .17

                HYDROGRAPH AT
+                           52B7      285.   3.12        24.        6.        4.      .08

                2 COMBINED AT
+                         52B7C1      768.   3.62       128.       33.       24.      .25

                HYDROGRAPH AT
+                           52A2      236.   3.12        21.        5.        4.      .06

                HYDROGRAPH AT
+                           52B0       53.   3.08         3.        1.        1.      .02

                4 COMBINED AT
+                         52A2C2     3266.   3.60       327.       83.       60.     1.59

                DIVERSION TO
+                          DV52W        0.   3.60         0.        0.        0.     1.59

                HYDROGRAPH AT
+                           D52W     3266.   3.60       327.       83.       60.     1.59
```

```
                HYDROGRAPH AT
+                          DVSP3     1328.   3.38      445.      115.      83.      .00
                ROUTED TO
+                          RDVSP3    1328.   3.43      445.      115.      83.      .00
                2 COMBINED AT
+                          C52SP4    4594.   3.60      770.      198.     143.     1.59
                DIVERSION TO
+                          DVSP4     1328.   3.60      525.      137.      98.     1.59
                HYDROGRAPH AT
+                          DSP4      3266.   3.60      245.       61.      44.     1.59
                ROUTED TO
+                          RSP4EX    3258.   3.63      245.       61.      44.     1.59
+                                                                                          3.19
3.63

                DIVERSION TO
+                          53HW         0.   3.63        0.        0.       0.     1.59
                HYDROGRAPH AT
+                          53PS      3258.   3.63      245.       61.      44.     1.59
                HYDROGRAPH AT
+                          S53A       225.   3.25       24.        6.       4.      .13
                2 COMBINED AT
+                          CPIMA1    3335.   3.63      269.       67.      49.     1.71
                ROUTED TO
+                          RPMA4B    3342.   3.65      269.       67.      49.     1.71
+                                                                                          3.19
3.65

                HYDROGRAPH AT
+                          PRSD       600.   3.28      252.       65.      47.      .00
                ROUTED TO
                           RDPSD1     600.   3.30      252.       65.      47.      .00
                ROUTED TO
+                          RDPSD2     600.   3.32      252.       65.      47.      .00
                HYDROGRAPH AT
+                          DVSP4     1328.   3.12      525.      137.      98.      .00
                ROUTED TO
+                          RDVSP     1333.   3.17      525.      137.      98.      .00
+                                                                                          2.67
3.17

                2 COMBINED AT
+                          CPCH1     1928.   3.33      777.      201.     145.      .00
                ROUTED TO
+                          RPMA4A    1928.   3.37      777.      201.     145.      .00
+                                                                                          3.27
3.37

                HYDROGRAPH AT
+                          S53A2      131.   3.12       11.        3.       2.      .05
                2 COMBINED AT
+                          CPCH2     1975.   3.35      787.      204.     147.      .05
                2 COMBINED AT
+                          CPCH3     5291.   3.65     1056.      271.     195.     1.77
                ROUTED TO
+                          RUH2A     5264.   3.68     1056.      271.     195.     1.77
+                                                                                          5.32
3.68

                HYDROGRAPH AT
+                          S53A4      128.   3.13       11.        3.       2.      .05
                2 COMBINED AT
+                          CPCH4     5284.   3.68     1066.      274.     197.     1.82
```

```
          3 COMBINED AT
+                        UHIC2      8723.    3.67        1319.        337.        243.      10.78

          HYDROGRAPH AT
+                        CPIMA3      192.    3.15          18.          5.          3.        .07
```

```
+                          53PS        0.    7.23        0.        0.        0.     1.59

         HYDROGRAPH AT
+                          S53A       31.    3.47        6.        2.        1.      .13

         2 COMBINED AT
+                        CPIMA1       31.    3.47        6.        2.        1.     1.71

         ROUTED TO
+                        RPMA4B       31.    3.52        6.        2.        1.     1.71
+                                                                                          1.06
3.52

         HYDROGRAPH AT
+                          PRSD      267.    4.07       69.       18.       13.      .00

         ROUTED TO
+                        RDPSD1      267.    4.07       69.       18.       13.      .00

         ROUTED TO
+                        RDPSD2      267.    4.08       69.       18.       13.      .00

         HYDROGRAPH AT
+                          DVSP4      546.    4.22      180.       48.       35.      .00

         ROUTED TO
+                          RDVSP      546.    4.23      180.       48.       35.      .00
+                                                                                          1.98
4.23

         2 COMBINED AT
+                          CPCH1      784.    4.23      248.       66.       48.      .00

         ROUTED TO
+                        RPMA4A      780.    4.28      248.       66.       48.      .00
+                                                                                          1.97
4.28

         HYDROGRAPH AT
+                          S53A2       20.    3.23        3.        1.        1.      .05

         2 COMBINED AT
                          CPCH2      782.    4.28      251.       67.       48.      .05

         2 COMBINED AT
+                          CPCH3      792.    4.28      257.       68.       49.     1.77

         ROUTED TO
+                          RUH2A      790.    4.32      257.       68.       49.     1.77
+                                                                                          1.84
4.32

         HYDROGRAPH AT
+                          S53A4       20.    3.23        3.        1.        1.      .05

         2 COMBINED AT
+                          CPCH4      793.    4.32      259.       69.       50.     1.82

         3 COMBINED AT
+                          UHIC2      821.    4.32      275.       73.       53.    10.78

         HYDROGRAPH AT
+                        CPIMA3       47.    3.22        7.        2.        1.      .07
```

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   28AUG09  TIME  12:20:33  *
*                                      *
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****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X       XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S30N	130.	3.65	28.	7.	5.	.65		
	ROUTED TO	R30N	129.	3.72	28.	7.	5.	.65	101.41	3.72
+	HYDROGRAPH AT	S31.1	34.	3.72	8.	2.	2.	.27		
+	2 COMBINED AT	C31.1	163.	3.72	36.	9.	7.	.92		
+	HYDROGRAPH AT	S34.2	58.	3.67	14.	4.	3.	.44		
+	2 COMBINED AT	C34.2	220.	3.72	50.	13.	9.	1.36		
+	HYDROGRAPH AT	S35N	144.	3.42	24.	6.	4.	.55		
+	DIVERSION TO	D35NL	63.	3.42	10.	3.	2.	.55		
+	HYDROGRAPH AT	D35NR	82.	3.42	14.	3.	3.	.55		
+	ROUTED TO	R35NR	80.	3.55	14.	3.	3.	.55	100.56	3.55
+	HYDROGRAPH AT	S36.2	33.	3.50	7.	2.	1.	.21		
+	2 COMBINED AT	C36.2	112.	3.55	20.	5.	4.	.76		
+	DIVERSION TO	D36.2L	0.	3.55	0.	0.	0.	.76		
+	HYDROGRAPH AT	D36.2R	112.	3.55	20.	5.	4.	.76		

```
          ROUTED TO
+                        R36.2R        98.    4.10          20.          5.          4.        .76
+                                                                                                          100.61
4.10

          HYDROGRAPH AT
+                         S34.1       157.    3.62          37.          9.          7.       1.17

          2 COMBINED AT
+                         C34.1       191.    4.02          57.         15.         11.       1.93

          2 COMBINED AT
+                        HVDB-I       375.    3.68         107.         28.         20.       3.29

          ROUTED TO
+                        HVDB-O        81.    5.80          77.         28.         20.       3.29
+                                                                                                         2073.64
5.80

          DIVERSION TO
+                       DO34.1         81.     .00          77.         28.         20.       3.29

          HYDROGRAPH AT
+                         D34.1         0.     .00           0.          0.          0.       3.29

          ROUTED TO
+                         R34.1         0.     .00           0.          0.          0.       3.29
+                                                                                                          100.00
.00

          HYDROGRAPH AT
+                         S36.1        12.    3.85           3.          1.          1.        .14

          2 COMBINED AT
+                         C36.1        12.    3.85           3.          1.          1.       3.43

          DIVERSION TO
+                       DO36.1         12.     .00           3.          1.          1.       3.43

          HYDROGRAPH AT
+                         D36.1         0.     .00           0.          0.          0.       3.43

          ROUTED TO
+                         R36.1         0.     .00           0.          0.          0.       3.43
+                                                                                                          100.00
.00

          HYDROGRAPH AT
+                         B35NL        63.    3.42          10.          3.          2.        .00

          ROUTED TO
+                         R35NL        57.    3.93          10.          3.          2.        .00
+                                                                                                          101.24
3.93

          HYDROGRAPH AT
+                        B36.2L         0.     .00           0.          0.          0.        .00

          ROUTED TO
+                        R36.2L         0.     .00           0.          0.          0.        .00
+                                                                                                          100.00
.00

          HYDROGRAPH AT
+                       S36R1A         47.    4.02          15.          4.          3.        .63

          4 COMBINED AT
+                       C36R1A        103.    3.95          25.          6.          5.       4.06

          ROUTED TO
+                       R36R1A        103.    3.97          25.          6.          5.       4.06
+                                                                                                          101.12
3.97

          HYDROGRAPH AT
+                       S36R1C          6.    3.80           2.          0.          0.        .08

          DIVERSION TO
+                      DOSR1C          6.     .00           2.          0.          0.        .08
```

```
                HYDROGRAPH AT
+                               DS-R1C        0.     .00          0.        0.        0.       .08

                2 COMBINED AT
+                               C36R1C      103.    3.97         25.        6.        5.      4.14

                DIVERSION TO
+                               DO361C      103.     .00         25.        6.        5.      4.14

                HYDROGRAPH AT
+                               D36R1C        0.     .00          0.        0.        0.      4.14

                HYDROGRAPH AT
+                               S36R1D       36.    3.97         12.        3.        2.       .50

                DIVERSION TO
+                               DOSR1D       36.    3.98          3.        1.        1.       .50

                HYDROGRAPH AT
+                               DS-R1D       36.    3.98          9.        2.        2.       .50

                2 COMBINED AT
+                               C36R1D       36.    3.98          9.        2.        2.      4.64

                ROUTED TO
+                               R36R1D       33.    4.22          9.        2.        2.      4.64
+                                                                                                    .63
4.22

                HYDROGRAPH AT
+                               S1A2F         2.    3.13          0.        0.        0.       .01

                2 COMBINED AT
+                               C1A2F        34.    4.22          9.        2.        2.      4.65

                DIVERSION TO
+                               DO1A2F        4.    4.22          1.        0.        0.      4.65

                HYDROGRAPH AT
+                               D1A2F        29.    4.22          8.        2.        2.      4.65

                ROUTED TO
                                R1A2F        27.    4.40          8.        2.        2.      4.65
+                                                                                                    .58
4.40

                HYDROGRAPH AT
+                               S1A2E         8.    3.15          1.        0.        0.       .03

                DIVERSION TO
+                               DOSA2E        0.    3.15          0.        0.        0.       .03

                HYDROGRAPH AT
+                               DS-A2E        8.    3.15          1.        0.        0.       .03

                2 COMBINED AT
+                               C1A2E        28.    4.40          9.        2.        2.      4.68

                DIVERSION TO
+                               DO1A2E        0.    4.40          0.        0.        0.      4.68

                HYDROGRAPH AT
+                               D1A2E        28.    4.40          9.        2.        2.      4.68

                ROUTED TO
+                               R1A2E        27.    4.48          9.        2.        2.      4.68
+                                                                                                    .60
4.48

                HYDROGRAPH AT
+                               S1A2D         4.    3.17          1.        0.        0.       .02

                2 COMBINED AT
+                               C1A2D        28.    4.48          9.        3.        2.      4.70

                DIVERSION TO
                                DO1A2D        0.    4.48          0.        0.        0.      4.70

                HYDROGRAPH AT
+                               D1A2D        28.    4.48          9.        3.        2.      4.70
```

```
          ROUTED TO
+                        R1A2D        27.   4.53          9.          3.          2.       4.70
+                                                                                                          .60
4.53

          HYDROGRAPH AT
+                        S1A2A        13.   3.15          2.          0.          0.        .05

          DIVERSION TO
+                       DOSA2A        13.   6.28          2.          0.          0.        .05

          HYDROGRAPH AT
+                       DS-A2A         1.   6.28          0.          0.          0.        .05

          HYDROGRAPH AT
+                        S1A2B         6.   3.17          1.          0.          0.        .02

          2 COMBINED AT
+                        C1A2B         6.   3.17          1.          0.          0.        .07

          HYDROGRAPH AT
+                        S1A2C         3.   3.13          0.          0.          0.        .01

          3 COMBINED AT
+                        C1A2C        28.   4.53         10.          3.          2.       4.78

          ROUTED TO
+                        R1A2C        27.   4.63         10.          3.          2.       4.78
+                                                                                                          .60
4.63

          HYDROGRAPH AT
+                        S1A2G         1.   3.13          0.          0.          0.        .00

          2 COMBINED AT
+                        C1A2G        27.   4.63         10.          3.          2.       4.78

          DIVERSION TO
+                       DO1A2G         0.   4.63          0.          0.          0.       4.78

          HYDROGRAPH AT
+                        D1A2G        27.   4.63         10.          3.          2.       4.78

          DIVERSION TO
+                       DOA2G1        14.   4.63          5.          1.          1.       4.78

          HYDROGRAPH AT
+                        DA2G1        14.   4.63          5.          1.          1.       4.78

          ROUTED TO
+                        RA2G1        13.   4.65          5.          1.          1.       4.78

          HYDROGRAPH AT
+                        DA2G1        14.   4.63          5.          1.          1.        .00

          ROUTED TO
+                        RA2G2        13.   4.65          5.          1.          1.        .00

          2 COMBINED AT
+                       CRA2G1        27.   4.65         10.          3.          2.       4.78

          HYDROGRAPH AT
+                         S1B4         4.   3.17          1.          0.          0.        .02

          DIVERSION TO
+                       DOSR1D         0.   3.17          0.          0.          0.        .02

          HYDROGRAPH AT
+                       DS-1B4         4.   3.17          1.          0.          0.        .02

          2 COMBINED AT
+                         C1B4        27.   4.63         11.          3.          2.       4.80

          DIVERSION TO
+                        DO1B4         0.   4.63          0.          0.          0.       4.80

          HYDROGRAPH AT
+                         D1B4        27.   4.63         11.          3.          2.       4.80

          DIVERSION TO
+                       DOB4_1        14.   4.63          5.          1.          1.       4.80
```

```
                HYDROGRAPH AT
+                                DB4_1      14.   4.63        5.        1.        1.      4.80
                ROUTED TO
+                                RB4_2      14.   4.65        5.        1.        1.      4.80
                HYDROGRAPH AT
+                                DB4_1      14.   4.63        5.        1.        1.       .00
                ROUTED TO
+                                RB4_1      14.   4.65        5.        1.        1.       .00
                2 COMBINED AT
+                                CR1B4      27.   4.65       11.        3.        2.      4.80
                HYDROGRAPH AT
+                                 S1B3      20.   3.28        3.        1.        1.       .14
                2 COMBINED AT
+                                 C1B3      39.   3.28       14.        4.        3.      4.95
                DIVERSION TO
+                              DOB3_1       19.   3.28        7.        2.        1.      4.95
                HYDROGRAPH AT
+                                DB3_1      19.   3.28        7.        2.        1.      4.95
                ROUTED TO
+                                RB3_2      19.   3.28        7.        2.        1.      4.95
                HYDROGRAPH AT
+                                DB3_1      19.   3.28        7.        2.        1.       .00
                ROUTED TO
+                                RB3_1      19.   3.28        7.        2.        1.       .00
                2 COMBINED AT
+                                CR1B3      39.   3.28       14.        4.        3.      4.95
                DIVERSION TO
                                 DO1B3       0.   3.28        0.        0.        0.      4.95
                HYDROGRAPH AT
+                                 D1B3      39.   3.28       14.        4.        3.      4.95
                HYDROGRAPH AT
+                                 S1B1       5.   3.17        1.        0.        0.       .03
                ROUTED TO
+                                 R1B1       5.   3.20        1.        0.        0.       .03
+                                                                                          100.11
3.20

                HYDROGRAPH AT
+                                 S1B2       4.   3.32        1.        0.        0.       .04
                3 COMBINED AT
+                                 C1B2      47.   3.28       16.        4.        3.      5.02
                DIVERSION TO
+                                DO1B2      47.    .00       16.        4.        3.      5.02
                HYDROGRAPH AT
+                                 D1B2       0.    .00        0.        0.        0.      5.02
                HYDROGRAPH AT
+                                DO1B3       0.    .00        0.        0.        0.       .00
                2 COMBINED AT
+                               CD1A2G       0.    .00        0.        0.        0.      5.02
                ROUTED TO
+                                RD1B2       0.    .00        0.        0.        0.      5.02
+                                                                                           95.00
.00

                HYDROGRAPH AT
+                                 D1B2      47.   3.28       16.        4.        3.       .00
                DIVERSION TO
```

```
+                    DOB2_1        16.    3.28          5.          1.          1.        .00

        HYDROGRAPH AT
+                     DB2_1        32.    3.28         10.          3.          2.        .00

        DIVERSION TO
+                    DOB2_2        16.    3.28          5.          1.          1.        .00

        HYDROGRAPH AT
+                     DB2_2        16.    3.28          5.          1.          1.        .00

        ROUTED TO
+                     RB2_3        16.    3.30          5.          1.          1.        .00

        HYDROGRAPH AT
+                     DB2_2        16.    3.28          5.          1.          1.        .00

        ROUTED TO
+                     RB2_2        16.    3.30          5.          1.          1.        .00

        HYDROGRAPH AT
+                     DB2_1        16.    3.28          5.          1.          1.        .00

        ROUTED TO
+                     RB2_1        16.    3.30          5.          1.          1.        .00

        3 COMBINED AT
+                     CR1B2        47.    3.30         16.          4.          3.        .00

        DIVERSION TO
+                   DO511D         0.    3.30          0.          0.          0.        .00

        HYDROGRAPH AT
+                    D51.1D        47.    3.30         16.          4.          3.        .00

        ROUTED TO
+                    R51.1D        47.    3.33         16.          4.          3.        .00
+                                                                                          95.54
3.33

        HYDROGRAPH AT
+                    SEEC13         4.    3.15          0.          0.          0.        .01

        2 COMBINED AT
+                    CEEC13        48.    3.33         16.          4.          3.        .01

        ROUTED TO
+                    REEC13        48.    3.35         16.          4.          3.        .01
+                                                                                          95.55
3.35

        HYDROGRAPH AT
+                    SEEC12         1.    3.10          0.          0.          0.        .00

        2 COMBINED AT
+                    CEEC12        48.    3.35         16.          4.          3.        .01

        ROUTED TO
+                    REEC12        48.    3.35         16.          4.          3.        .01
+                                                                                          95.55
3.35

        HYDROGRAPH AT
+                    SEEC11         2.    3.23          0.          0.          0.        .01

        2 COMBINED AT
+                    CEEC11        50.    3.35         16.          4.          3.        .02

        ROUTED TO
+                    REEC11        50.    3.35         16.          4.          3.        .02
+                                                                                          95.56
3.35

        HYDROGRAPH AT
+                    SEEC10         5.    3.23          1.          0.          0.        .02

        3 COMBINED AT
+                    CEEC10        54.    3.35         17.          5.          3.       5.05

        ROUTED TO
+                    REEC10        54.    3.35         17.          5.          3.       5.05
```

```
+                                                                                                95.59
3.35

          HYDROGRAPH AT
+                          SEEC09        7.    3.27          1.          0.          0.        .02

          HYDROGRAPH AT
+                           DO1B4        0.     .00          0.          0.          0.        .00

          3 COMBINED AT
+                          CEEC09       59.    3.35         18.          5.          4.       5.07

          ROUTED TO
+                          REEC09       59.    3.37         18.          5.          4.       5.07
+                                                                                                95.62
3.37

          HYDROGRAPH AT
+                          SEEC08        5.    3.55          1.          0.          0.        .03

          2 COMBINED AT
+                          CEEC08       64.    3.37         19.          5.          4.       5.10

          ROUTED TO
+                          REEC08       63.    3.40         19.          5.          4.       5.10
+                                                                                                95.64
3.40

          HYDROGRAPH AT
+                          SEEC07        2.    3.15          0.          0.          0.        .01

          2 COMBINED AT
+                          CEEC07       64.    3.38         19.          5.          4.       5.11

          ROUTED TO
+                          REEC07       64.    3.40         19.          5.          4.       5.11
+                                                                                                95.65
3.40

          HYDROGRAPH AT
                           SEEC06        1.    3.15          0.          0.          0.        .00

          2 COMBINED AT
+                          CEEC06       64.    3.40         19.          5.          4.       5.11

          ROUTED TO
+                          REEC06       64.    3.43         19.          5.          4.       5.11
+                                                                                                95.65
3.43

          HYDROGRAPH AT
+                          SEEC05       17.    3.37          3.          1.          1.        .07

          HYDROGRAPH AT
+                          DO1A2D        0.     .00          0.          0.          0.        .00

          ROUTED TO
+                          RD1A2D        0.     .00          0.          0.          0.        .00
+                                                                                                95.00
.00

          HYDROGRAPH AT
+                          DO1A2G        0.     .00          0.          0.          0.        .00

          2 COMBINED AT
+                          CD1A2G        0.     .00          0.          0.          0.        .00

          ROUTED TO
+                          RD1A2G        0.     .00          0.          0.          0.        .00
+                                                                                                95.00
.00

          3 COMBINED AT
+                          CEEC05       80.    3.42         22.          6.          4.       5.18

          DIVERSION TO
                            37AW        40.    3.42         11.          3.          2.       5.18

          HYDROGRAPH AT
+                           37AE        40.    3.42         11.          3.          2.       5.18
```

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          ROUTED TO
+                        REEC05       39.   3.47        11.        3.        2.      5.18
+                                                                                              95.42
3.47

          HYDROGRAPH AT
+                        SEEC04       27.   3.40         5.        1.        1.       .13

          HYDROGRAPH AT
+                        DO1A2E        0.    .00         0.        0.        0.       .00

          ROUTED TO
+                        RD1A2E        0.    .00         0.        0.        0.       .00
+                                                                                              95.00
.00

          3 COMBINED AT
+                        CEEC04       66.   3.45        17.        4.        3.      5.31

          ROUTED TO
+                        REEC04       66.   3.47        17.        4.        3.      5.31
+                                                                                              95.59
3.47

          HYDROGRAPH AT
+                        SEEC03        1.   3.33         0.        0.        0.       .01

          2 COMBINED AT
+                        CEEC03       67.   3.47        17.        5.        3.      5.32

          ROUTED TO
+                        REEC03       67.   3.48        17.        5.        3.      5.32
+                                                                                              95.59
3.48

          HYDROGRAPH AT
+                        SEEC02        4.   3.15         0.        0.        0.       .01

          2 COMBINED AT
+                        CEEC02       68.   3.48        17.        5.        3.      5.33

          ROUTED TO
+                        REEC02       68.   3.48        17.        5.        3.      5.33
+                                                                                              95.60
3.48

          HYDROGRAPH AT
+                        SEEC01       37.   3.45         8.        2.        1.       .19

          HYDROGRAPH AT
+                        DO1A2F        4.   4.22         1.        0.        0.       .00

          ROUTED TO
+                        RD1A2F        4.   5.02         1.        0.        0.       .00
+                                                                                              95.06
5.02

          3 COMBINED AT
+                        CEEC01      105.   3.48        26.        7.        5.      5.51

          ROUTED TO
+                        REEC01      103.   3.57        26.        7.        5.      5.51
+                                                                                              95.77
3.57

          HYDROGRAPH AT
+                         S37A3       31.   3.32         5.        1.        1.       .12

          2 COMBINED AT
+                         C37A3      121.   3.53        31.        8.        6.      5.63

          ROUTED TO
+                         R37A3      121.   3.57        31.        8.        6.      5.63
+                                                                                              95.85
3.57

          HYDROGRAPH AT
+                         S37A2       13.   3.63         4.        1.        1.       .08

          2 COMBINED AT
+                         C37A2      134.   3.57        35.        9.        7.      5.72
```

+	ROUTED TO	D37A2	134.	3.57	28.	7.	5.	5.72	1791.00
+ 3.50									
+	ROUTED TO	R37A2	134.	3.60	28.	7.	5.	5.72	1.17
+ 3.60									
+	HYDROGRAPH AT	S37A1	61.	3.65	17.	4.	3.	.40	
+	HYDROGRAPH AT	DO361C	103.	3.97	25.	6.	5.	.00	
+	ROUTED TO	RD-R1C	98.	4.35	25.	6.	5.	.00	95.84
+ 4.35									
+	HYDROGRAPH AT	D036.1	12.	3.85	3.	1.	1.	.00	
+	ROUTED TO	RD36.1	11.	4.93	3.	1.	1.	.00	95.18
+ 4.93									
+	HYDROGRAPH AT	DO34.1	81.	5.80	77.	28.	20.	.00	
+	ROUTED TO	RD34.1	81.	6.30	77.	28.	20.	.00	95.74
+ 6.28									
+	5 COMBINED AT	C37A1	244.	4.33	139.	47.	34.	6.11	
	HYDROGRAPH AT	52C13	11.	3.15	1.	0.	0.	.02	
+	DIVERSION TO	STORM	11.	.00	1.	0.	0.	.02	
+	HYDROGRAPH AT	2C13DV	0.	.00	0.	0.	0.	.02	
+	HYDROGRAPH AT	52C15	43.	3.15	4.	1.	1.	.05	
+	HYDROGRAPH AT	52C14A	39.	3.15	4.	1.	1.	.04	
+	3 COMBINED AT	SP1	82.	3.15	9.	2.	2.	.11	
+	DIVERSION TO	DVSP1	82.	3.15	9.	2.	2.	.11	
+	HYDROGRAPH AT	SP1EX	0.	3.15	0.	0.	0.	.11	
+	ROUTED TO	RSP1EX	0.	3.53	0.	0.	0.	.11	.50
+ 3.63									
+	HYDROGRAPH AT	39	431.	3.60	92.	23.	17.	1.88	
+	HYDROGRAPH AT	40	158.	3.40	25.	6.	4.	.58	
	2 COMBINED AT	C40	539.	3.57	116.	30.	21.	2.47	
+	ROUTED TO	R41	530.	3.82	116.	30.	21.	2.47	

```
+                                                                                                                                  1.34
3.82

          HYDROGRAPH AT
+                                41        45.    4.07          14.          4.          3.        .83

          2 COMBINED AT
+                                C41      563.    3.82         131.         33.         24.       3.29

          HYDROGRAPH AT
+                                42        71.    3.57          15.          4.          3.        .58

          HYDROGRAPH AT
+                                43       300.    3.45          52.         13.         10.       1.07

          HYDROGRAPH AT
+                                44       232.    3.47          41.         10.          8.        .84

          2 COMBINED AT
+                                C44      532.    3.45          94.         24.         17.       1.91

          ROUTED TO
+                                R45      529.    3.53          94.         24.         17.       1.91
+                                                                                                                                  1.68
3.53

          HYDROGRAPH AT
+                                45        50.    3.32           7.          2.          1.        .20

          2 COMBINED AT
+                                C45      560.    3.52         101.         26.         18.       2.11

          HYDROGRAPH AT
+                                45A       68.    3.32           9.          2.          2.        .17

          HYDROGRAPH AT
+                                46       438.    3.28          49.         12.          9.        .93

          3 COMBINED AT
+                                C46      824.    3.48         159.         40.         29.       3.21

          ROUTED TO
+                                R47      809.    3.65         159.         40.         29.       3.21
+                                                                                                                                  1.77
3.65

          HYDROGRAPH AT
+                                47        25.    4.23           9.          2.          2.        .38

          2 COMBINED AT
+                              C47.1      818.    3.65         168.         43.         31.       3.58

          3 COMBINED AT
+                              C47.2     1354.    3.72         313.         80.         58.       7.46

          ROUTED TO
+                                R50     1353.    3.75         313.         80.         58.       7.46
+                                                                                                                                  2.03
3.75

          HYDROGRAPH AT
+                                50       115.    3.38          17.          4.          3.        .41

          2 COMBINED AT
+                                C50     1404.    3.75         329.         84.         61.       7.87

          DIVERSION TO
+                             APEXSO      702.    3.75         165.         42.         30.       7.87

          HYDROGRAPH AT
+                             APEXSW      702.    3.75         165.         42.         30.       7.87

          ROUTED TO
+                             R51.2A      701.    3.78         165.         42.         30.       7.87
+                                                                                                                                  2.04
3.78

          HYDROGRAPH AT
+                             S51.1A       16.    3.50           3.          1.          1.        .07

          2 COMBINED AT
```

+	C51.1A	712.	3.78	168.	43.	31.	7.93
DIVERSION TO							
+	SPT1SW	206.	3.78	49.	12.	9.	7.93
HYDROGRAPH AT							
+	SPT1SO	505.	3.78	119.	30.	22.	7.93
ROUTED TO							
+	R51B9	505.	3.80	119.	30.	22.	7.93
HYDROGRAPH AT							
+	51B9	9.	3.18	1.	0.	0.	.02
2 COMBINED AT							
+	C51B9	507.	3.80	120.	31.	22.	7.96
DIVERSION TO							
+	SPT2SW	162.	3.80	38.	10.	7.	7.96
HYDROGRAPH AT							
+	SPT2SO	345.	3.80	81.	21.	15.	7.96
ROUTED TO							
+	R51B2	343.	3.93	81.	21.	15.	7.96
HYDROGRAPH AT							
+	51B2	17.	3.35	3.	1.	1.	.06
2 COMBINED AT							
+	C51B2	348.	3.93	84.	22.	16.	8.02
ROUTED TO							
+	51B2R	348.	3.95	84.	22.	16.	8.02
HYDROGRAPH AT							
+	52C8	3.	3.17	0.	0.	0.	.01
2 COMBINED AT							
+	52C8C	349.	3.95	84.	22.	16.	8.03
ROUTED TO							
+	52C8R	348.	3.98	84.	22.	16.	8.03
HYDROGRAPH AT							
+	51C3	5.	3.27	1.	0.	0.	.02
ROUTED TO							
+	51C3R	5.	3.32	1.	0.	0.	.02
HYDROGRAPH AT							
+	51B1	5.	3.22	1.	0.	0.	.01
ROUTED TO							
+	51B1R	5.	3.25	1.	0.	0.	.01
HYDROGRAPH AT							
+	52C7	2.	3.15	0.	0.	0.	.01
3 COMBINED AT							
+	52C7C	12.	3.25	2.	0.	0.	.04
ROUTED TO							
+	52C7R	11.	3.35	2.	0.	0.	.04
2 COMBINED AT							
+	52C9C1	351.	3.98	85.	22.	16.	8.06
ROUTED TO							
+	52C9R1	351.	4.00	85.	22.	16.	8.06
HYDROGRAPH AT							
+	52C9	26.	3.25	4.	1.	1.	.07
2 COMBINED AT							
+	52C9C2	356.	4.00	88.	23.	17.	8.13
ROUTED TO							
+	52C9R2	355.	4.02	88.	23.	17.	8.13
HYDROGRAPH AT							

```
+                    51C2      12.   3.32        2.        1.        0.      .04

     ROUTED TO
+                    51C2R     12.   3.35        2.        1.        0.      .04

     HYDROGRAPH AT
+                    52C5       6.   3.20        1.        0.        0.      .02

     2 COMBINED AT
+                    52C5C     16.   3.28        3.        1.        1.      .06

     ROUTED TO
+                    52C5R     16.   3.48        3.        1.        1.      .06

     HYDROGRAPH AT
+                    52C6      12.   3.30        2.        0.        0.      .04

     2 COMBINED AT
+                    52C6C     25.   3.43        5.        1.        1.      .09

     ROUTED TO
+                    52C6R     25.   3.45        5.        1.        1.      .09

     2 COMBINED AT
+                   2C10C1    365.   4.02       93.       24.       18.     8.23

     ROUTED TO
+                   2C10R1    364.   4.02       93.       24.       18.     8.23

     HYDROGRAPH AT
+                    52C10      2.   3.28        0.        0.        0.      .01

     2 COMBINED AT
+                   2C10C2    365.   4.02       93.       24.       18.     8.24

     HYDROGRAPH AT
+                    52C11     13.   3.30        2.        1.        0.      .04

     ROUTED TO
+                   2C11R1     13.   3.32        2.        1.        0.      .04

     HYDROGRAPH AT
+                   52C13D     11.   3.15        1.        0.        0.      .00

     2 COMBINED AT
+                   52C11C     20.   3.20        3.        1.        1.      .04

     ROUTED TO
+                   2C11CR     20.   3.23        3.        1.        1.      .04

     2 COMBINED AT
+                   2C11C2    369.   4.02       96.       25.       18.     8.28

     ROUTED TO
+                   2C11R2    369.   4.03       96.       25.       18.     8.28

     HYDROGRAPH AT
+                    52C12     33.   3.10        3.        1.        1.      .02

     2 COMBINED AT
+                   52C12C    371.   4.03       98.       26.       19.     8.31

     ROUTED TO
+                   52C12R    370.   4.07       98.       26.       19.     8.31

     HYDROGRAPH AT
+                   52C14B     19.   3.13        2.        0.        0.      .02

     HYDROGRAPH AT
+                    DVSP1     82.   3.15        9.        2.        2.      .00

     ROUTED TO
+                   RDVSP1     82.   3.18        9.        2.        2.      .00

     3 COMBINED AT
+                      SP2    380.   4.07      108.       29.       21.     8.33

     DIVERSION TO
+                    DVSP2    380.   3.08      108.       29.       21.     8.33

     HYDROGRAPH AT
```

+		DSP2	0.	3.08	0.	0.	0.	8.33
	ROUTED TO							
+		RSP2EX	0.	3.85	0.	0.	0.	8.33
+								.50
5								
	HYDROGRAPH AT							
+		51B3	6.	3.42	1.	0.	0.	.02
	ROUTED TO							
+		51B3R	6.	3.45	1.	0.	0.	.02
	HYDROGRAPH AT							
+		52B1	1.	3.17	0.	0.	0.	.00
	2 COMBINED AT							
+		52B1C	6.	3.43	1.	0.	0.	.03
	ROUTED TO							
+		52B1R	6.	3.50	1.	0.	0.	.03
	HYDROGRAPH AT							
+		SPT2SW	162.	3.80	38.	10.	7.	.00
	ROUTED TO							
+		R51B10	162.	3.88	38.	10.	7.	.00
	HYDROGRAPH AT							
+		51B10	8.	3.25	1.	0.	0.	.02
	2 COMBINED AT							
+		C51B10	163.	3.88	39.	10.	7.	.02
	DIVERSION TO							
+		SPT3SW	65.	3.88	16.	4.	3.	.02
	HYDROGRAPH AT							
+		SPT3SO	98.	3.88	24.	6.	4.	.02
	ROUTED TO							
		R51B4	98.	4.00	24.	6.	4.	.02
	HYDROGRAPH AT							
+		51B4	7.	3.30	1.	0.	0.	.02
	2 COMBINED AT							
+		C51B4	99.	4.00	24.	6.	5.	.05
	ROUTED TO							
+		51B4R1	99.	4.03	24.	6.	5.	.05
	2 COMBINED AT							
+		52B2C1	102.	4.03	26.	7.	5.	.08
	ROUTED TO							
+		52B2R1	101.	4.07	26.	7.	5.	.08
	HYDROGRAPH AT							
+		52B2	7.	3.32	1.	0.	0.	.03
	2 COMBINED AT							
+		52B2C2	103.	4.07	27.	7.	5.	.11
	ROUTED TO							
+		52B2R2	103.	4.10	27.	7.	5.	.11
	ROUTED TO							
+		52B3R1	103.	4.12	27.	7.	5.	.11
	HYDROGRAPH AT							
+		52B3	21.	3.30	3.	1.	1.	.06
	2 COMBINED AT							
+		52B3C2	107.	4.12	30.	8.	6.	.17
	ROUTED TO							
+		52B3R2	107.	4.18	30.	8.	6.	.17
	HYDROGRAPH AT							
+		52B4	22.	3.17	2.	1.	0.	.03

```
          2 COMBINED AT
+                        52B4C      108.   4.18        32.        8.        6.       .20

          ROUTED TO
+                        52B4R      108.   4.20        32.        8.        6.       .20

          HYDROGRAPH AT
+                         52B5       17.   3.15         2.        0.        0.       .02

          HYDROGRAPH AT
+                        DVSP2      380.   4.07       108.       29.       21.       .00

          ROUTED TO
+                       RDVSP2      380.   4.08       108.       29.       21.       .00

          3 COMBINED AT
+                          SP3      473.   4.15       141.       38.       27.       .22

          DIVERSION TO
+                        DVSP3      473.   3.07       141.       38.       27.       .22

          HYDROGRAPH AT
+                         DSP3        0.   3.07         0.        0.        0.       .22

          ROUTED TO
+                       RSP3EX        0.   4.43         0.        0.        0.       .22

          3 COMBINED AT
+                        CSPEX        0.   7.60         0.        0.        0.      8.65

          ROUTED TO
+                        R53A1        0.   7.97         0.        0.        0.      8.65

          HYDROGRAPH AT
+                        S53A1       44.   3.52         9.        2.        2.       .18

          2 COMBINED AT
+                        C53A1       44.   3.52         9.        2.        2.      8.84

          ROUTED TO
+                       RPIMA2       44.   3.63         9.        2.        2.      8.84

          HYDROGRAPH AT
+                        S53A3       25.   3.35         4.        1.        1.       .07

          2 COMBINED AT
+                       CPIMA2       58.   3.58        13.        3.        2.      8.91

          ROUTED TO
+                        RUH2B       57.   3.72        13.        3.        2.      8.91
+                                                                                          1.48
3.72

          HYDROGRAPH AT
+                        S53A6       11.   3.17         1.        0.        0.       .03

          ROUTED TO
+                        RUH2C       10.   3.23         1.        0.        0.       .03
+                                                                                           .25
3.23

          HYDROGRAPH AT
+                        S53A5        9.   3.18         1.        0.        0.       .02

          2 COMBINED AT
+                        UHIC1       19.   3.22         3.        1.        0.       .05

          HYDROGRAPH AT
+                       SPT1SW      206.   3.78        49.       12.        9.       .00

          ROUTED TO
+                       R51.2B      205.   3.83        49.       12.        9.       .00
+                                                                                           .98
3.83

          HYDROGRAPH AT
+                       S51.1B       11.   3.55         2.        1.        0.       .05

          2 COMBINED AT
+                       C51.1B      213.   3.83        51.       13.        9.       .05
```

+	ROUTED TO	R51.2C	211.	3.90	51.	13.	9.	.05
+								1.00
3.90								
+	HYDROGRAPH AT	S51.1C	19.	3.70	5.	1.	1.	.10
+	2 COMBINED AT	C51.1C	227.	3.90	55.	14.	10.	.15
+	ROUTED TO	R51.2D	225.	4.00	55.	14.	10.	.15
+								1.04
4.00								
+	HYDROGRAPH AT	S51.1D	153.	3.87	42.	11.	8.	.90
+	HYDROGRAPH AT	D51.1D	0.	.00	0.	0.	0.	.00
+	3 COMBINED AT	C51.1D	368.	3.98	96.	25.	18.	1.05
+	DIVERSION TO	STOPDV	152.	3.98	9.	2.	2.	1.05
+	HYDROGRAPH AT	DETPDV	368.	3.98	89.	23.	16.	1.05
+	ROUTED TO	R52A1C	365.	4.07	89.	23.	16.	1.05
+								2.32
4.07								
+	HYDROGRAPH AT	51B8	9.	3.48	2.	0.	0.	.04
	ROUTED TO	51B8R	9.	3.75	2.	0.	0.	.04
+	HYDROGRAPH AT	52A1	51.	3.23	7.	2.	1.	.13
+	2 COMBINED AT	52A1C	52.	3.23	9.	2.	2.	.17
+	2 COMBINED AT	C52A	379.	4.07	96.	25.	18.	1.22
+	HYDROGRAPH AT	52A0	15.	3.17	1.	0.	0.	.04
+	2 COMBINED AT	C52A.1	381.	4.07	98.	25.	18.	1.25
+	DIVERSION TO	DV52AW	114.	4.07	29.	8.	6.	1.25
+	HYDROGRAPH AT	D52AW	267.	4.07	69.	18.	13.	1.25
+	DIVERSION TO	PRSD	267.	.00	69.	18.	13.	1.25
+	HYDROGRAPH AT	PRSDEX	0.	.00	0.	0.	0.	1.25
+	ROUTED TO	RC52	0.	.00	0.	0.	0.	1.25
+								.00
4.80								
	HYDROGRAPH AT	51B5	2.	3.20	0.	0.	0.	.00
+	ROUTED TO	51B5R	2.	3.35	0.	0.	0.	.00

```
          HYDROGRAPH AT
+                      SPT3SW      65.   3.88        16.        4.        3.      .00

          ROUTED TO
+                       R51B6      65.   4.05        16.        4.        3.      .00

          HYDROGRAPH AT
+                        51B6      13.   3.30         2.        1.        0.      .04

          2 COMBINED AT
+                       C51B6      68.   4.05        17.        5.        3.      .04

          ROUTED TO
+                       51B6R      68.   4.07        17.        5.        3.      .04

          HYDROGRAPH AT
+                        51B7       7.   3.33         1.        0.        0.      .03

          ROUTED TO
+                      51B7R1       7.   3.37         1.        0.        0.      .03

          3 COMBINED AT
+                       51B7C      70.   4.07        19.        5.        4.      .08

          ROUTED TO
+                      51B7R2      70.   4.17        19.        5.        4.      .08

          HYDROGRAPH AT
+                        52B6      31.   3.27         5.        1.        1.      .10

          2 COMBINED AT
+                       52B6C      75.   4.17        23.        6.        4.      .17

          ROUTED TO
+                       52B6R      74.   4.30        23.        6.        4.      .17

          HYDROGRAPH AT
+                        52B7      86.   3.17         9.        2.        2.      .08

          2 COMBINED AT
+                      52B7C1      93.   3.17        31.        9.        6.      .25

          HYDROGRAPH AT
+                        52A2      74.   3.18         8.        2.        2.      .06

          HYDROGRAPH AT
+                        52B0       5.   3.23         1.        0.        0.      .02

          4 COMBINED AT
+                      52A2C2     171.   3.18        40.       11.        8.     1.59

          DIVERSION TO
+                       DV52W       0.   3.18         0.        0.        0.     1.59

          HYDROGRAPH AT
+                         D52W     171.   3.18        40.       11.        8.     1.59

          HYDROGRAPH AT
+                       DVSP3     473.   4.15       141.       38.       27.      .00

          ROUTED TO
+                      RDVSP3     472.   4.17       141.       38.       27.      .00

          2 COMBINED AT
+                      C52SP4     546.   4.22       180.       48.       35.     1.59

          DIVERSION TO
+                       DVSP4     546.   6.83       180.       48.       35.     1.59

          HYDROGRAPH AT
+                        DSP4       0.   6.83         0.        0.        0.     1.59

          ROUTED TO
+                      RSP4EX       0.   7.23         0.        0.        0.     1.59
+                                                                                      .00
7.33

          DIVERSION TO
+                        53HW       0.   7.23         0.        0.        0.     1.59

          HYDROGRAPH AT
```

```
+                          53PS        0.    7.23        0.        0.        0.     1.59

         HYDROGRAPH AT
+                          S53A       31.    3.47        6.        2.        1.      .13

         2 COMBINED AT
+                          CPIMA1     31.    3.47        6.        2.        1.     1.71

         ROUTED TO
+                          RPMA4B     31.    3.52        6.        2.        1.     1.71
+                                                                                          1.06
3.52

         HYDROGRAPH AT
+                          PRSD      267.    4.07       69.       18.       13.      .00

         ROUTED TO
+                          RDPSD1    267.    4.07       69.       18.       13.      .00

         ROUTED TO
+                          RDPSD2    267.    4.08       69.       18.       13.      .00

         HYDROGRAPH AT
+                          DVSP4     546.    4.22      180.       48.       35.      .00

         ROUTED TO
+                          RDVSP     546.    4.23      180.       48.       35.      .00
+                                                                                          1.98
4.23

         2 COMBINED AT
+                          CPCH1     784.    4.23      248.       66.       48.      .00

         ROUTED TO
+                          RPMA4A    780.    4.28      248.       66.       48.      .00
+                                                                                          1.97
4.28

         HYDROGRAPH AT
+                          S53A2      20.    3.23        3.        1.        1.      .05

         2 COMBINED AT
                           CPCH2     782.    4.28      251.       67.       48.      .05

         2 COMBINED AT
+                          CPCH3     792.    4.28      257.       68.       49.     1.77

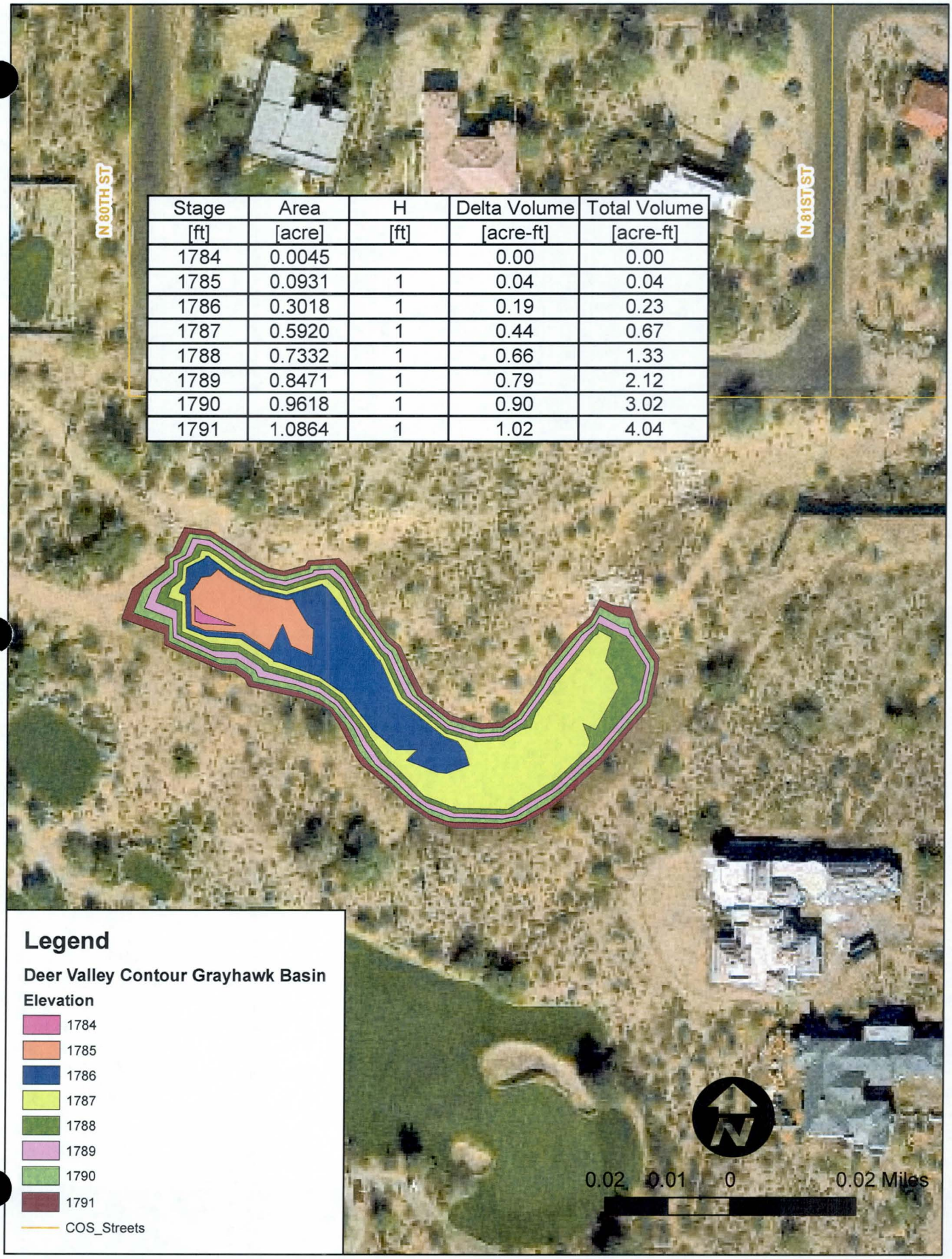
         ROUTED TO
+                          RUH2A     790.    4.32      257.       68.       49.     1.77
+                                                                                          1.84
4.32

         HYDROGRAPH AT
+                          S53A4      20.    3.23        3.        1.        1.      .05

         2 COMBINED AT
+                          CPCH4     793.    4.32      259.       69.       50.     1.82

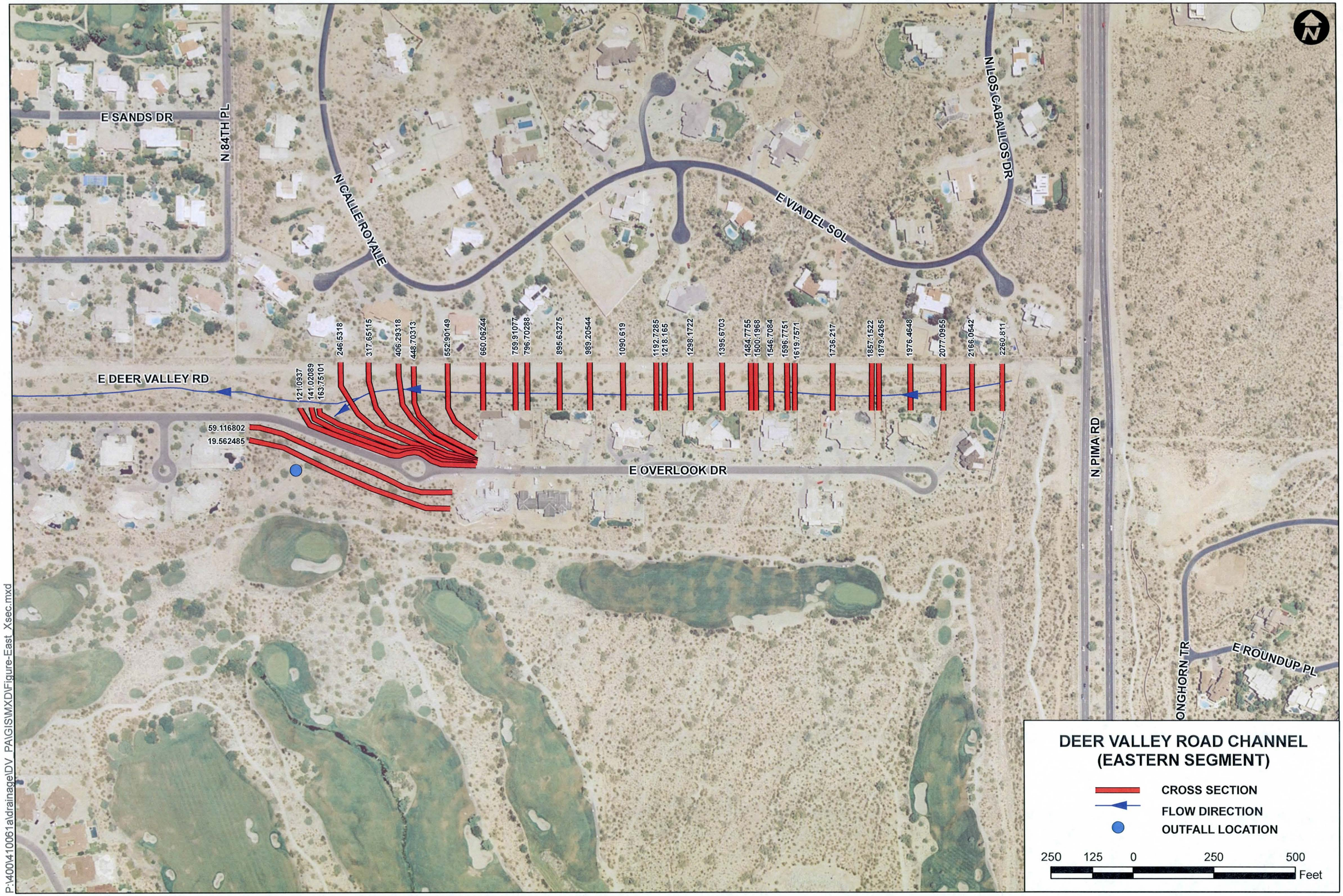
         3 COMBINED AT
+                          UHIC2     821.    4.32      275.       73.       53.    10.78

         HYDROGRAPH AT
+                          CPIMA3     47.    3.22        7.        2.        1.      .07
```

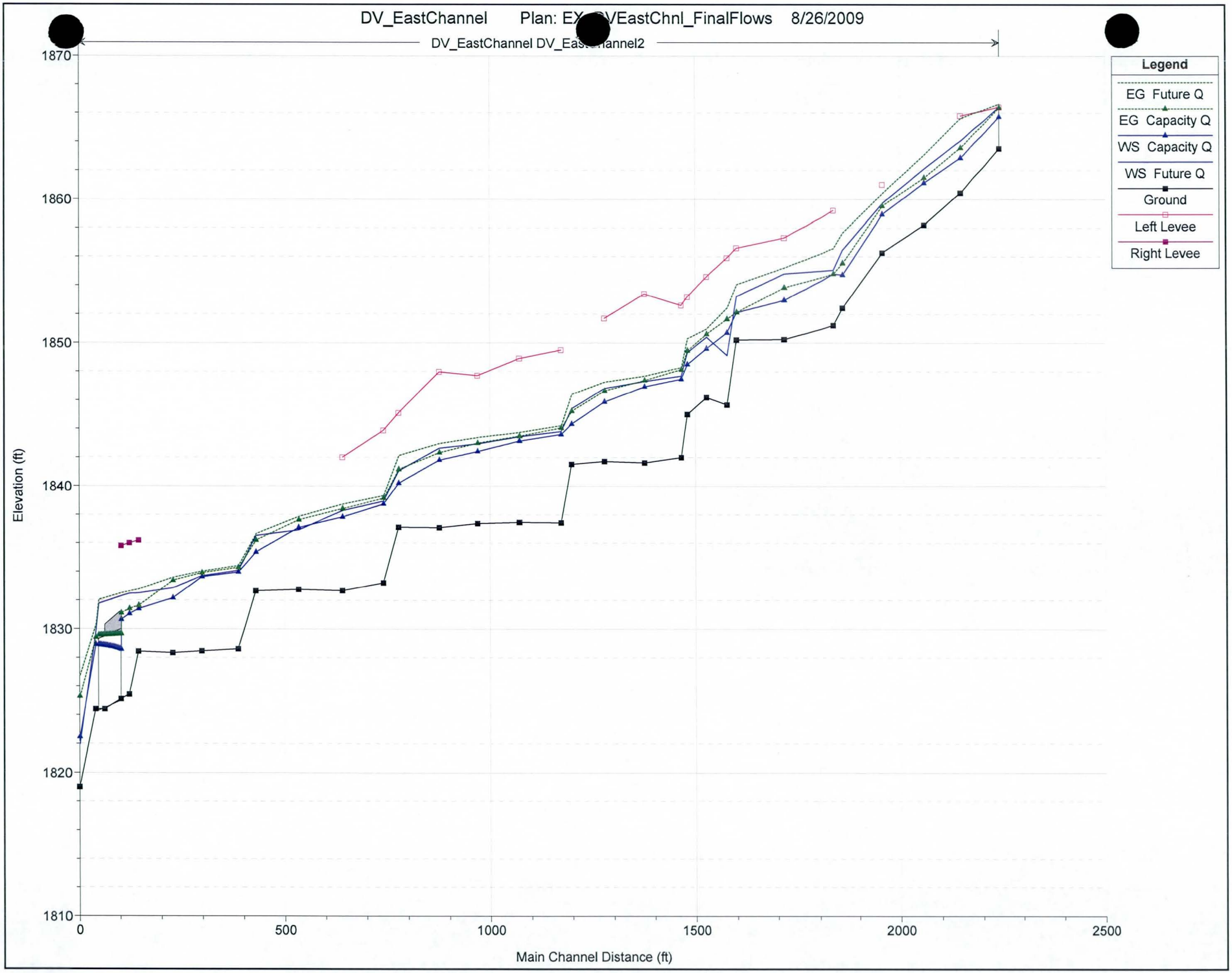


Stage	Area	H	Delta Volume	Total Volume
[ft]	[acre]	[ft]	[acre-ft]	[acre-ft]
1784	0.0045		0.00	0.00
1785	0.0931	1	0.04	0.04
1786	0.3018	1	0.19	0.23
1787	0.5920	1	0.44	0.67
1788	0.7332	1	0.66	1.33
1789	0.8471	1	0.79	2.12
1790	0.9618	1	0.90	3.02
1791	1.0864	1	1.02	4.04

APPENDIX F: EXISTING CONDITIONS HYDRAULIC DOCUMENTATION



P:\400\410061a\drainage\DV_PA\GIS\MXD\Figure-East_Xsec.mxd


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
DV_EastChannel DV_EastChannel2
Legend
EG Future Q
EG Capacity Q
WS Capacity Q
WS Future Q
Ground
Left Levee
Right Levee
Elevation (ft)
1870
1860
1850
1840
1830
1820
1810
0
500
1000
1500
2000
2500
Main Channel Distance (ft)

HEC-RAS Plan: QFinalAu2009 River: DV_EastChannel Reach: DV_EastChannel2

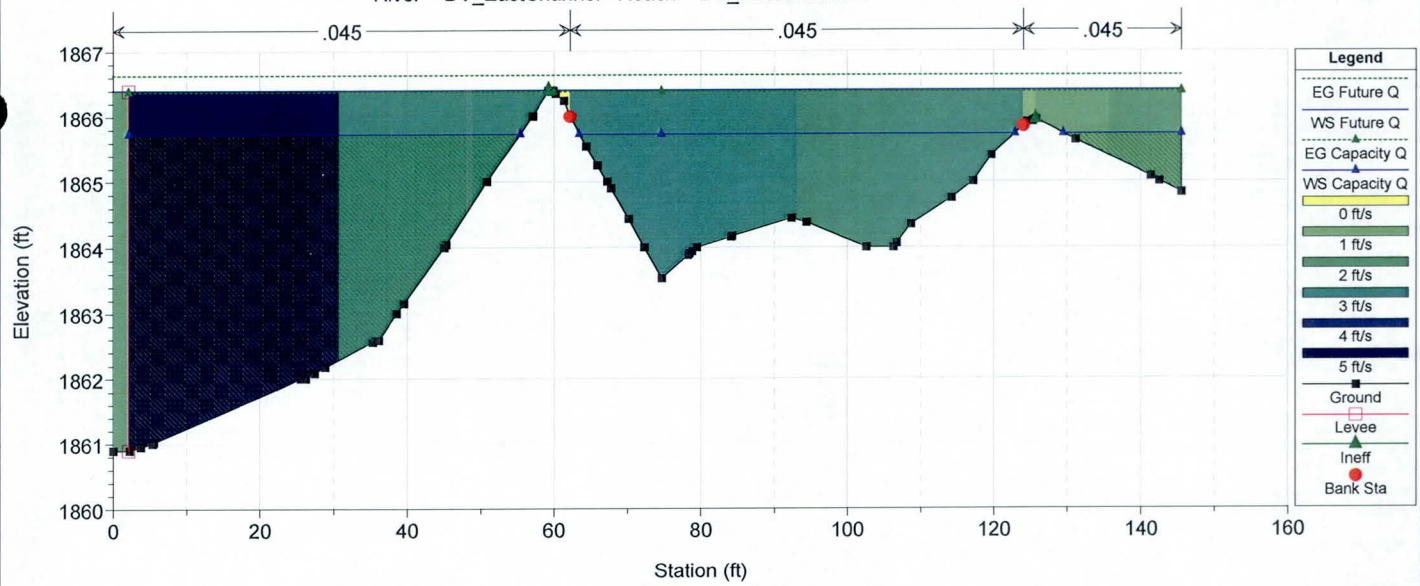
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Right	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft/s)	(ft)
DV_EastChannel2	19.56248	Future Q	1310.00	1818.99	1821.96	1823.37	1826.76	0.282876	17.59	74.48	42.19	2.33		2.97
DV_EastChannel2	19.56248	Capacity Q	1310.00	1818.99	1822.47	1823.37	1825.29	0.132821	13.49	97.13	46.41	1.64		3.48
DV_EastChannel2	59.11680	Future Q	1310.00	1824.41	1829.83	1829.83	1830.30	0.023468	7.03	250.90	439.40	0.66	4.68	5.42
DV_EastChannel2	59.11680	Capacity Q	300.00	1824.41	1828.92	1828.92	1829.42	0.025620	6.19	57.16	126.96	0.67	2.61	4.50
DV_EastChannel2	80		Culvert											
DV_EastChannel2	121.0936	Future Q	1310.00	1825.12	1832.31	1831.94	1832.51	0.011133	4.57	374.60	393.17	0.38	3.86	7.19
DV_EastChannel2	121.0936	Capacity Q	300.00	1825.12	1830.66	1830.66	1831.12	0.036305	6.13	56.99	62.58	0.63	4.63	5.54
DV_EastChannel2	141.0208	Future Q	1310.00	1825.43	1832.48	1830.75	1832.64	0.003774	3.69	485.53	351.33	0.30	2.24	7.05
DV_EastChannel2	141.0208	Capacity Q	800.00	1825.43	1831.06	1829.81	1831.42	0.010936	4.92	167.80	108.07	0.48	2.84	5.63
DV_EastChannel2	163.7510	Future Q	1310.00	1828.44	1832.51	1831.22	1832.78	0.006457	4.20	316.13	193.48	0.40	2.08	4.07
DV_EastChannel2	163.7510	Capacity Q	700.00	1828.44	1831.42	1830.45	1831.64	0.007462	3.51	186.91	91.43	0.40	0.99	2.98
DV_EastChannel2	246.5317	Future Q	1310.00	1828.34	1832.87	1832.29	1833.60	0.011822	6.95	201.19	126.09	0.74		4.53
DV_EastChannel2	246.5317	Capacity Q	1250.00	1828.34	1832.17	1832.17	1833.39	0.022241	8.88	140.92	60.22	1.00		3.83
DV_EastChannel2	317.6511	Future Q	1310.00	1828.47	1833.71	1831.56	1834.04	0.003172	4.55	288.18	190.71	0.40		5.24
DV_EastChannel2	317.6511	Capacity Q	1200.00	1828.47	1833.65	1831.42	1833.93	0.002787	4.23	283.55	182.92	0.38		5.18
DV_EastChannel2	406.2931	Future Q	1310.00	1828.61	1834.09	1831.87	1834.42	0.006180	4.57	286.71	98.15	0.39		5.48
DV_EastChannel2	406.2931	Capacity Q	1250.00	1828.61	1833.98	1831.80	1834.29	0.006089	4.48	279.08	91.15	0.39		5.37
DV_EastChannel2	448.7031	Future Q	1310.00	1832.67	1836.52	1836.52	1836.66	0.006220	3.27	439.92	317.70	0.37	0.57	3.85
DV_EastChannel2	448.7031	Capacity Q	600.00	1832.67	1835.37	1835.37	1836.20	0.051606	7.31	82.13	191.34	0.99		2.70
DV_EastChannel2	552.9014	Future Q	1310.00	1832.77	1836.92	1836.48	1837.85	0.014849	7.77	168.51	170.52	0.83		4.15
DV_EastChannel2	552.9014	Capacity Q	1050.00	1832.77	1837.09	1836.08	1837.62	0.008121	5.86	179.29	186.94	0.62		4.32
DV_EastChannel2	660.0624	Future Q	1310.00	1832.68	1838.27	1836.45	1838.72	0.004660	5.38	243.53	70.20	0.49		5.59
DV_EastChannel2	660.0624	Capacity Q	1310.00	1832.68	1837.82	1836.45	1838.40	0.006475	6.09	215.28	60.69	0.57		5.14
DV_EastChannel2	759.9107	Future Q	1310.00	1833.22	1838.94	1836.74	1839.30	0.007140	4.83	271.03	67.80	0.42		5.72
DV_EastChannel2	759.9107	Capacity Q	1310.00	1833.22	1838.74	1836.74	1839.14	0.008152	5.08	257.71	64.96	0.45		5.52
DV_EastChannel2	796.7028	Future Q	1310.00	1837.11	1841.05	1841.05	1842.12	0.035053	8.44	161.83	76.05	0.89	3.25	3.94
DV_EastChannel2	796.7028	Capacity Q	800.00	1837.11	1840.19	1840.19	1841.15	0.049590	7.88	101.57	56.30	1.00	0.19	3.08
DV_EastChannel2	895.6327	Future Q	1310.00	1837.09	1842.64	1840.61	1842.96	0.003307	4.54	292.74	91.09	0.41	0.21	5.55
DV_EastChannel2	895.6327	Capacity Q	1300.00	1837.09	1841.81	1840.59	1842.32	0.006506	5.75	225.99	70.21	0.57		4.72
DV_EastChannel2	989.2054	Future Q	1310.00	1837.37	1842.94	1841.32	1843.37	0.005028	5.31	258.09	95.47	0.50	0.28	5.57
DV_EastChannel2	989.2054	Capacity Q	1250.00	1837.37	1842.41	1841.23	1842.99	0.007408	6.10	205.00	79.90	0.60		5.04
DV_EastChannel2	1090.619	Future Q	1310.00	1837.46	1843.44	1840.89	1843.73	0.002454	4.30	304.87	83.29	0.36	0.59	5.98
DV_EastChannel2	1090.619	Capacity Q	1310.00	1837.46	1843.14	1840.89	1843.47	0.003118	4.63	282.99	70.11	0.40	0.30	5.68
DV_EastChannel2	1192.728	Future Q	1310.00	1837.43	1843.80	1841.94	1844.20	0.009309	5.06	258.65	80.44	0.47		6.37
DV_EastChannel2	1192.728	Capacity Q	1310.00	1837.43	1843.60	1841.94	1844.05	0.010762	5.37	243.84	71.34	0.51		6.17
DV_EastChannel2	1218.165	Future Q	1310.00	1841.52	1845.40	1845.40	1846.40	0.033501	8.30	167.17	80.30	0.87	4.64	3.88
DV_EastChannel2	1218.165	Capacity Q	650.00	1841.52	1844.33	1844.33	1845.23	0.053456	7.61	85.53	50.61	1.02	2.23	2.81
DV_EastChannel2	1298.172	Future Q	1310.00	1841.73	1846.82	1845.36	1847.24	0.004609	5.31	257.07	83.47	0.49	1.44	5.09
DV_EastChannel2	1298.172	Capacity Q	1250.00	1841.73	1845.88	1845.28	1846.64	0.011651	6.99	178.98	75.89	0.74	0.77	4.15
DV_EastChannel2	1395.670	Future Q	1310.00	1841.63	1847.30	1845.35	1847.66	0.003770	4.77	274.60	74.77	0.44		5.67
DV_EastChannel2	1395.670	Capacity Q	1310.00	1841.63	1846.94	1845.35	1847.37	0.004956	5.29	247.79	71.05	0.50		5.30
DV_EastChannel2	1484.775	Future Q	1310.00	1842.00	1847.68	1845.97	1848.27	0.011666	6.19	211.64	50.70	0.53		5.68
DV_EastChannel2	1484.775	Capacity Q	1310.00	1842.00	1847.46	1845.97	1848.12	0.013328	6.53	200.60	49.01	0.57		5.46
DV_EastChannel2	1500.196	Future Q	1310.00	1845.01	1849.33	1849.33	1850.29	0.029906	8.22	171.71	82.91	0.83	3.93	4.31
DV_EastChannel2	1500.196	Capacity Q	800.00	1845.01	1848.49	1848.49	1849.45	0.042098	7.88	103.32	69.78	0.93	2.09	3.48
DV_EastChannel2	1546.708	Future Q	1310.00	1846.19	1850.38	1849.52	1850.97	0.007840	6.18	220.49	90.60	0.62	1.13	4.19
DV_EastChannel2	1546.708	Capacity Q	1250.00	1846.19	1849.60	1849.43	1850.60	0.018356	8.02	155.93	64.32	0.91		3.41
DV_EastChannel2	1596.775	Future Q	1310.00	1845.67	1849.10	1850.17	1852.43	0.153090	14.65	89.42	41.44	1.76		3.43
DV_EastChannel2	1596.775	Capacity Q	1310.00	1845.67	1850.70	1850.17	1851.65	0.024094	7.89	169.81	62.07	0.75	2.31	5.03
DV_EastChannel2	1619.757	Future Q	1310.00	1850.22	1853.24	1853.24	1854.06	0.031835	7.44	184.91	115.42	0.83	3.59	3.02
DV_EastChannel2	1619.757	Capacity Q	50.00	1850.22	1852.13	1850.87	1852.13	0.000573	0.67	79.77	85.19	0.10	0.30	1.91
DV_EastChannel2	1736.217	Future Q	1310.00	1850.25	1854.81	1853.72	1855.22	0.004562	5.41	269.70	95.35	0.49	1.56	4.56
DV_EastChannel2	1736.217	Capacity Q	800.00	1850.25	1852.97	1852.87	1853.85	0.021008	7.53	106.28	68.27	0.94		2.72
DV_EastChannel2	1857.152	Future Q	1310.00	1851.22	1855.06	1855.41	1856.58	0.055866	10.18	135.66	69.23	1.11	5.74	3.84
DV_EastChannel2	1857.152	Capacity Q	50.00	1851.22	1854.80	1852.29	1854.80	0.000124	0.45	117.63	67.67	0.05	0.24	3.58
DV_EastChannel2	1879.426	Future Q	1310.00	1852.43	1856.46	1856.70	1857.66	0.040541	9.16	155.45	91.44	0.96	4.67	4.03
DV_EastChannel2	1879.426	Capacity Q	300.00	1852.43	1854.73	1854.93	1855.56	0.090754	7.29	41.28	44.22	1.23	1.44	2.30
DV_EastChannel2	1976.464	Future Q	1310.00	1856.28	1859.71	1859.71	1860.40	0.020116	7.00	204.56	142.72	0.91	2.80	3.63
DV_EastChannel2	1976.464	Capacity Q	500.00	1856.28	1858.95	1858.95	1859.53	0.028366	6.09	82.17	91.80	1.00		2.87
DV_EastChannel2	2077.095	Future Q	1310.00	1858.21	1862.11	1862.23	1863.10	0.019803	8.37	177.05	138.88	0.95	4.17	4.40
DV_EastChannel2	2077.095	Capacity Q	400.00	1858.21	1861.13	1860.76	1861.50	0.013167	4.88	82.03	85.17	0.71	0.24	3.42

HEC-RAS Plan: QFinalAu2009 River: DV_EastChannel Reach: DV_EastChannel2 (Continued)

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	Vel Right	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft/s)	(ft)
DV_EastChannel2	2166.054	Future Q	1310.00	1860.44	1864.06	1864.52	1865.63	0.037396	11.03	145.61	143.11	1.28	5.32	3.74
DV_EastChannel2	2166.054	Capacity Q	300.00	1860.44	1862.88	1862.97	1863.58	0.035145	6.72	44.63	73.70	1.11		2.56
DV_EastChannel2	2260.811	Future Q	1310.00	1863.53	1866.40	1866.40	1866.63	0.004017	3.22	356.11	145.53	0.41	1.95	5.50
DV_EastChannel2	2260.811	Capacity Q	500.00	1863.53	1865.73	1865.73	1866.38	0.026786	6.43	77.71	128.78	0.99		4.83

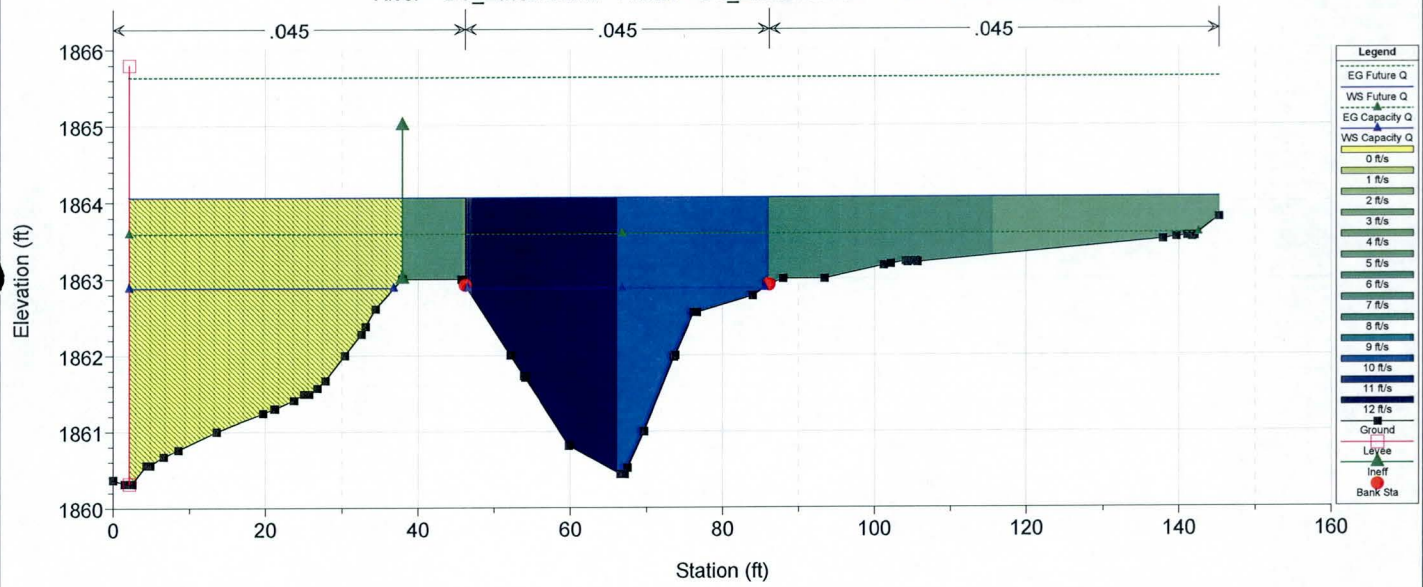
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 2260.811



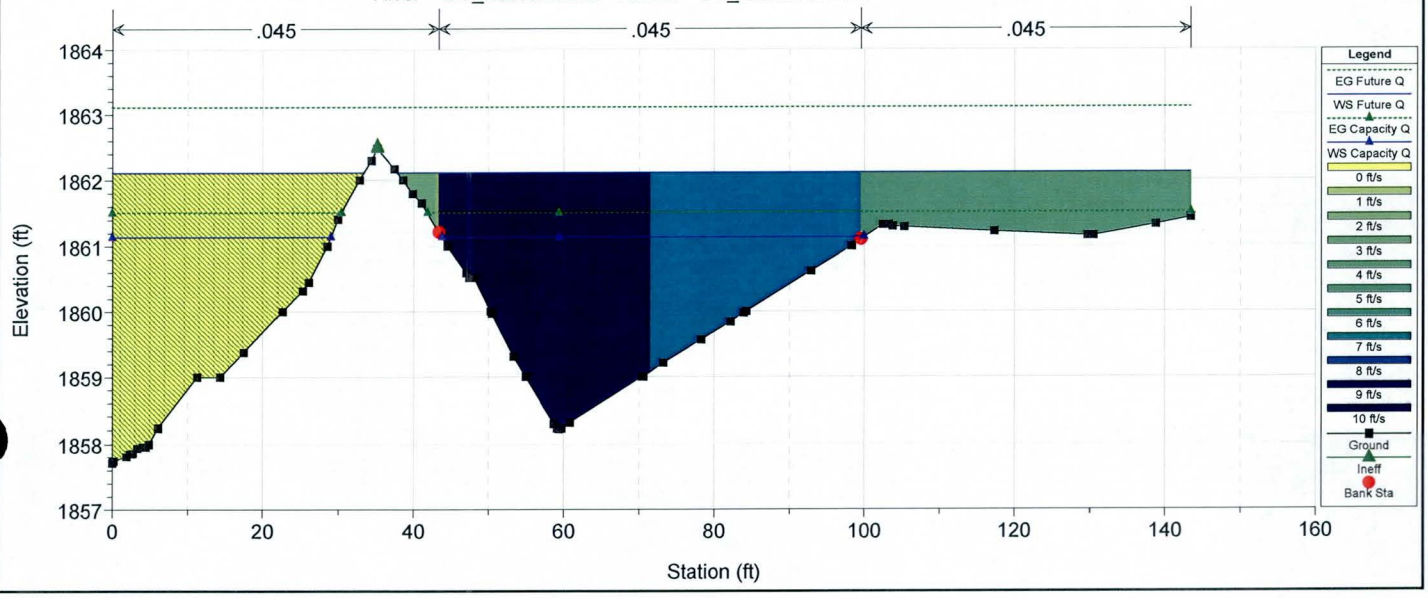
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 2166.054



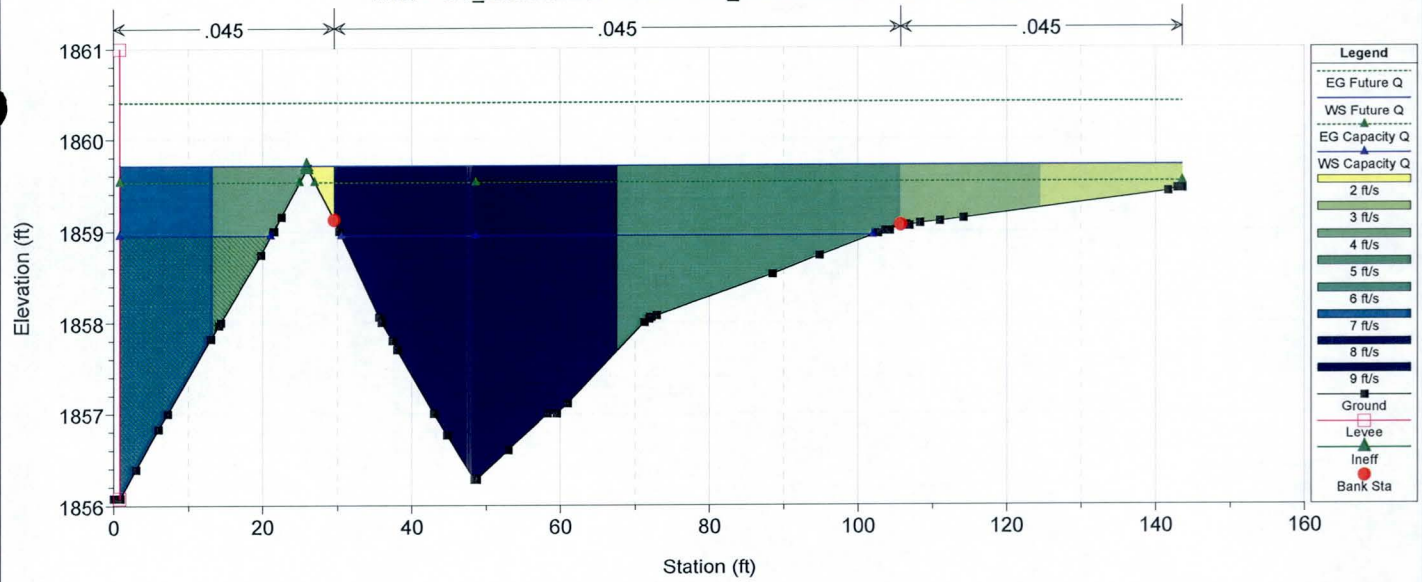
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 2077.095



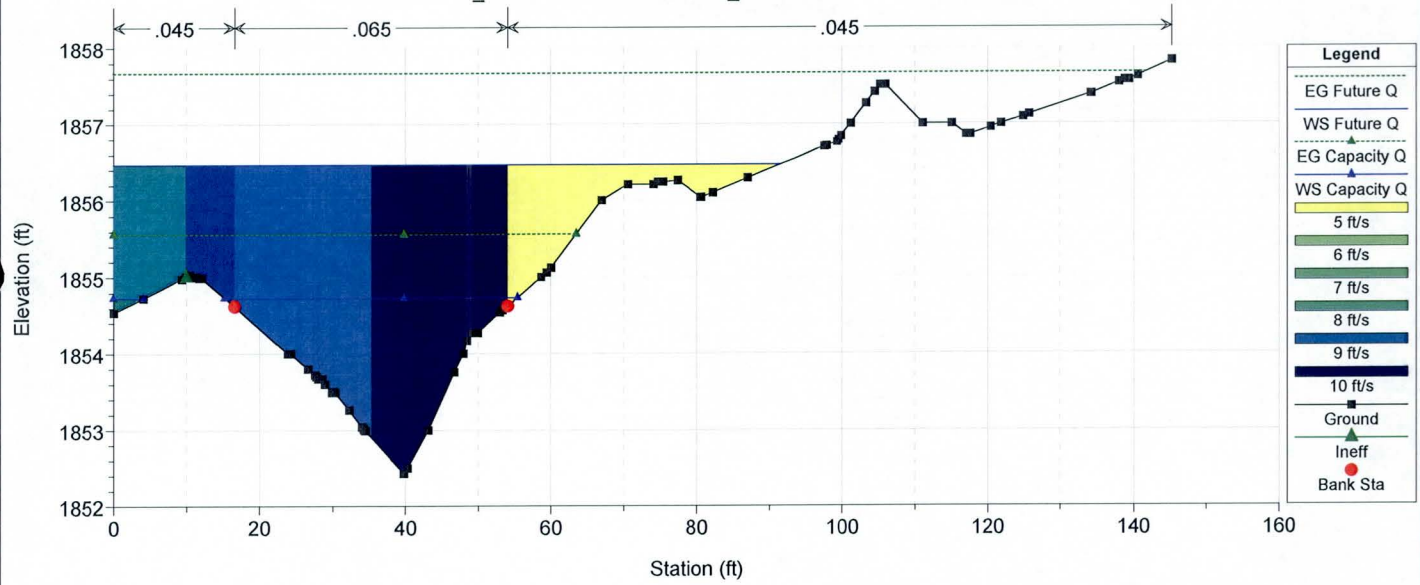
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 1976.464



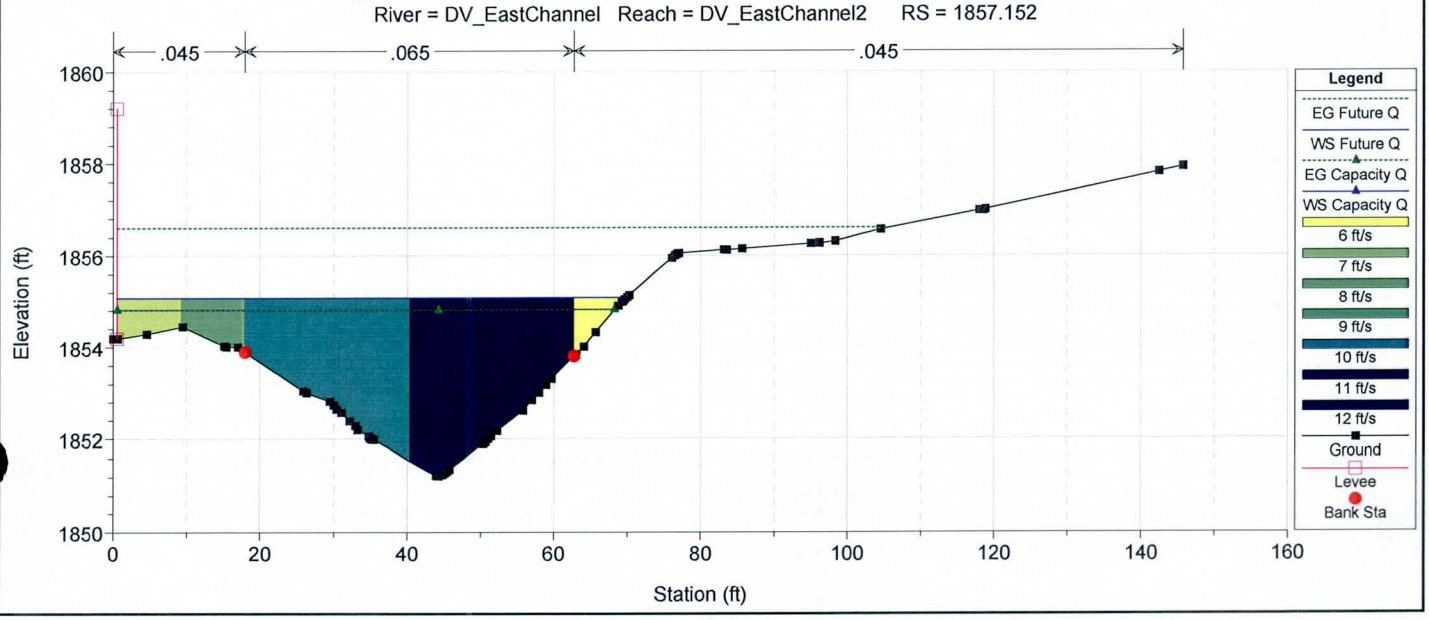
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 1879.426



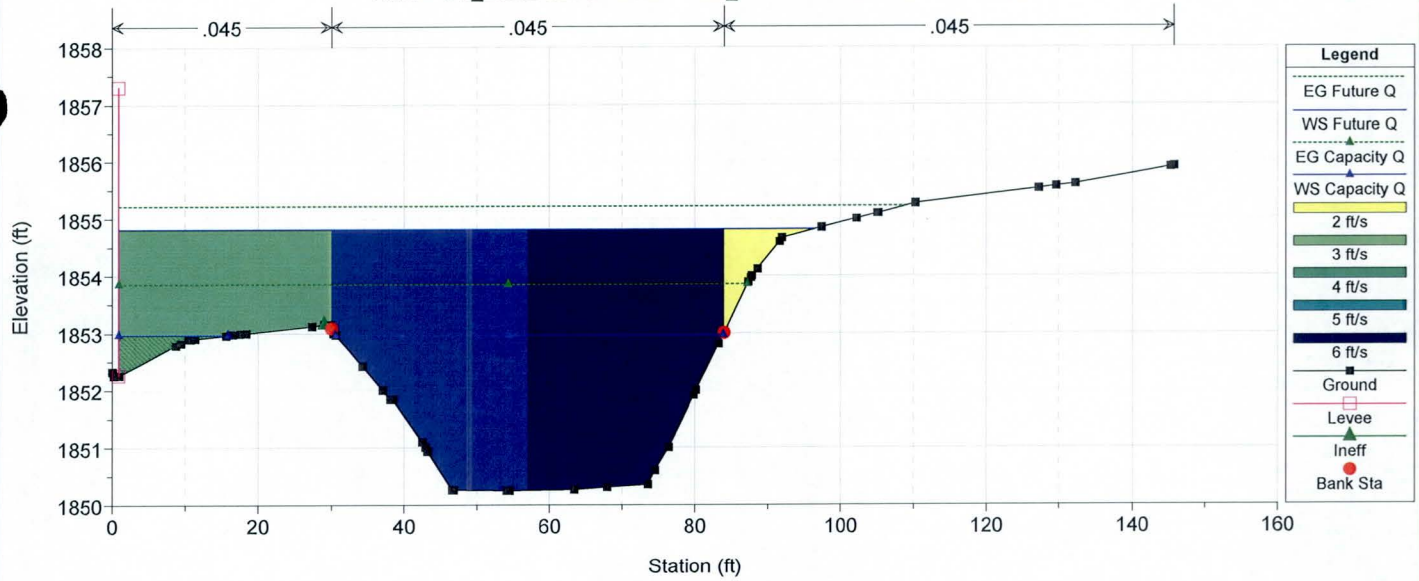
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 1857.152



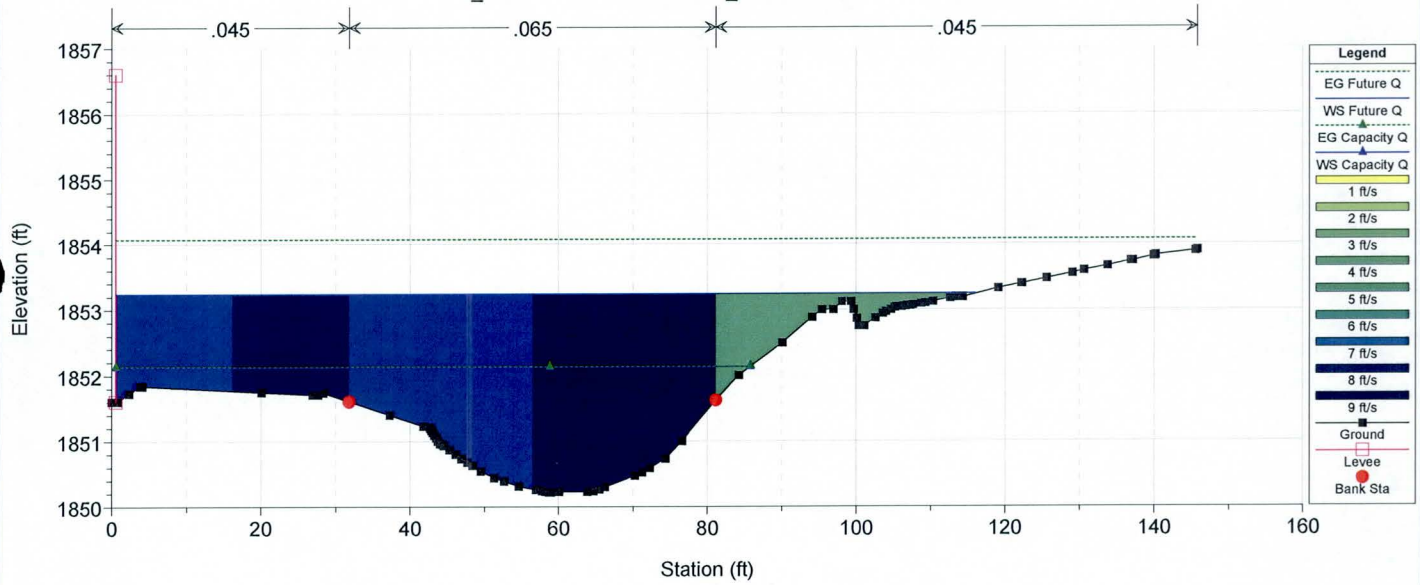
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 1736.217



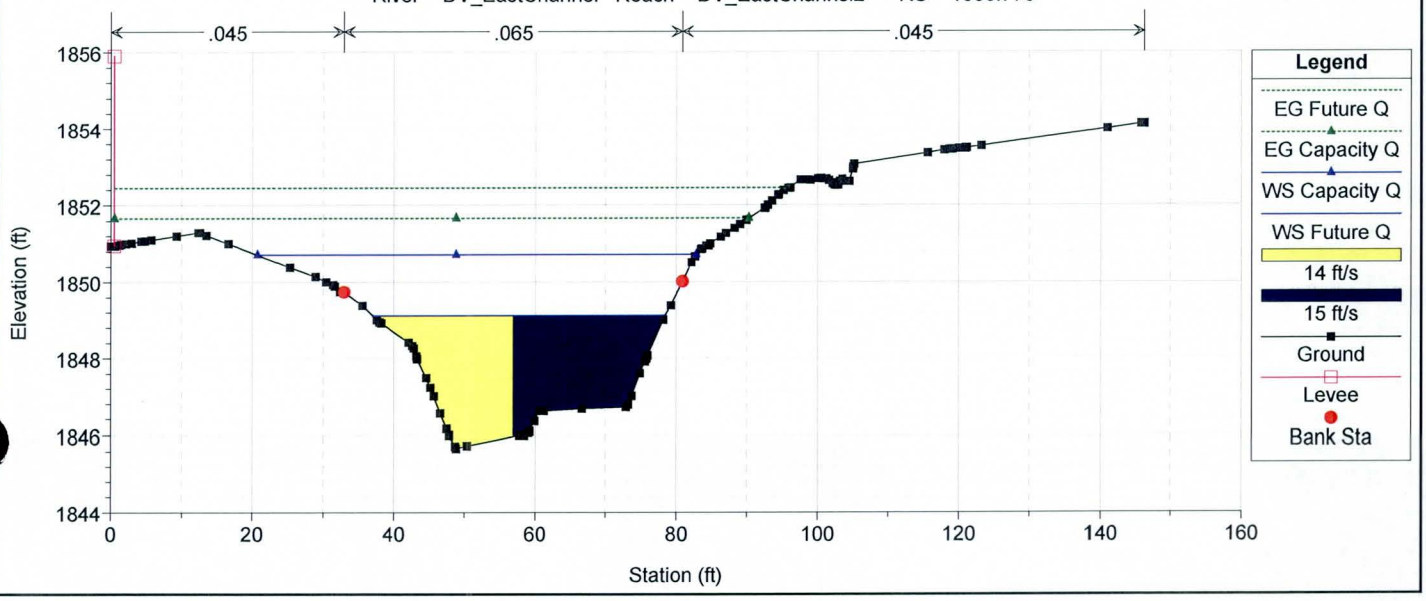
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 1619.757



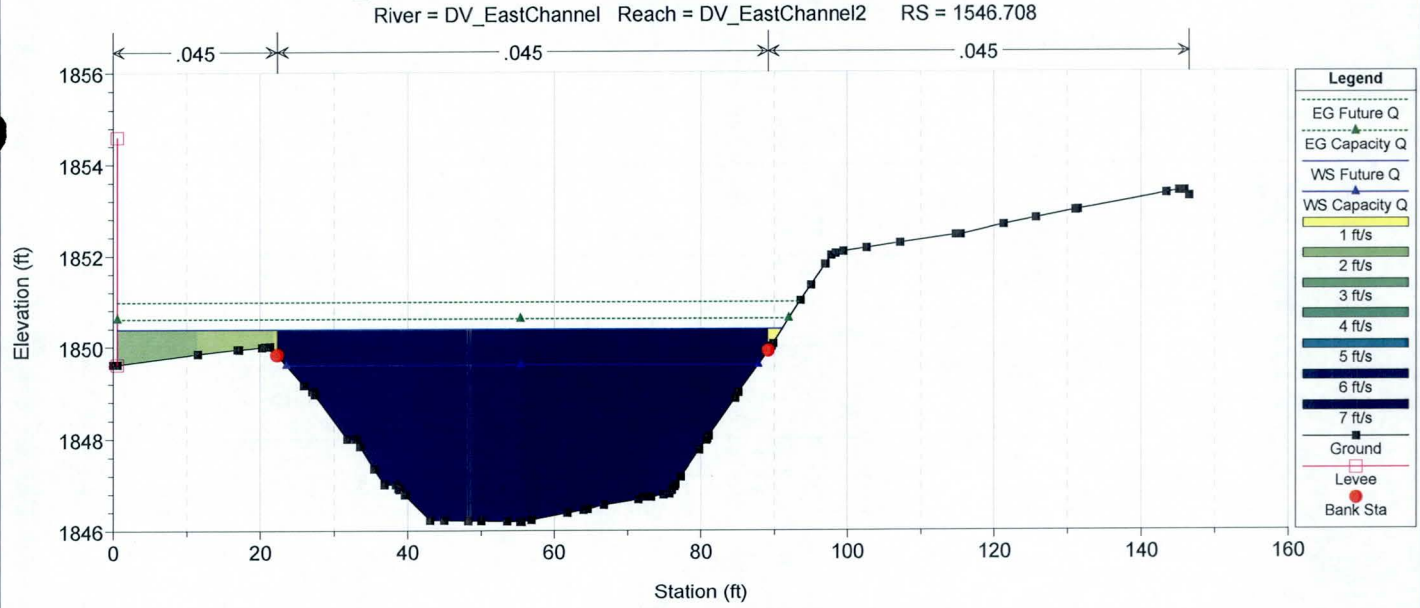
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 1596.775



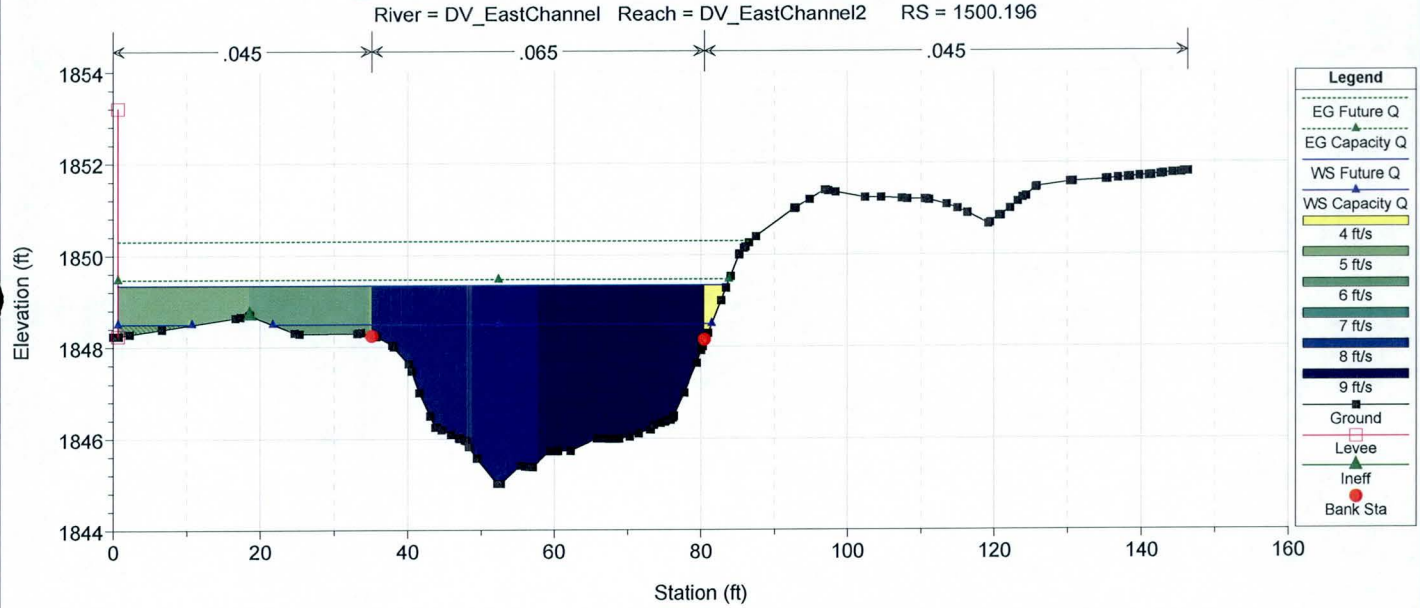
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 1546.708



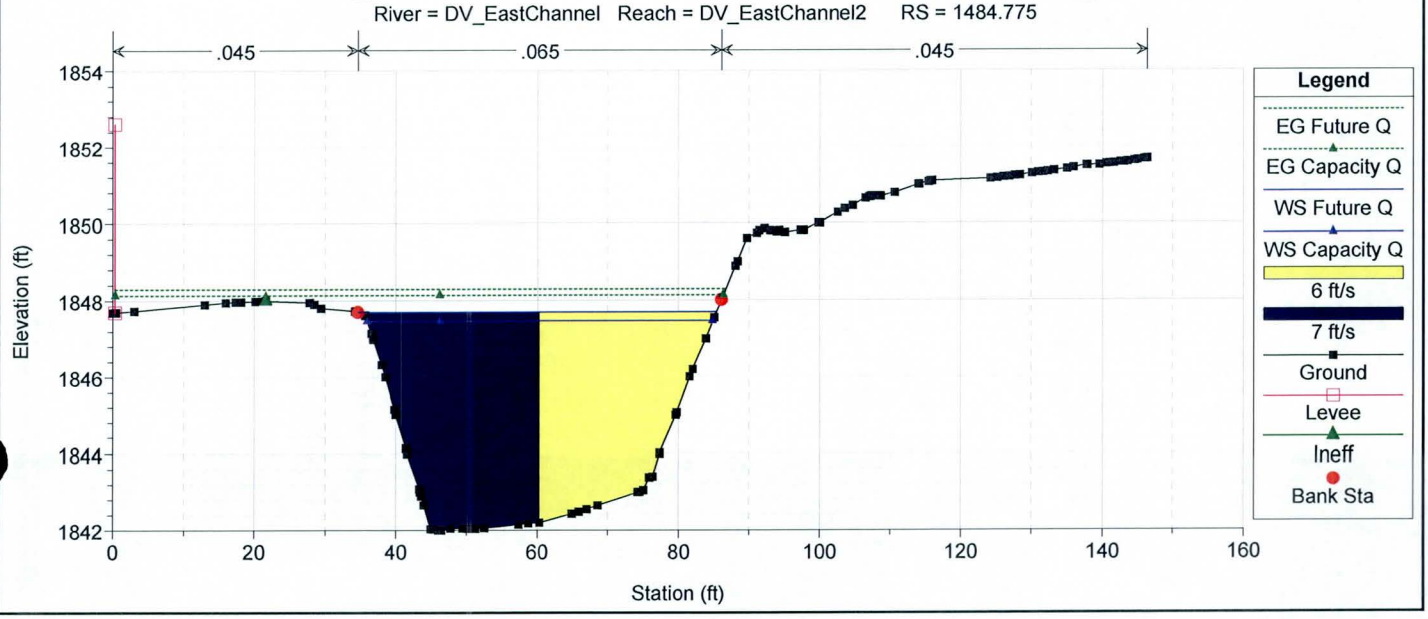
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

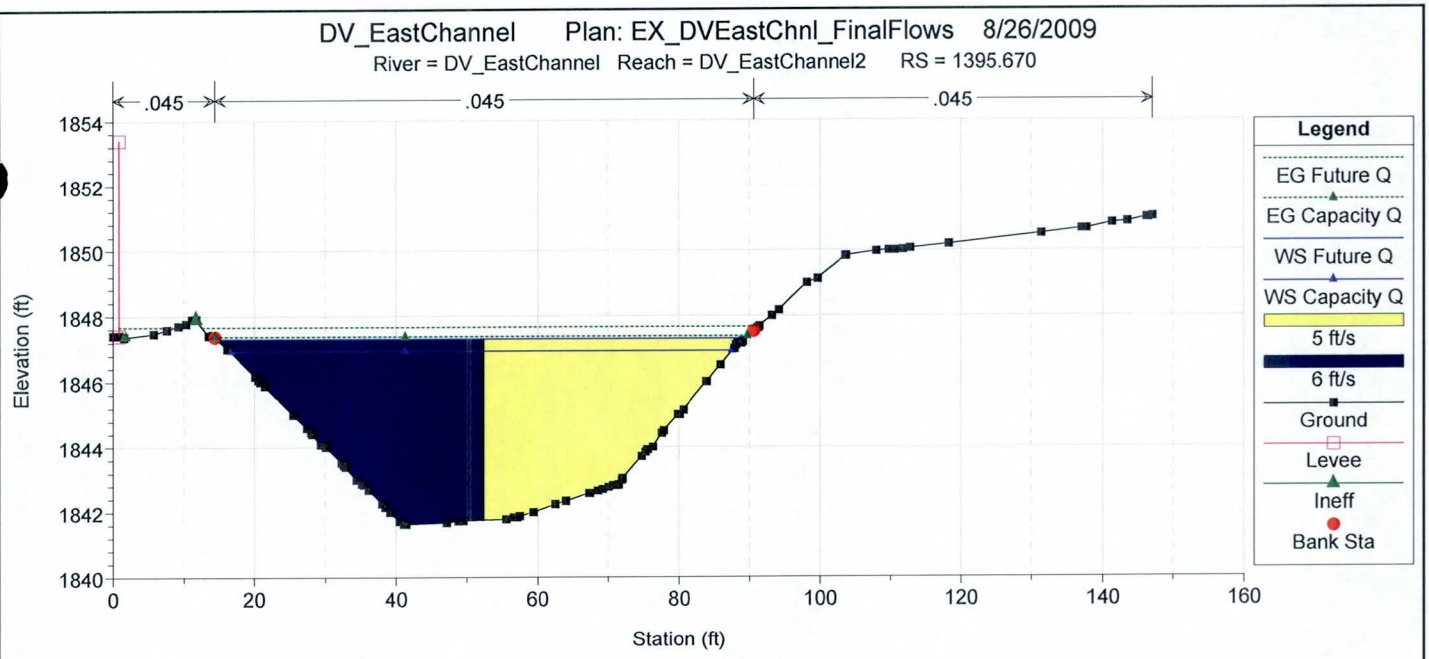
River = DV_EastChannel Reach = DV_EastChannel2 RS = 1500.196

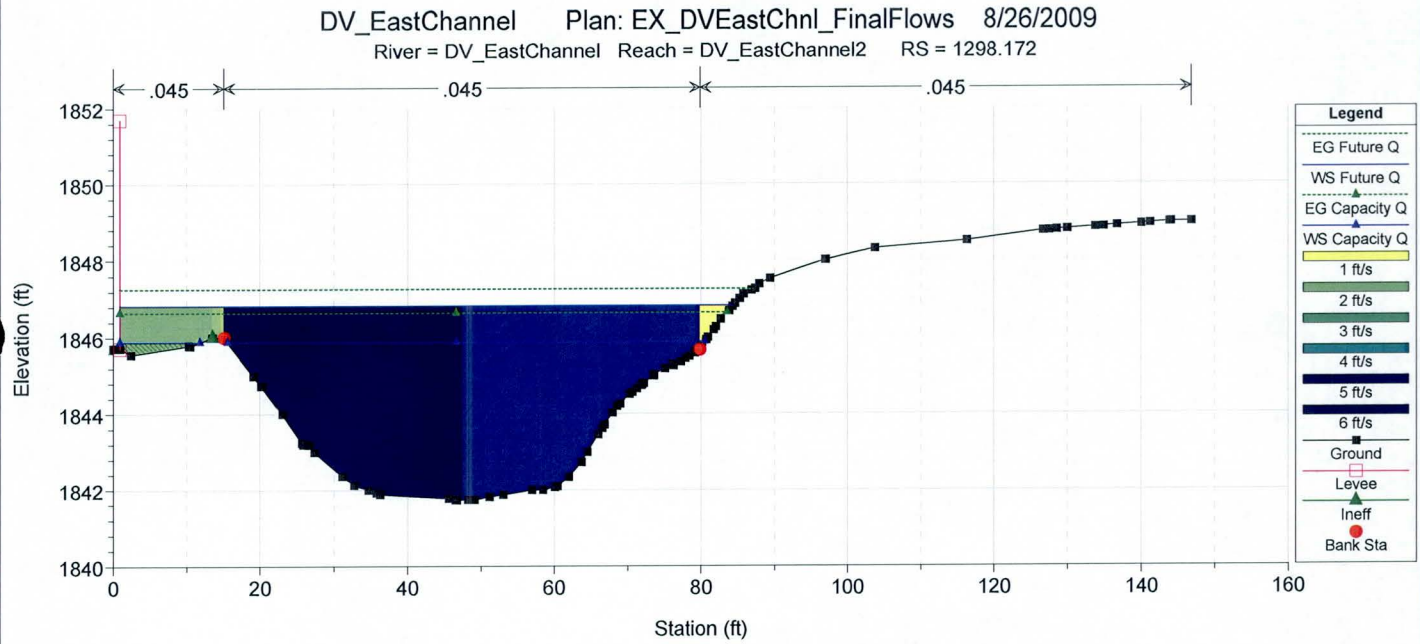


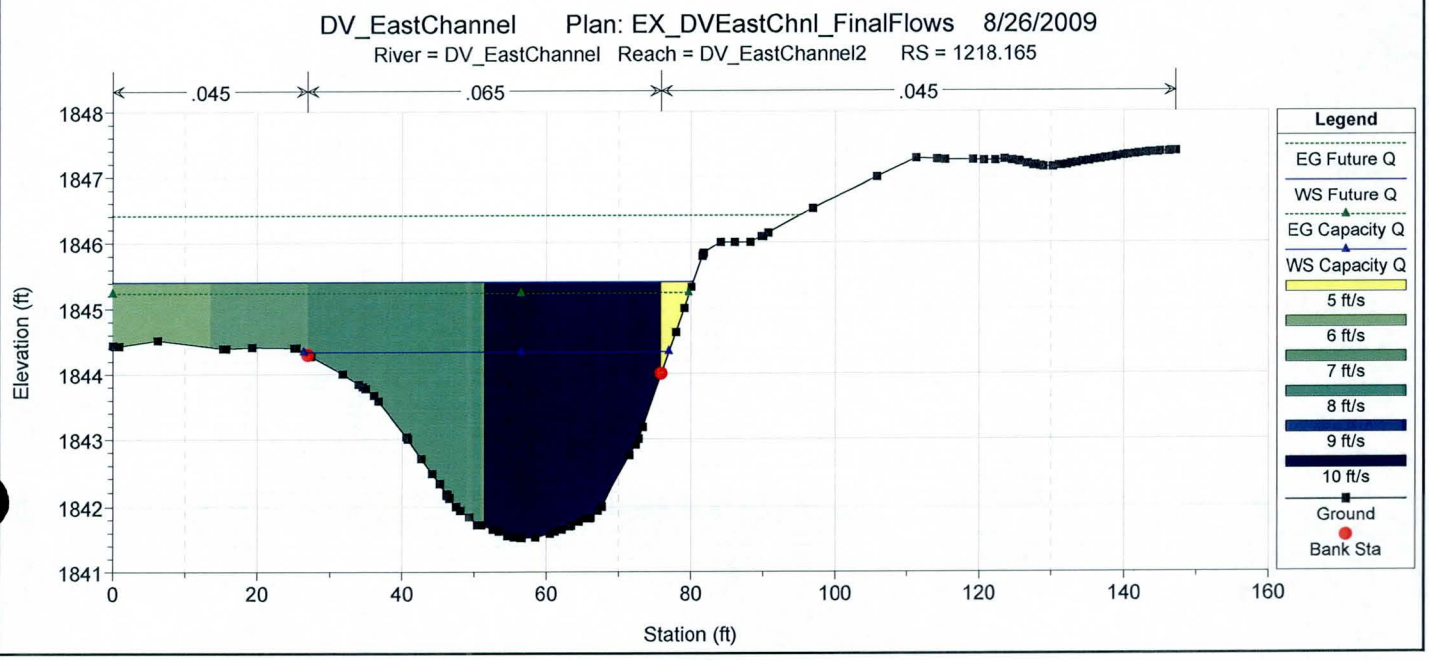
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

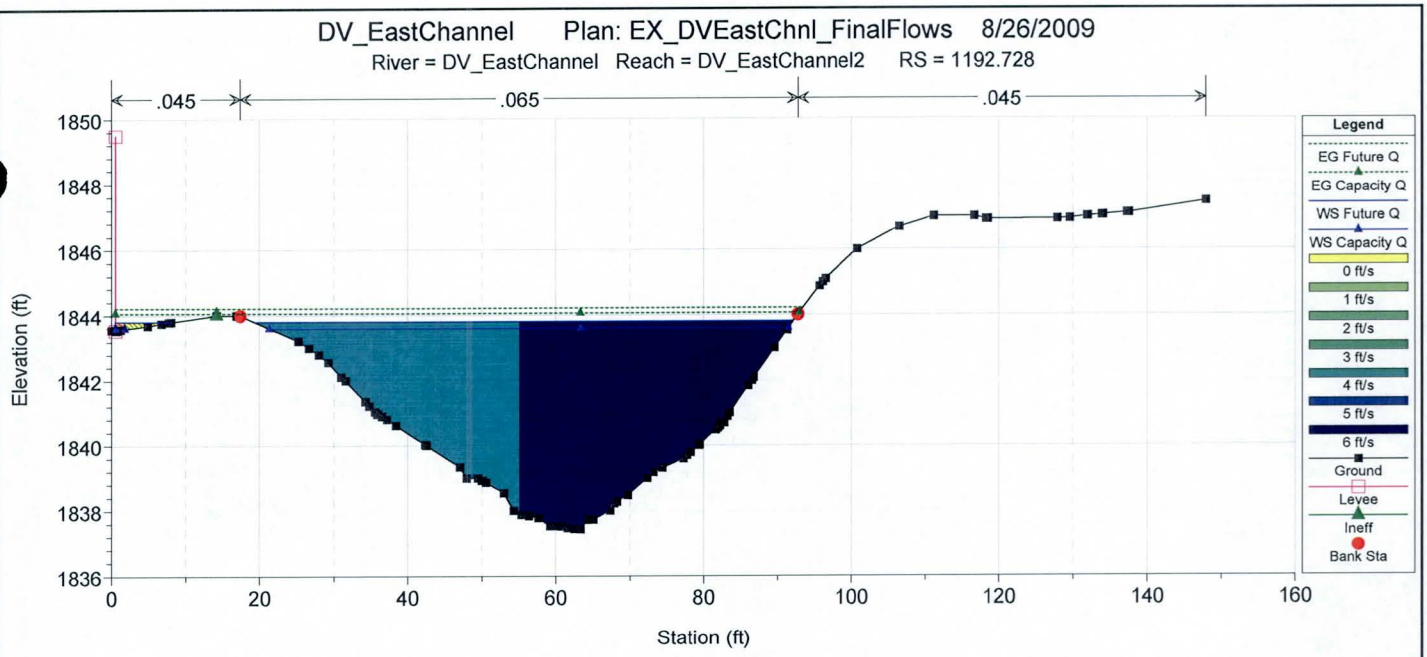
River = DV_EastChannel Reach = DV_EastChannel2 RS = 1484.775

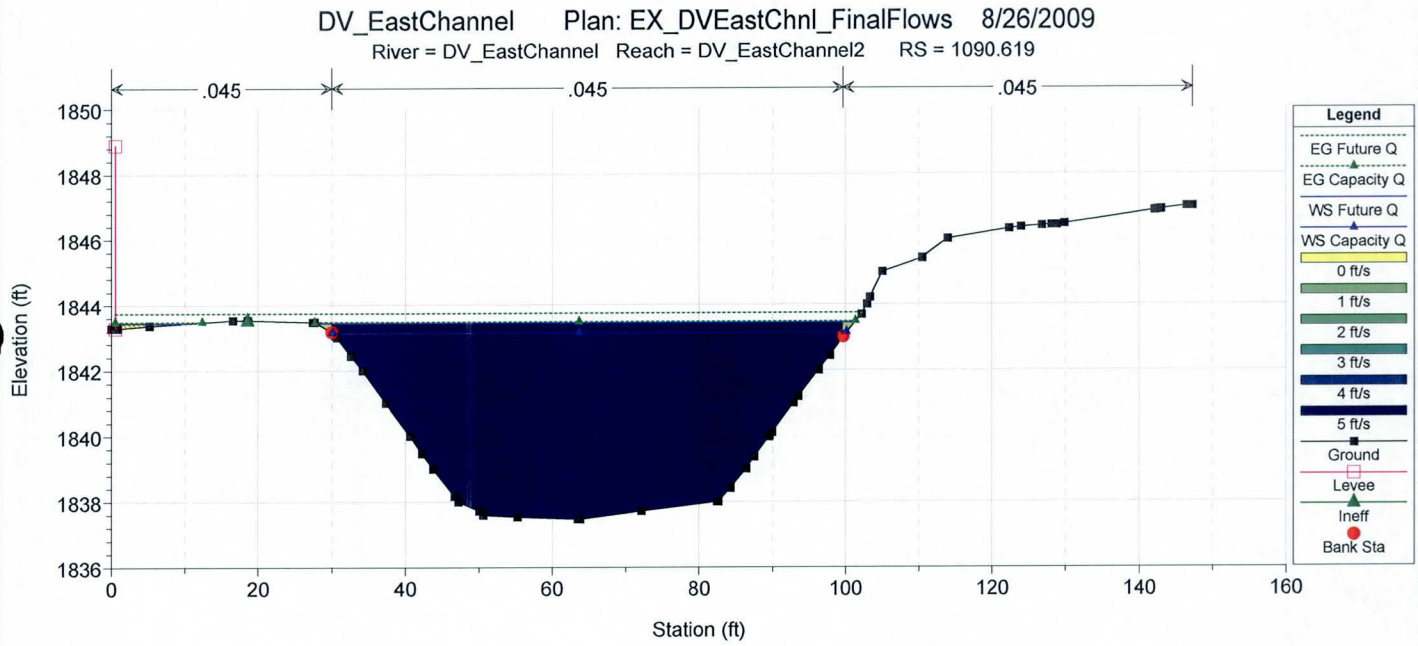


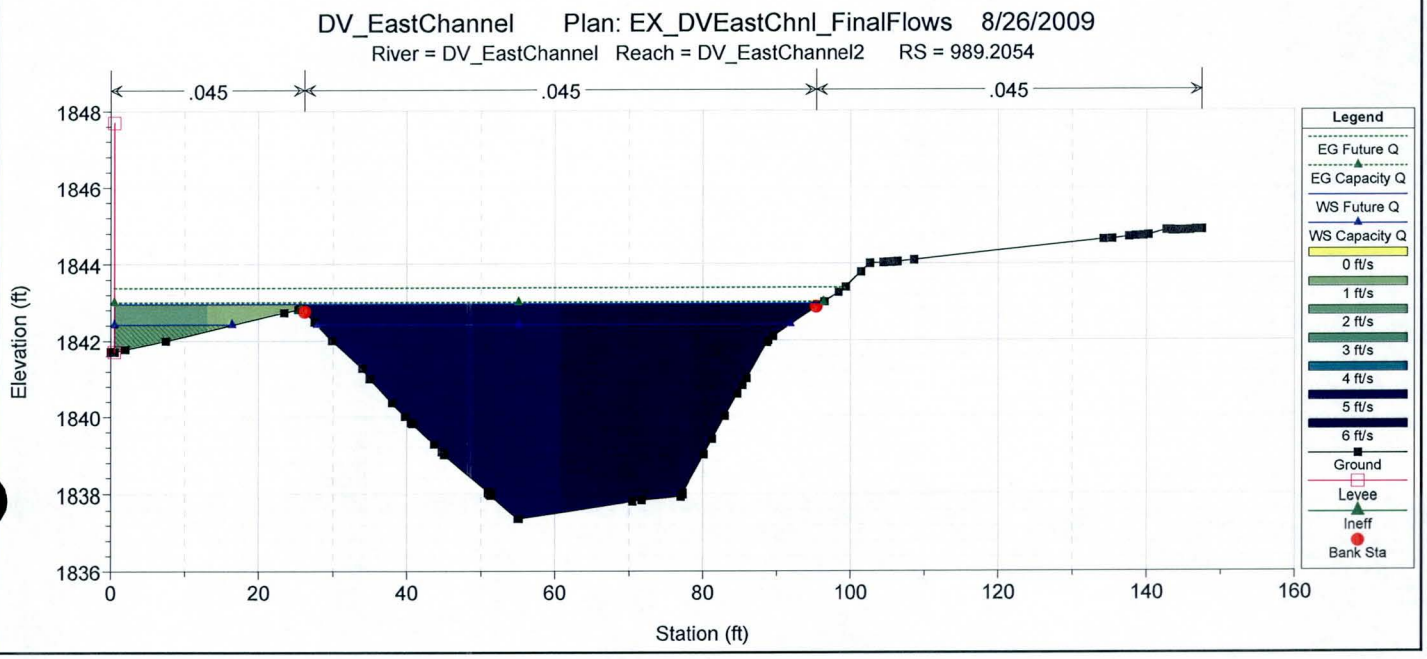

DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 1395.670
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
5 ft/s
6 ft/s
Ground
Levee
Ineff
Bank Sta

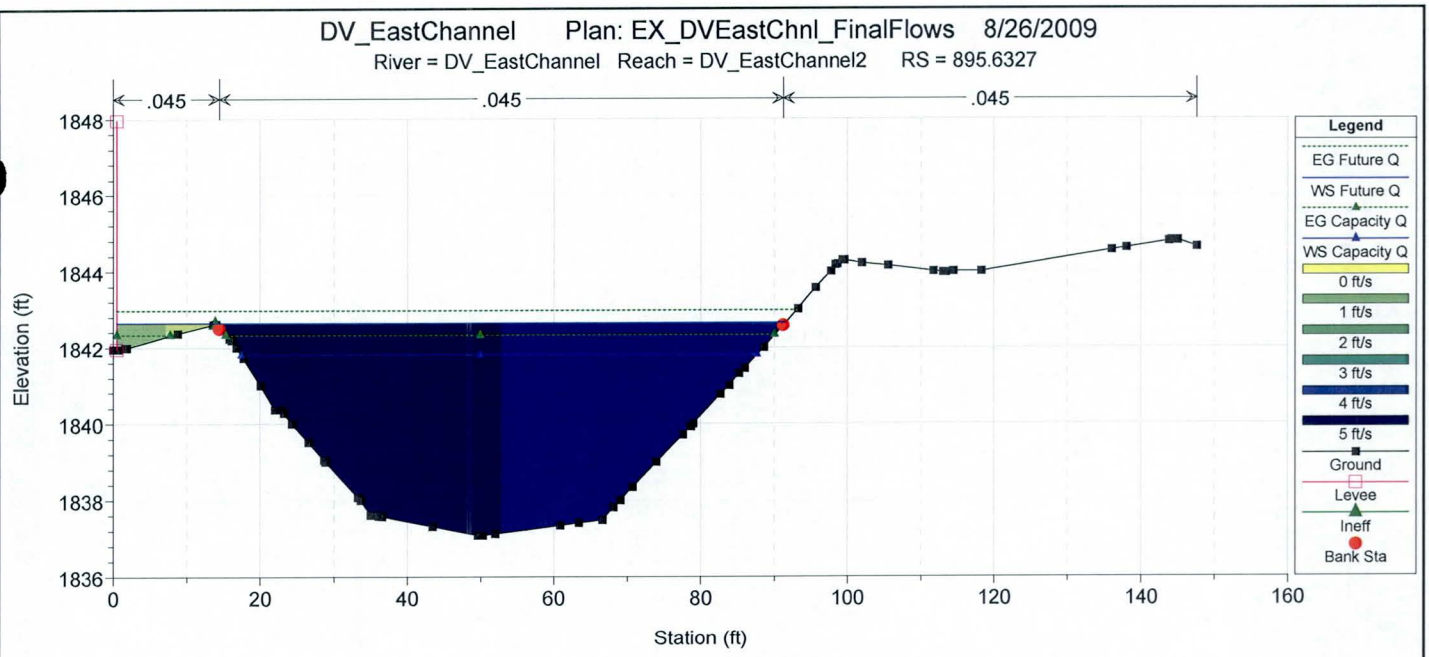

DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 1298.172
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
EG Capacity Q
WS Capacity Q
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Levee
Ineff
Bank Sta

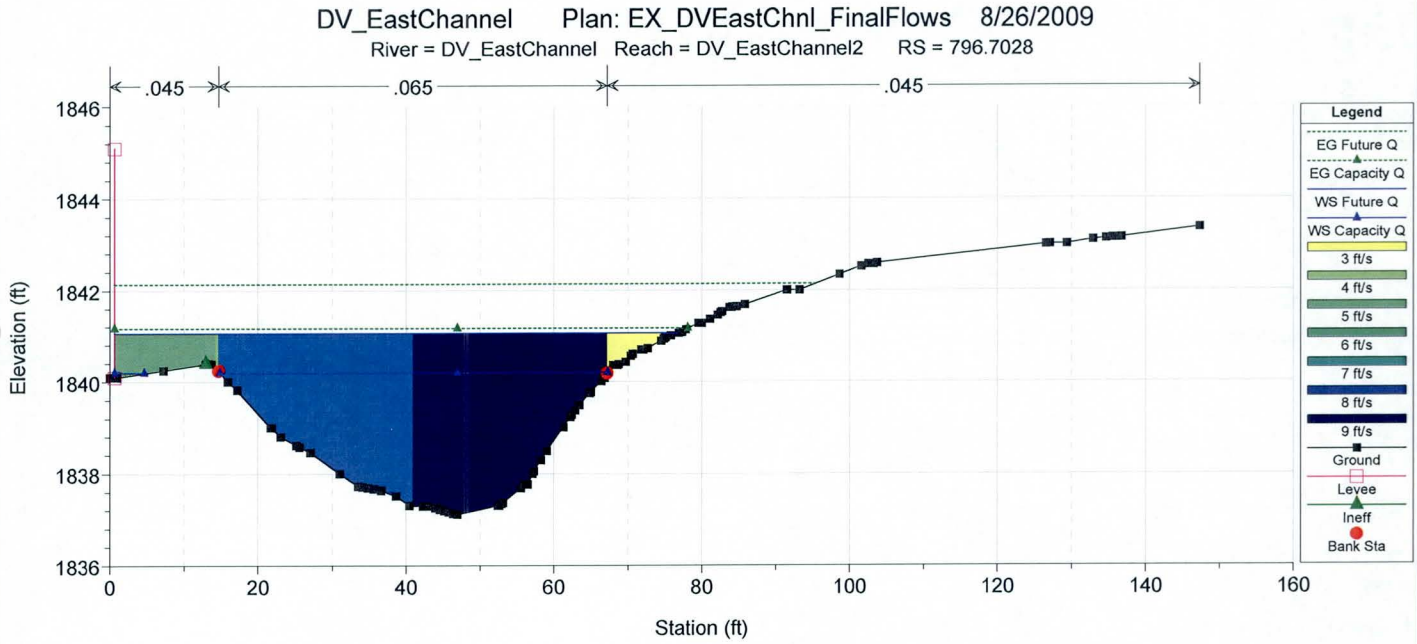

DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 1218.165
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
EG Capacity Q
WS Capacity Q
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

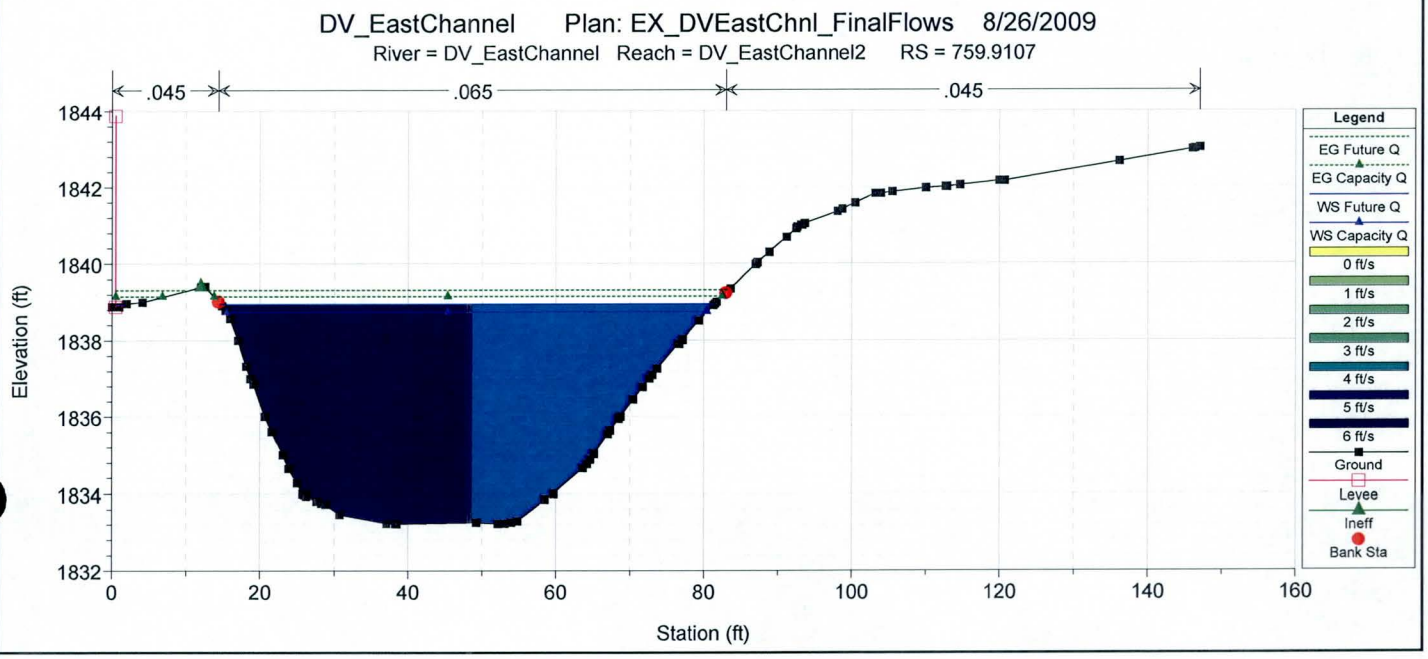

DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 1192.728
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Levee
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 1090.619
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Levee
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 989.2054
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Levee
Ineff
Bank Sta

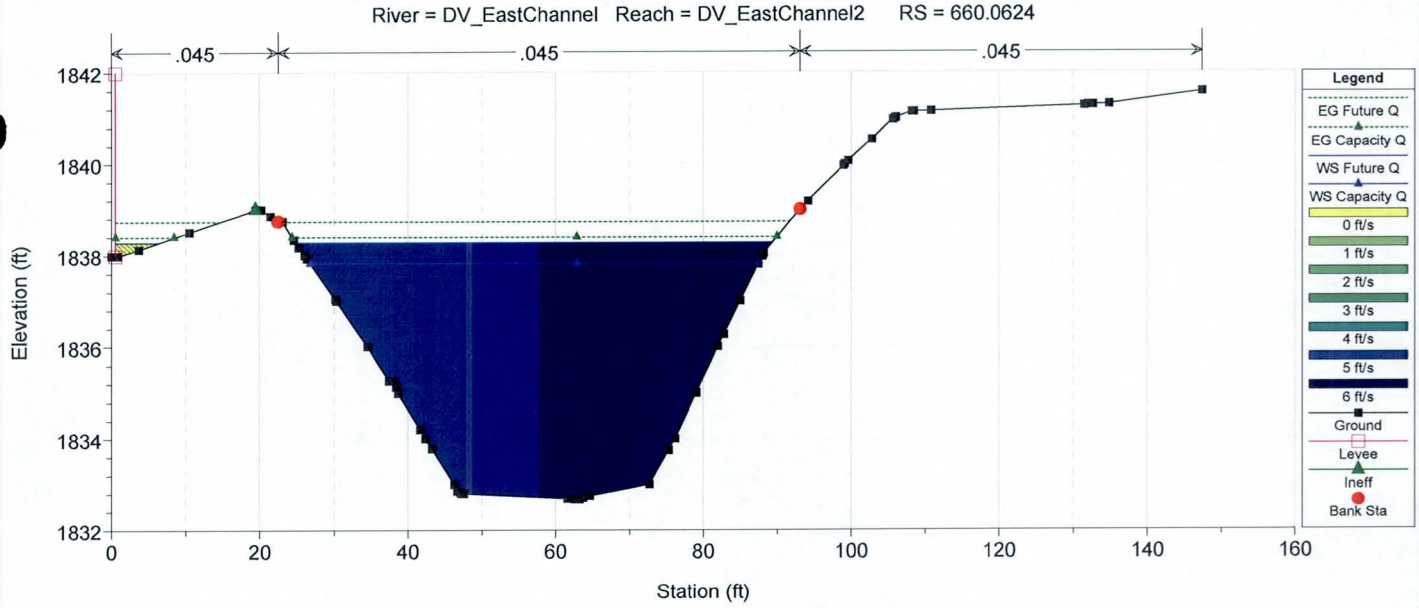

DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 895.6327
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
EG Capacity Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Levee
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 796.7028
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 759.9107
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Levee
Ineff
Bank Sta

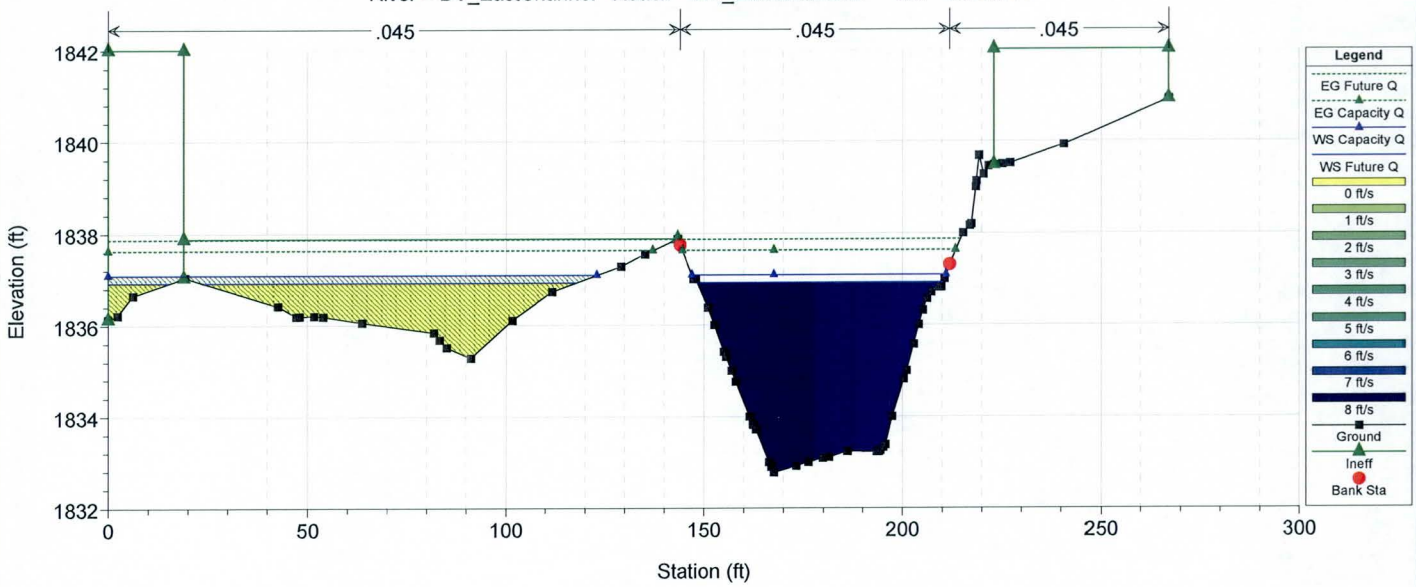
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 660.0624



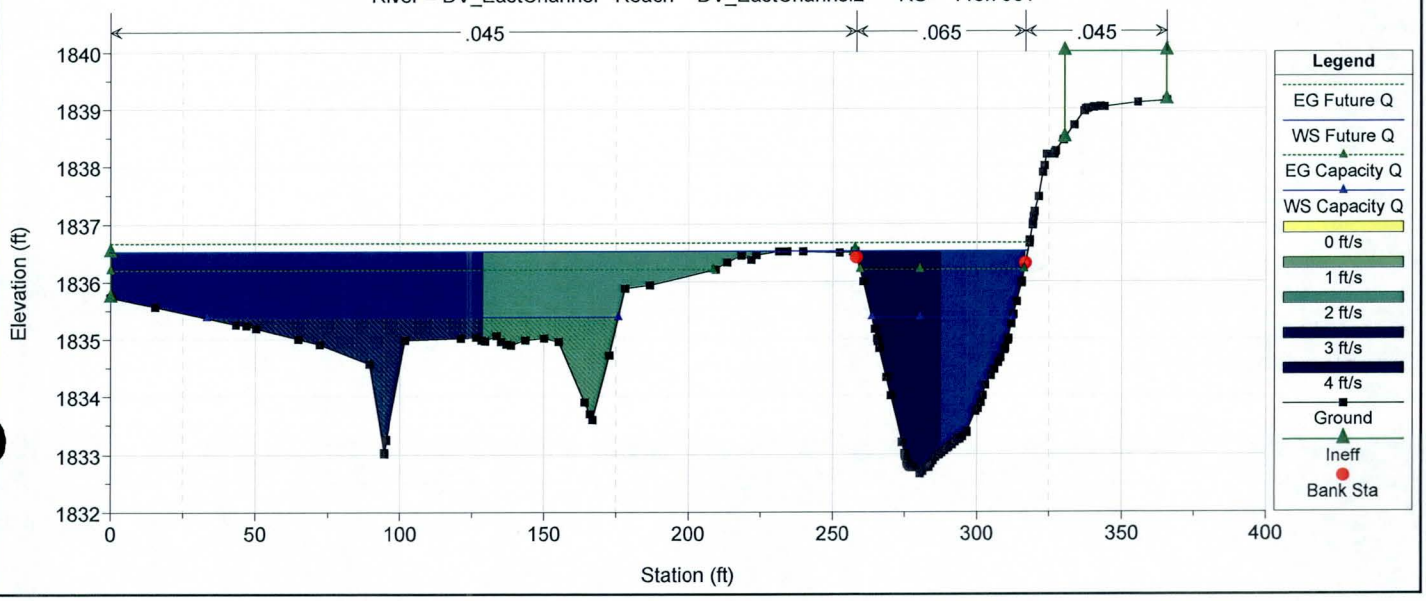
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

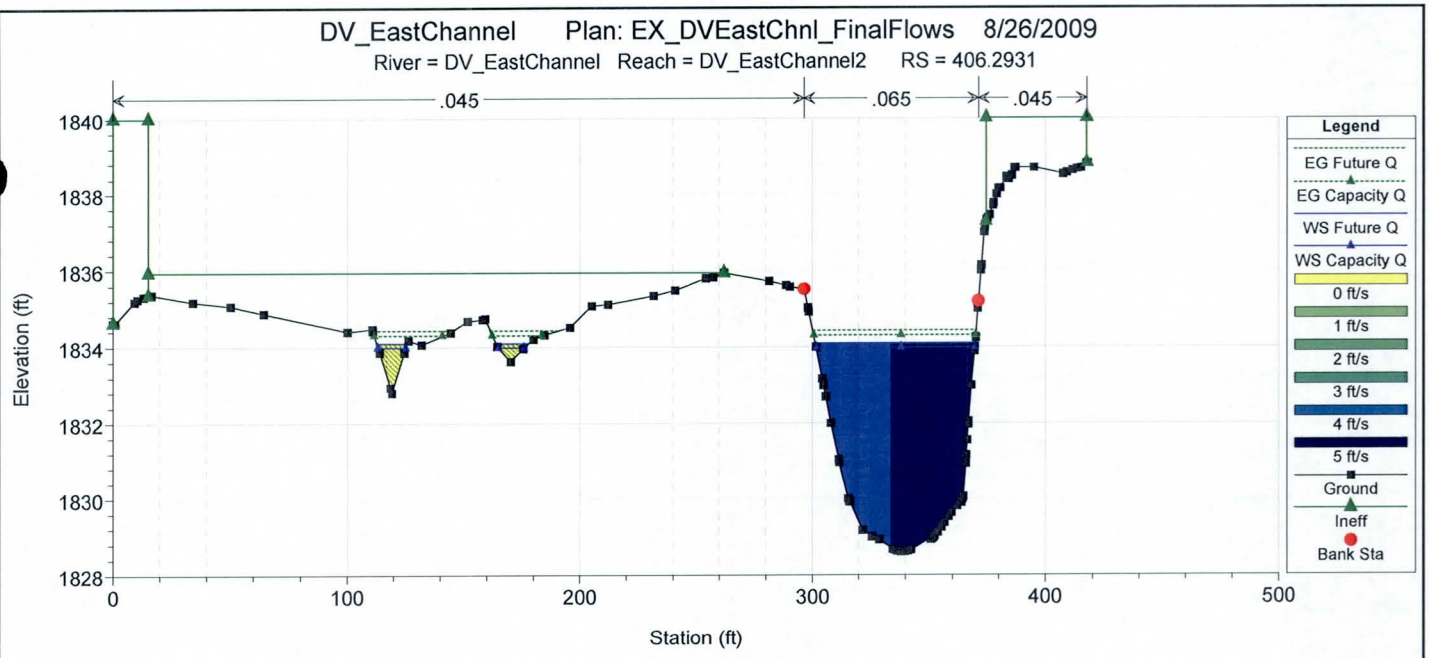
River = DV_EastChannel Reach = DV_EastChannel2 RS = 552.9014

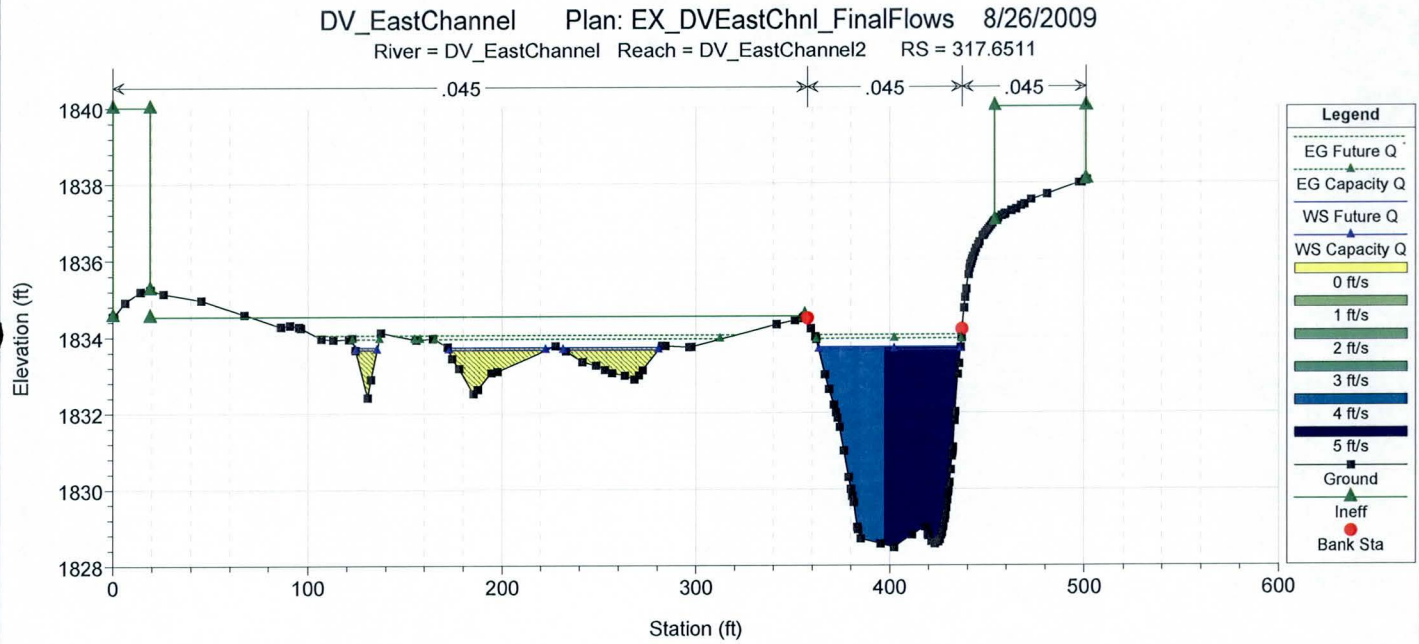


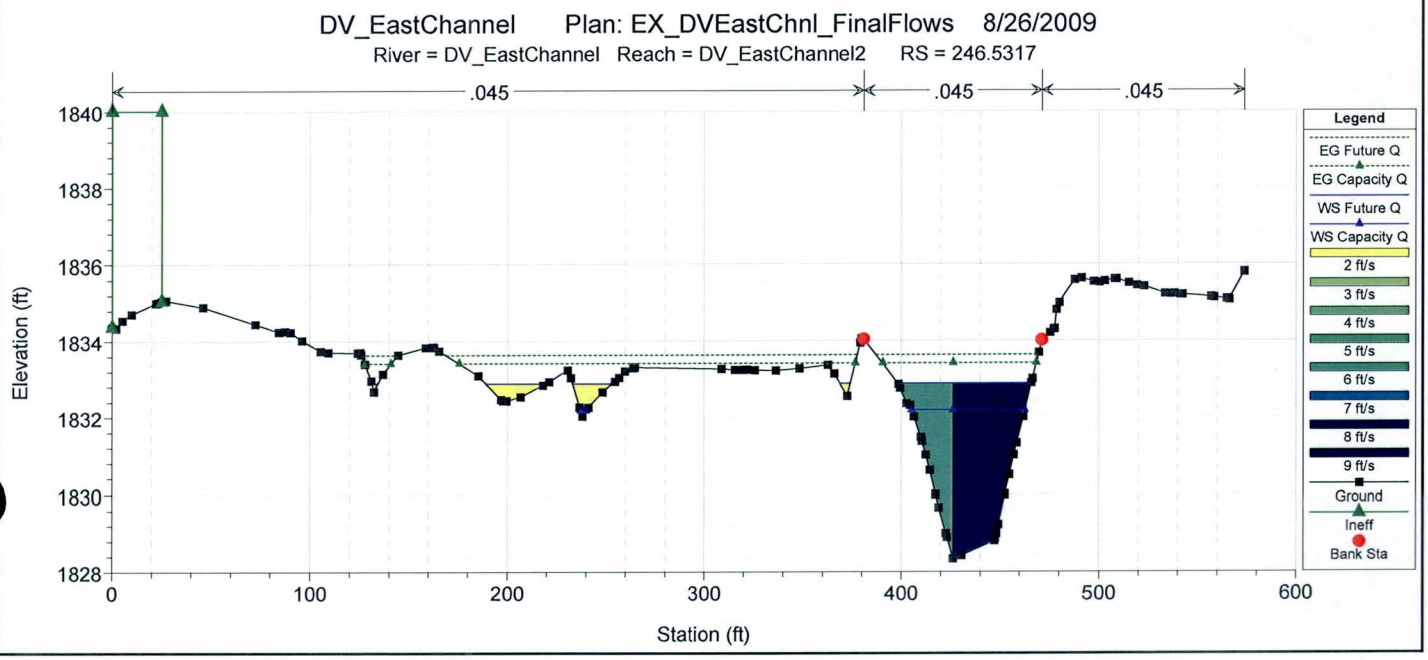
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 448.7031



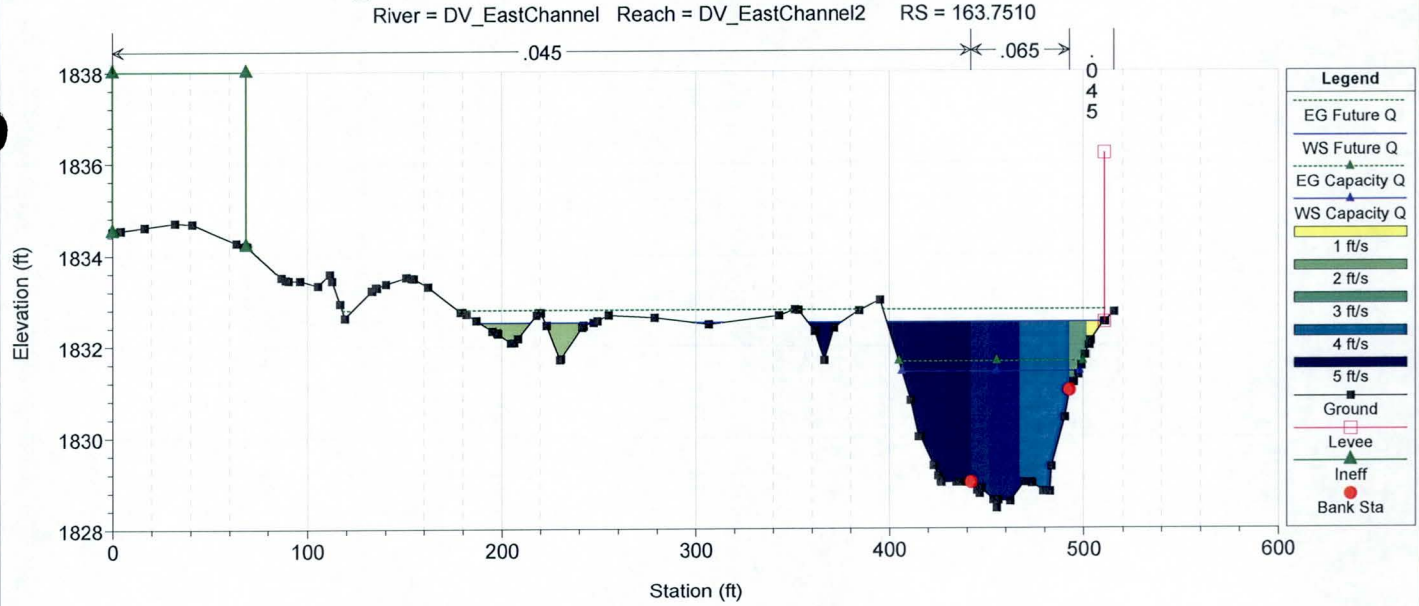

DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 406.2931
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 317.6511
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 246.5317
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Future Q
WS Capacity Q
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Ineff
Bank Sta

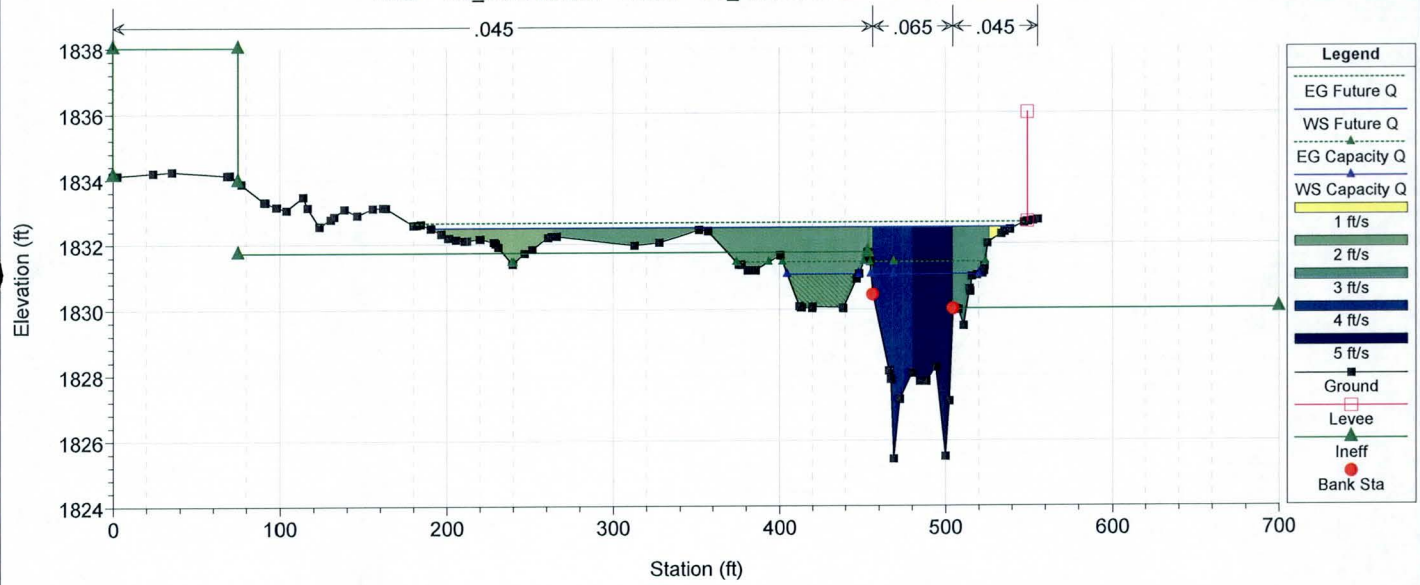
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

River = DV_EastChannel Reach = DV_EastChannel2 RS = 163.7510



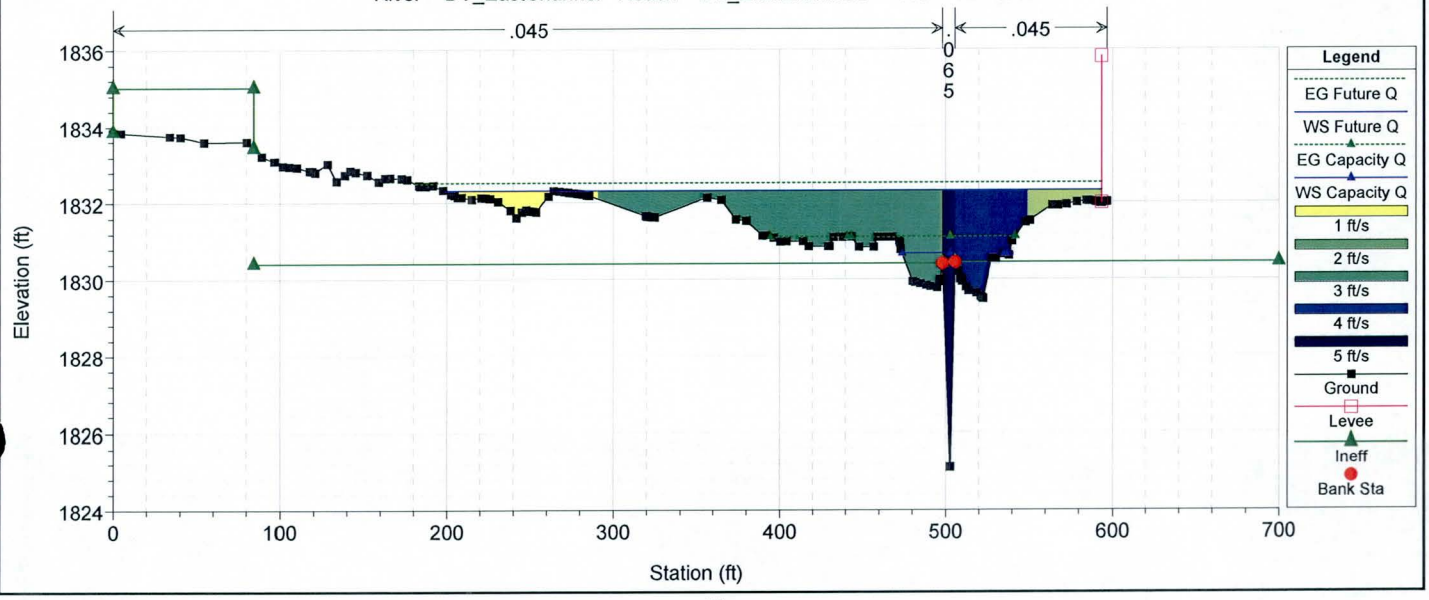
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

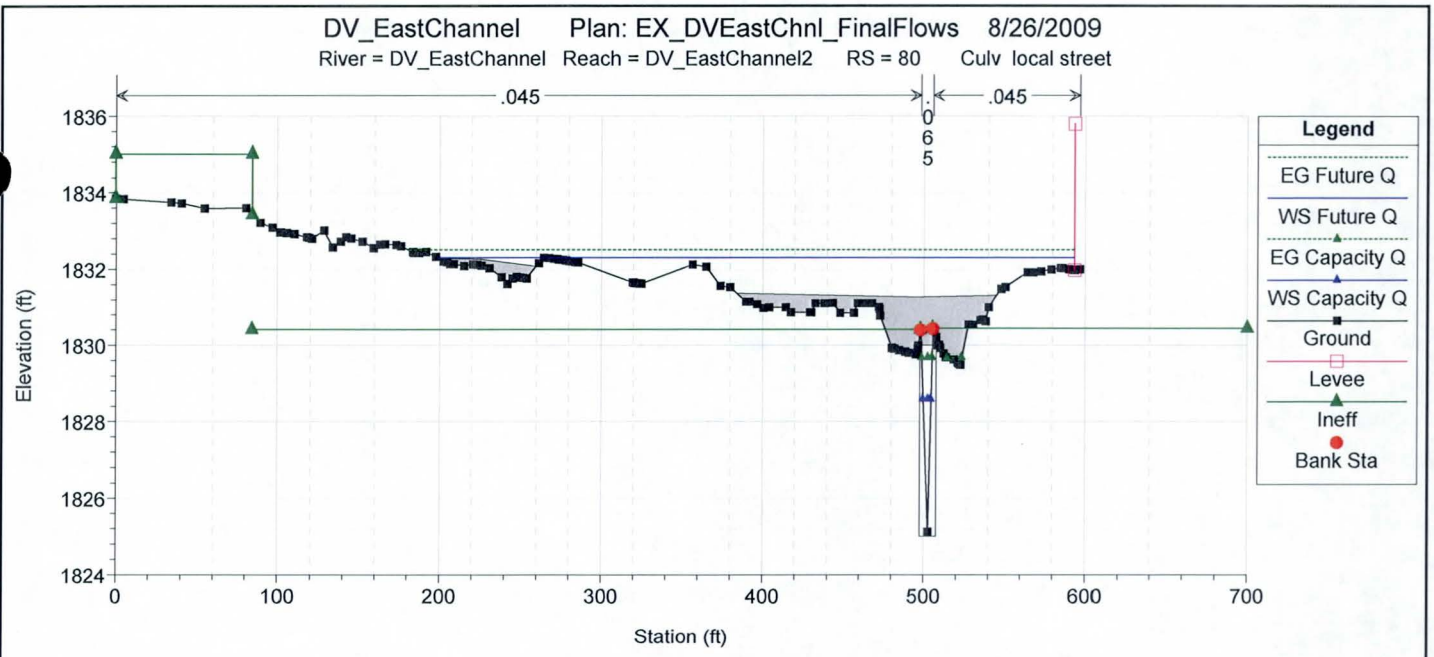
River = DV_EastChannel Reach = DV_EastChannel2 RS = 141.0208

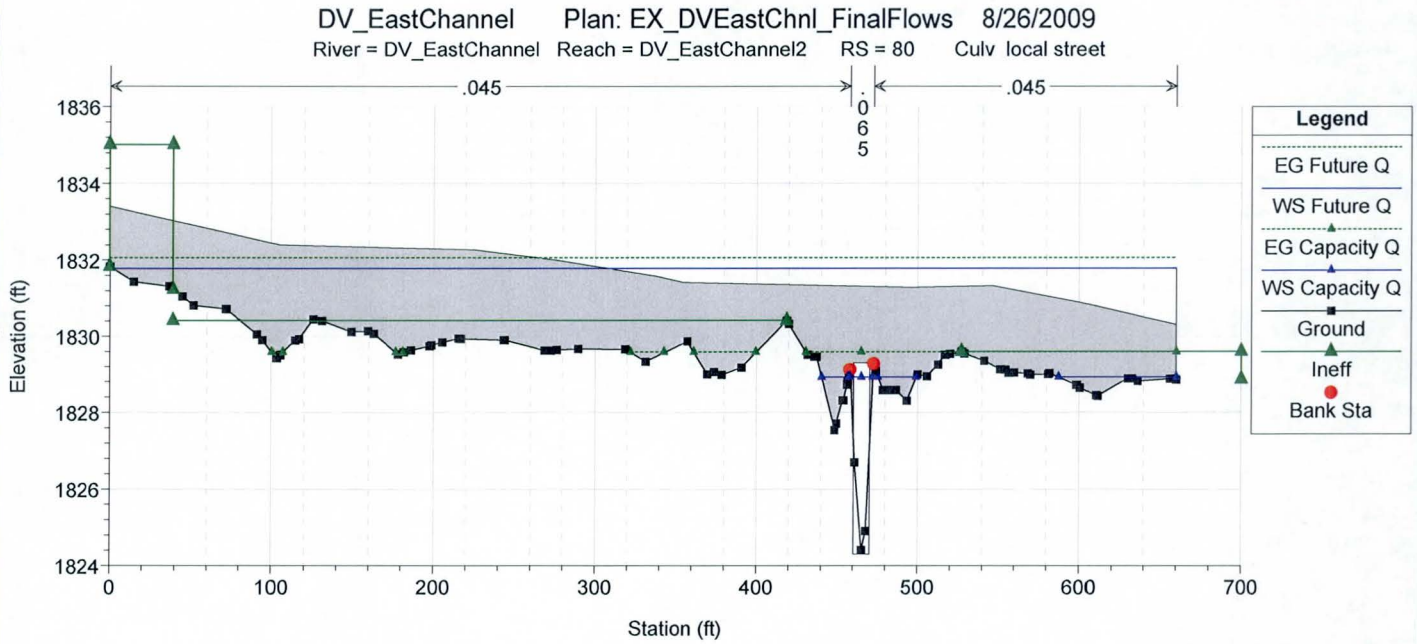


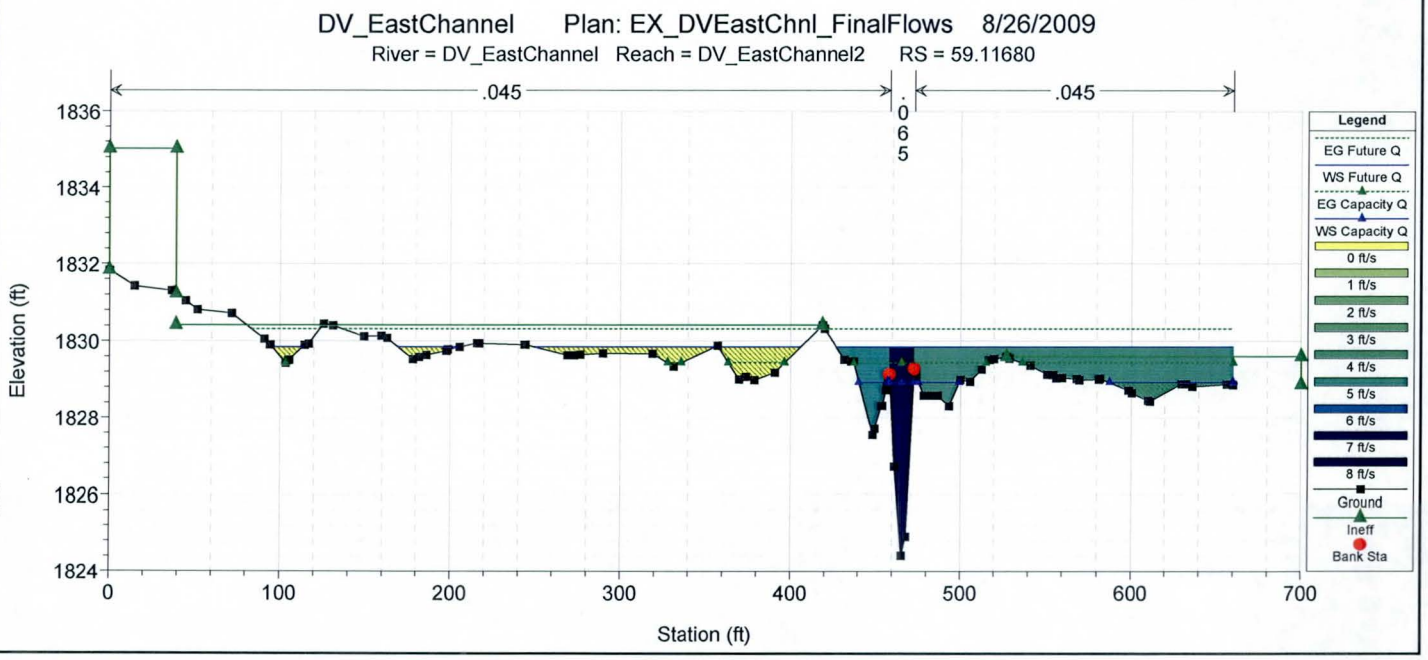
DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009

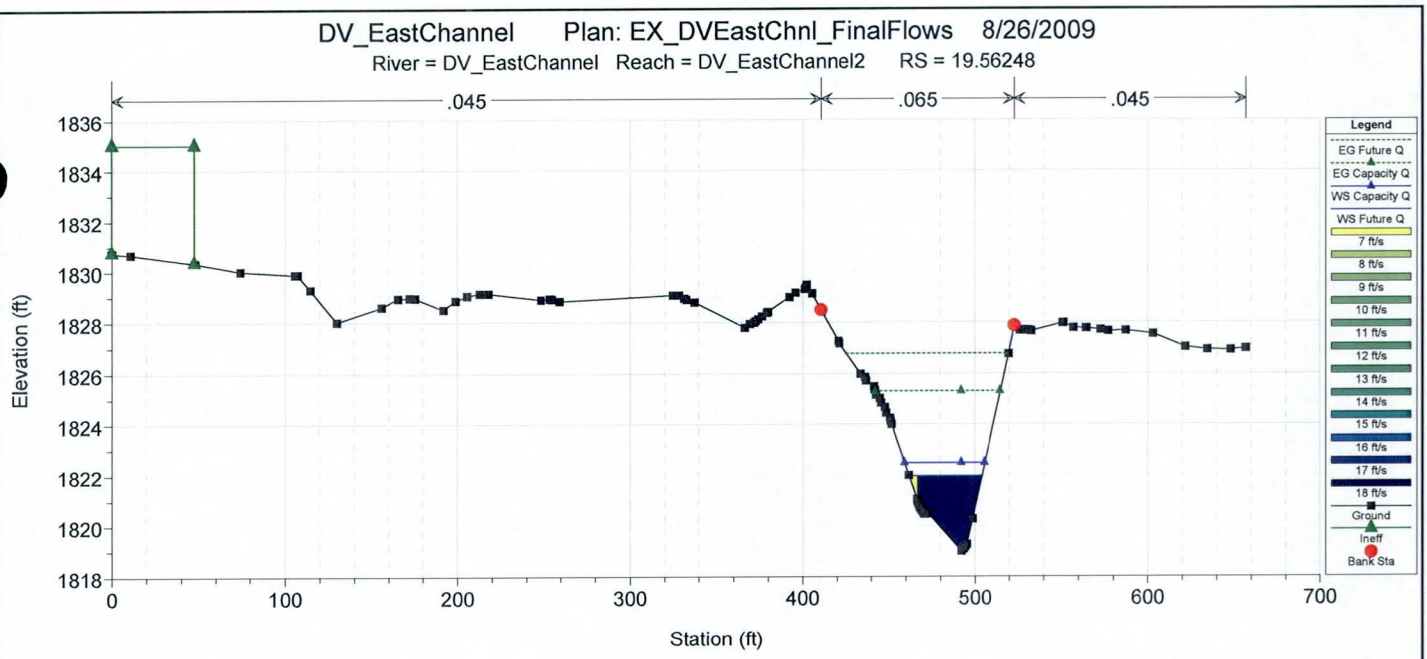
River = DV_EastChannel Reach = DV_EastChannel2 RS = 121.0936




DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 80 Culv local street
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
EG Capacity Q
WS Capacity Q
Ground
Levee
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 80 Culv local street
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
EG Capacity Q
WS Capacity Q
Ground
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 59.11680
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
EG Capacity Q
WS Capacity Q
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta


DV_EastChannel Plan: EX_DVEastChnl_FinalFlows 8/26/2009
River = DV_EastChannel Reach = DV_EastChannel2 RS = 19.56248
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
EG Capacity Q
WS Capacity Q
WS Future Q
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
Ground
Ineff
Bank Sta

Errors Warnings and Notes for Plan : QFinalAu2009

Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 2260.811 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 2260.811 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that
	had the least amount of error between computed and assumed values.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 2166.054 Profile: Future Q
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 2166.054 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 2077.095 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 2077.095 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1976.464 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1976.464 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may

	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1879.426 Profile: Future Q
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1879.426 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1857.152 Profile: Future Q
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1857.152 Profile: Capacity Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1736.217 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1736.217 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1619.757 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1619.757 Profile: Capacity Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1596.775 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.

Errors Warnings and Notes for Plan : QFinalAu2009 (Continued)

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1596.775 Profile: Capacity Q
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1546.708 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1546.708 Profile: Capacity Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1500.196 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1500.196 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1484.775 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1484.775 Profile: Capacity Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1395.670 Profile: Future Q
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1395.670 Profile: Capacity Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1298.172 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1298.172 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1218.165 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water

	surface and continued on with the calculations.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1218.165 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1192.728 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1192.728 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1090.619 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 1090.619 Profile: Capacity Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 989.2054 Profile: Future Q
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 989.2054 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 895.6327 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 895.6327 Profile: Capacity Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 796.7028 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Errors Warnings and Notes for Plan : QFinalAu2009 (Continued)

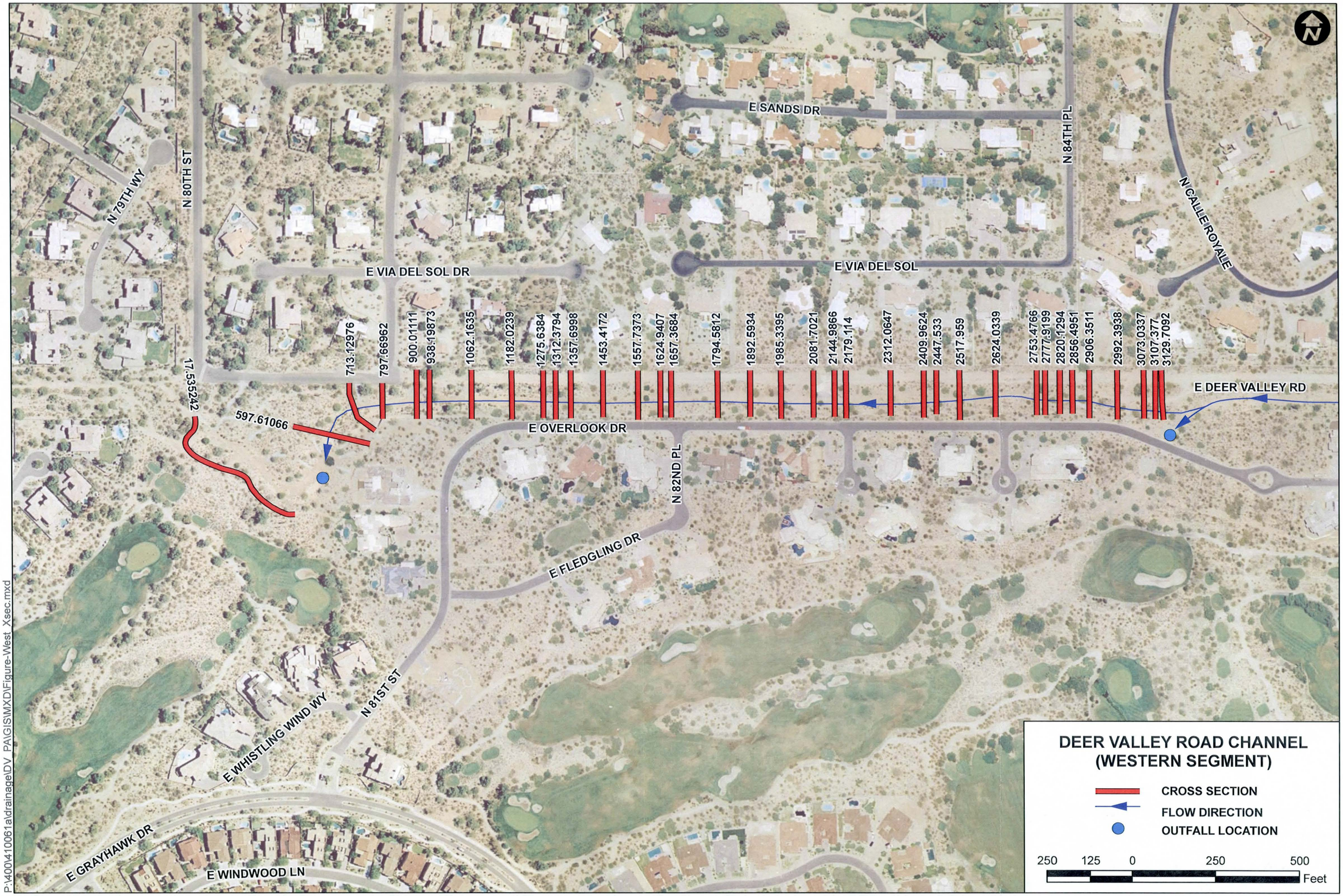
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 796.7028 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 759.9107 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 759.9107 Profile: Capacity Q
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 660.0624 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 660.0624 Profile: Capacity Q
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 552.9014 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 552.9014 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 448.7031 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 448.7031 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 406.2931 Profile: Future Q

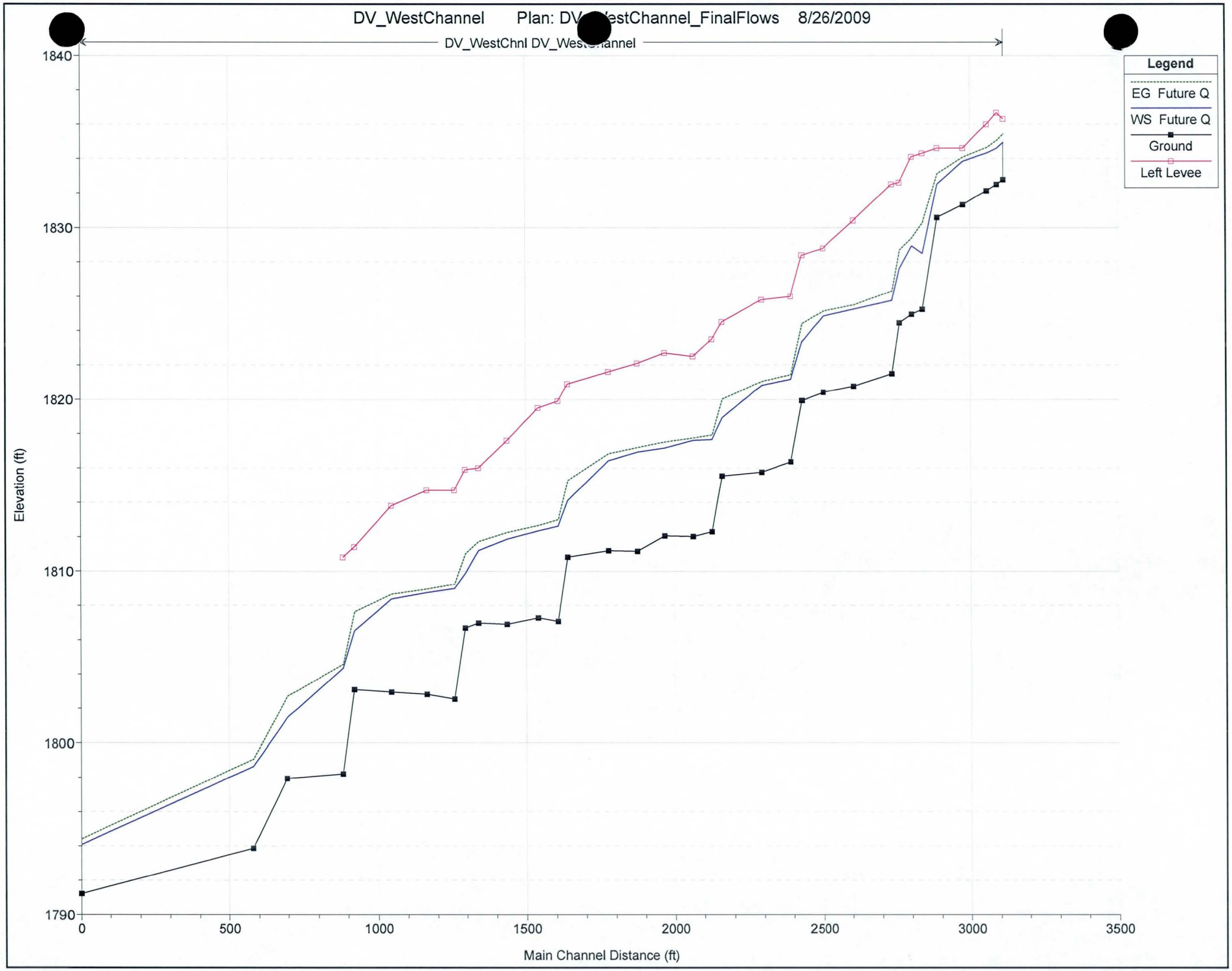
Errors Warnings and Notes for Plan : QFinalAu2009 (Continued)

Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 406.2931 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 317.6511 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 317.6511 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 246.5317 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 246.5317 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 163.7510 Profile: Future Q
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 163.7510 Profile: Capacity Q
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 141.0208 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 141.0208 Profile: Capacity Q
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 121.0936 Profile: Future Q
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 121.0936 Profile: Capacity Q
Warning:	During subcritical analysis, the water surface upstream of culvert went to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 80 Profile: Future Q Culv: Culvert #1
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:	The culvert inlet is submerged and the culvert flows full over part or all of its length. Therefore, the culvert inlet equations are not
	valid and the supercritical result has been discarded. The outlet answer will be used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 80 Profile: Capacity Q
Warning:	During subcritical analysis, the water surface upstream of culvert went to critical depth.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 59.11680 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Errors Warnings and Notes for Plan : QFinalAu2009 (Continued)

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 59.11680 Profile: Capacity Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 19.56248 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: DV_EastChannel Reach: DV_EastChannel2 RS: 19.56248 Profile: Capacity Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.


DEER VALLEY ROAD CHANNEL
(WESTERN SEGMENT)
CROSS SECTION
FLOW DIRECTION
OUTFALL LOCATION
250 125 0 250 500
Feet
E SANDS DR
N 84TH PL
N CALLE ROYALE
N 79TH WY
N 80TH ST
E VIA DEL SOL DR
E VIA DEL SOL
E DEER VALLEY RD
E OVERLOOK DR
N 82ND PL
E FLEDGLING DR
N 81ST ST
E WHISTLING WIND WY
E GRAYHAWK DR
E WINDWOOD LN
17.535242
597.61066
713.12976
797.66962
900.01111
938.19873
1062.1635
1182.0239
1275.6384
1312.3794
1357.6998
1453.4172
1557.7373
1624.9407
1657.3684
1794.5812
1892.5934
1985.3395
2081.7021
2144.9866
2179.114
2312.0647
2409.9624
2447.533
2517.959
2624.0339
2753.4766
2777.9199
2820.1294
2856.4951
2906.3511
2992.3938
3073.0337
3107.377
3129.7092
P:\400\410061a\drainage\DV_PA\GIS\MXD\Figure-West_Xsec.mxd

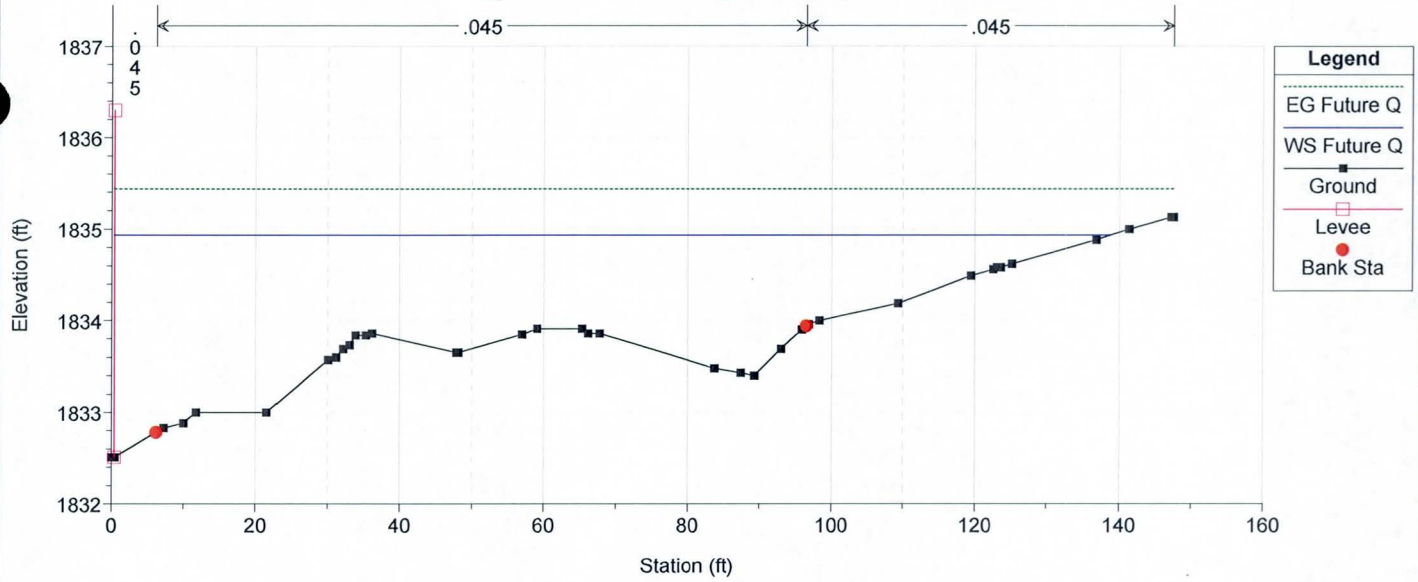

DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
DV_WestChnl DV_WestChannel
Legend
EG Future Q
WS Future Q
Ground
Left Levee
Elevation (ft)
1840
1830
1820
1810
1800
1790
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)

HEC-RAS Plan: QFinalAu2009 River: DV_WestChnl Reach: DV_WestChannel Profile: Future Q

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	Vel Right	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft/s)	(ft)
DV_WestChannel	17.53524	Future Q	1100.00	1791.23	1794.10	1794.06	1794.42	0.015014	5.06	269.02	322.62	0.75		2.87
DV_WestChannel	597.6106	Future Q	1100.00	1793.87	1798.63	1797.12	1799.05	0.005156	5.21	211.25	63.71	0.50		4.76
DV_WestChannel	713.1297	Future Q	1100.00	1797.94	1801.47	1801.47	1802.69	0.022823	8.88	123.83	51.28	1.01		3.53
DV_WestChannel	900.0111	Future Q	1100.00	1798.21	1804.33	1801.85	1804.57	0.005178	3.90	282.03	75.65	0.36		6.12
DV_WestChannel	938.1987	Future Q	1100.00	1803.10	1806.52	1806.52	1807.63	0.047876	8.46	130.07	58.60	1.00		3.42
DV_WestChannel	1062.163	Future Q	1100.00	1802.96	1808.38	1806.32	1808.65	0.002944	4.20	262.95	80.49	0.39	0.58	5.42
DV_WestChannel	1182.023	Future Q	1100.00	1802.82	1808.74	1806.03	1808.95	0.002001	3.65	301.14	76.05	0.32		5.92
DV_WestChannel	1275.638	Future Q	1100.00	1802.55	1808.98	1806.25	1809.24	0.004970	4.11	267.76	63.37	0.35		6.43
DV_WestChannel	1312.379	Future Q	1100.00	1806.69	1809.87	1809.87	1811.02	0.046732	8.57	128.34	55.48	0.99		3.18
DV_WestChannel	1357.699	Future Q	1100.00	1806.98	1811.21	1810.06	1811.72	0.006746	5.75	191.25	60.77	0.57		4.23
DV_WestChannel	1453.417	Future Q	1100.00	1806.91	1811.87	1810.20	1812.25	0.004415	4.95	222.15	64.20	0.47		4.96
DV_WestChannel	1557.737	Future Q	1100.00	1807.28	1812.35	1810.36	1812.65	0.003307	4.45	247.20	67.56	0.41		5.07
DV_WestChannel	1624.940	Future Q	1100.00	1807.08	1812.63	1810.61	1813.00	0.007839	4.88	225.21	58.07	0.44		5.55
DV_WestChannel	1657.368	Future Q	1100.00	1810.82	1814.13	1814.13	1815.27	0.046694	8.60	127.96	55.08	0.99		3.31
DV_WestChannel	1794.581	Future Q	1100.00	1811.19	1816.43	1814.81	1816.84	0.004705	5.09	216.18	62.99	0.48		5.24
DV_WestChannel	1892.593	Future Q	1100.00	1811.16	1816.93	1814.72	1817.20	0.002853	4.20	261.70	69.72	0.38		5.77
DV_WestChannel	1985.339	Future Q	1100.00	1812.06	1817.18	1815.31	1817.53	0.003784	4.72	232.99	64.46	0.44		5.12
DV_WestChannel	2081.702	Future Q	870.00	1812.02	1817.62	1814.69	1817.75	0.001187	2.90	300.50	72.07	0.25		5.60
DV_WestChannel	2144.986	Future Q	870.00	1812.30	1817.67	1815.47	1817.93	0.005799	4.11	211.78	56.40	0.37		5.37
DV_WestChannel	2179.114	Future Q	870.00	1815.54	1818.94	1818.94	1820.02	0.048216	8.34	104.36	47.99	1.00		3.40
DV_WestChannel	2312.064	Future Q	870.00	1815.76	1820.81	1818.73	1821.04	0.002676	3.88	224.28	63.92	0.36		5.05
DV_WestChannel	2409.962	Future Q	870.00	1816.37	1821.17	1819.21	1821.44	0.006400	4.15	209.41	59.59	0.39		4.80
DV_WestChannel	2447.532	Future Q	870.00	1819.93	1823.36	1823.36	1824.41	0.048600	8.21	106.00	50.34	1.00		3.43
DV_WestChannel	2517.958	Future Q	870.00	1820.42	1824.84	1823.17	1825.14	0.003782	4.35	200.05	62.52	0.43		4.42
DV_WestChannel	2624.033	Future Q	870.00	1820.76	1825.26	1823.34	1825.49	0.002835	3.86	225.17	67.98	0.37		4.50
DV_WestChannel	2753.476	Future Q	870.00	1821.50	1825.76	1824.68	1826.30	0.015544	5.94	146.40	46.86	0.59		4.26
DV_WestChannel	2777.919	Future Q	870.00	1824.46	1827.62	1827.62	1828.69	0.048911	8.28	105.02	49.47	1.00		3.16
DV_WestChannel	2820.129	Future Q	870.00	1824.97	1828.92	1827.92	1829.39	0.007301	5.48	158.86	57.84	0.58		3.95
DV_WestChannel	2856.495	Future Q	870.00	1825.25	1828.48	1828.97	1830.28	0.087109	10.76	80.83	39.42	1.32		3.23
DV_WestChannel	2906.351	Future Q	870.00	1830.58	1832.51	1832.51	1833.11	0.036975	5.94	145.82	119.52	0.83	4.45	1.93
DV_WestChannel	2992.393	Future Q	870.00	1831.33	1833.84	1833.11	1834.08	0.005186	3.44	231.39	127.79	0.46	1.25	3.17
DV_WestChannel	3073.033	Future Q	870.00	1832.13	1834.32	1833.90	1834.63	0.008650	4.62	205.61	144.04	0.60	2.37	2.34
DV_WestChannel	3107.376	Future Q	870.00	1832.51	1834.59	1834.36	1835.05	0.013963	5.59	166.45	123.63	0.75	2.26	2.08
DV_WestChannel	3129.709	Future Q	870.00	1832.78	1834.93	1834.87	1835.44	0.020038	5.79	159.12	138.30	0.87	2.95	2.42

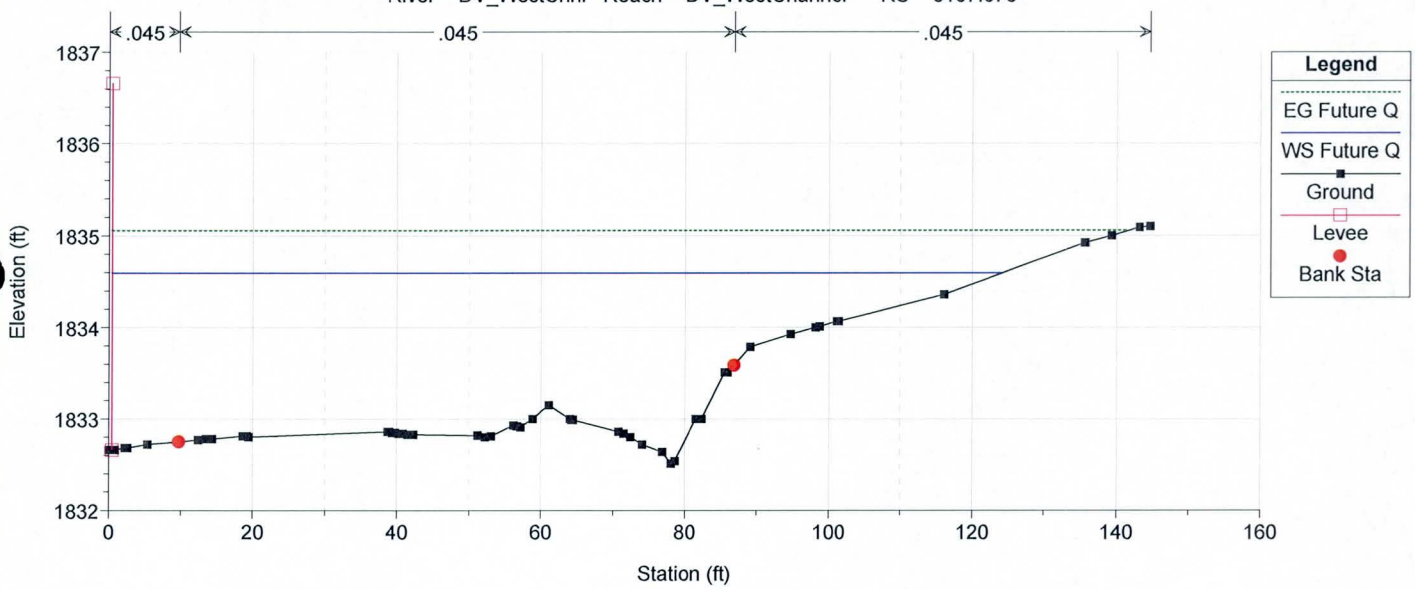
DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009

River = DV_WestChnl Reach = DV_WestChannel RS = 3129.709



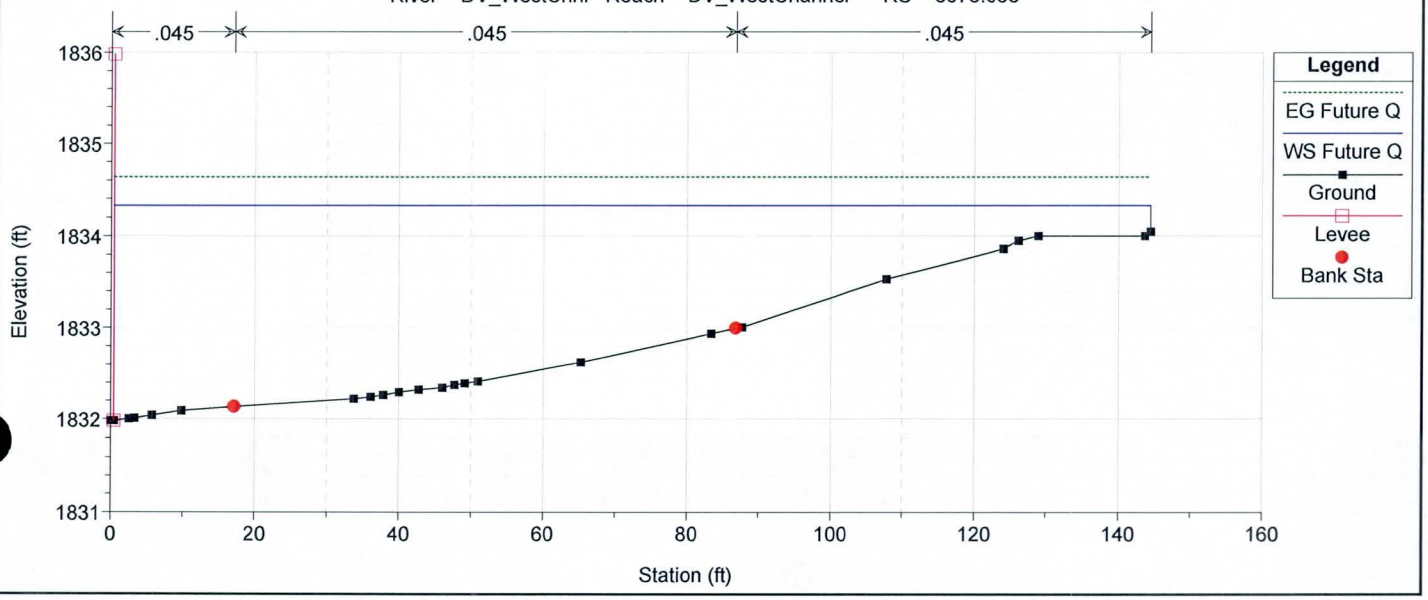
DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009

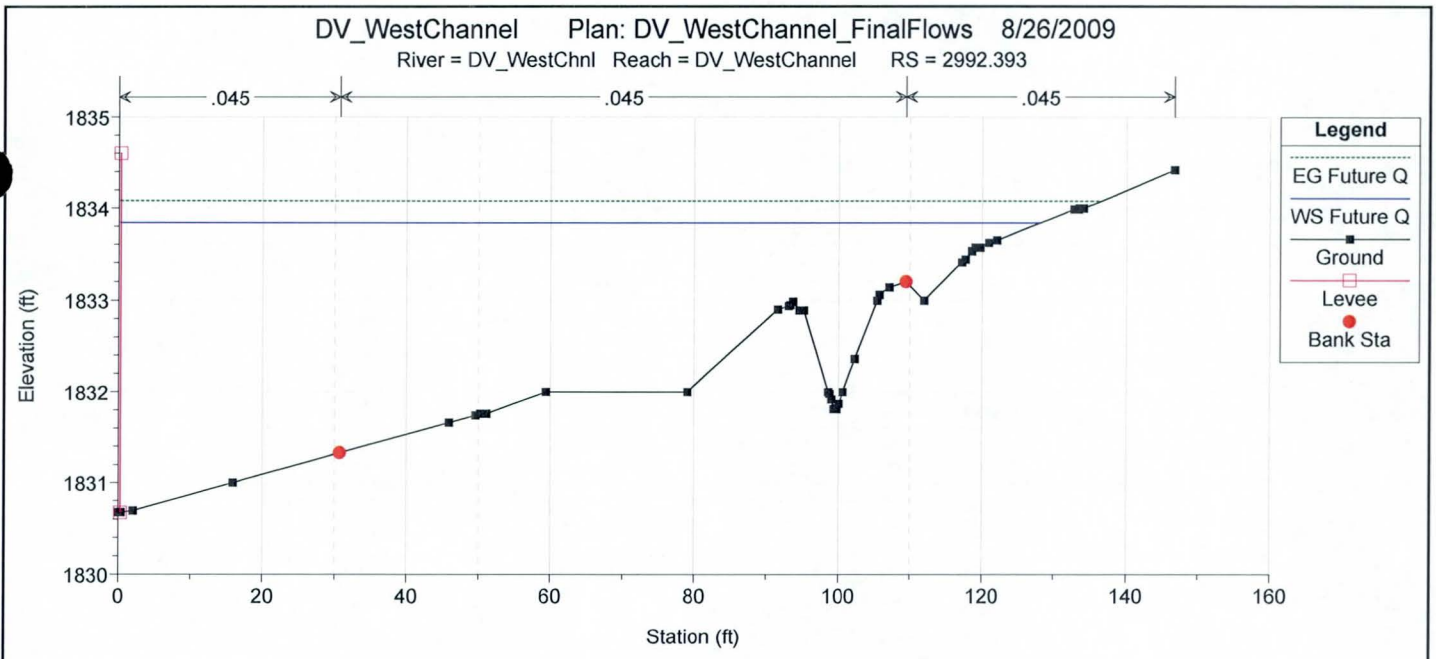
River = DV_WestChnl Reach = DV_WestChannel RS = 3107.376

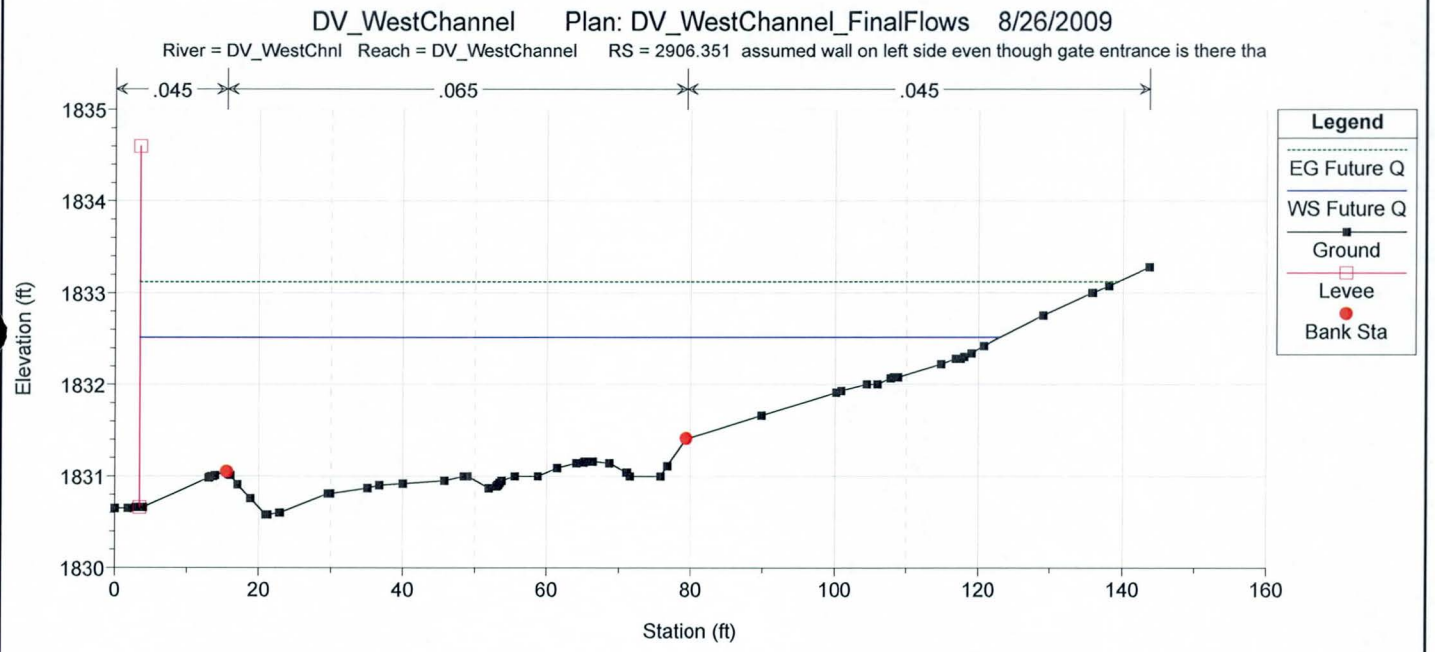


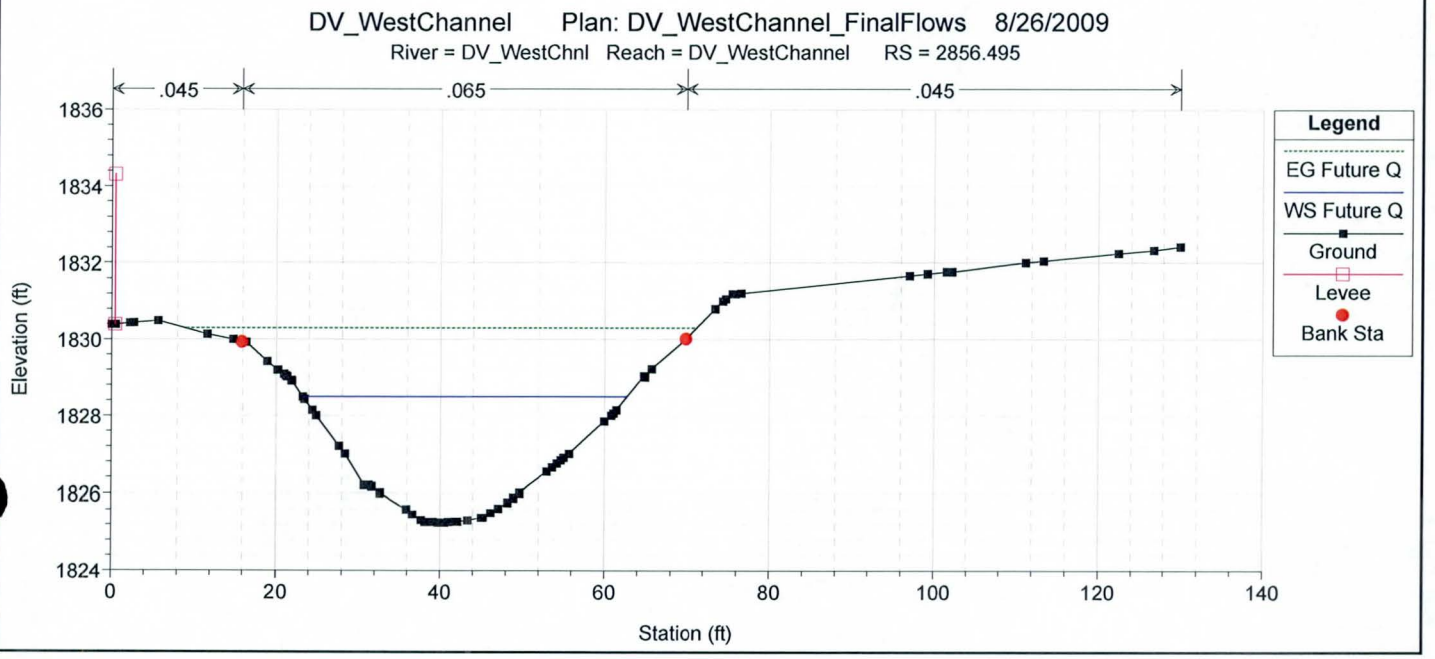
DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009

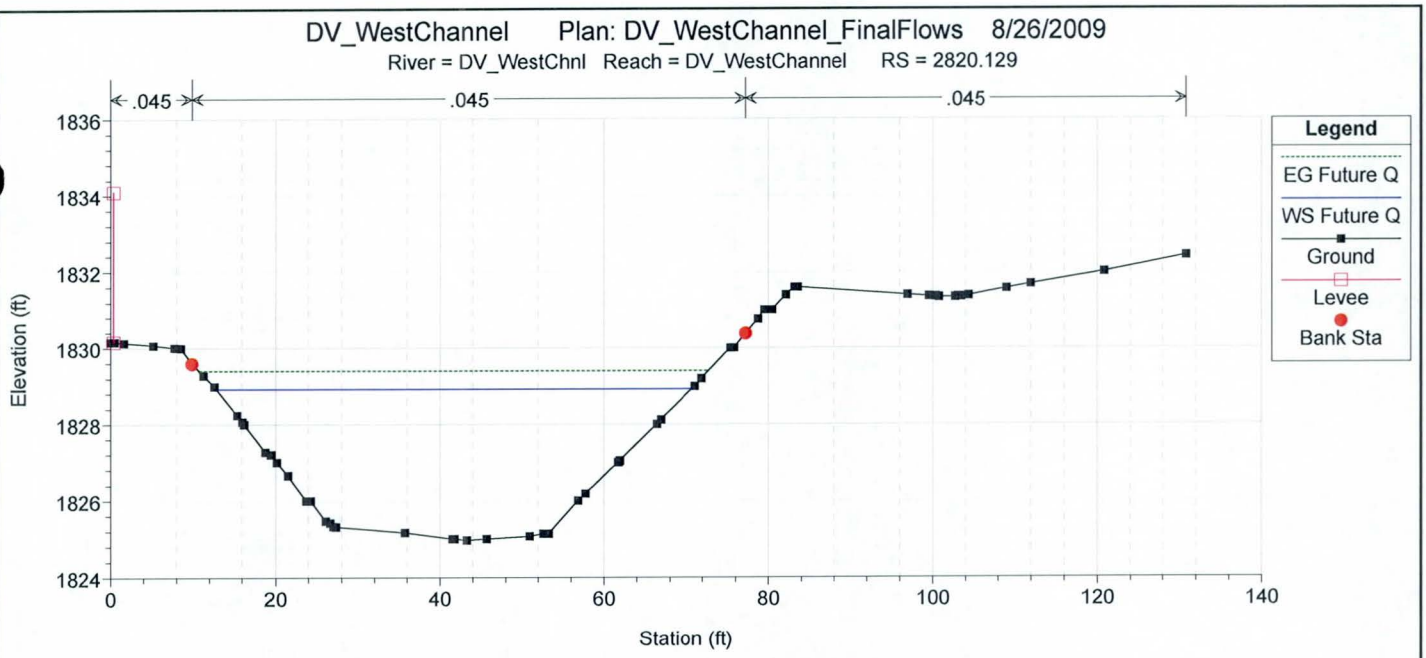
River = DV_WestChnl Reach = DV_WestChannel RS = 3073.033

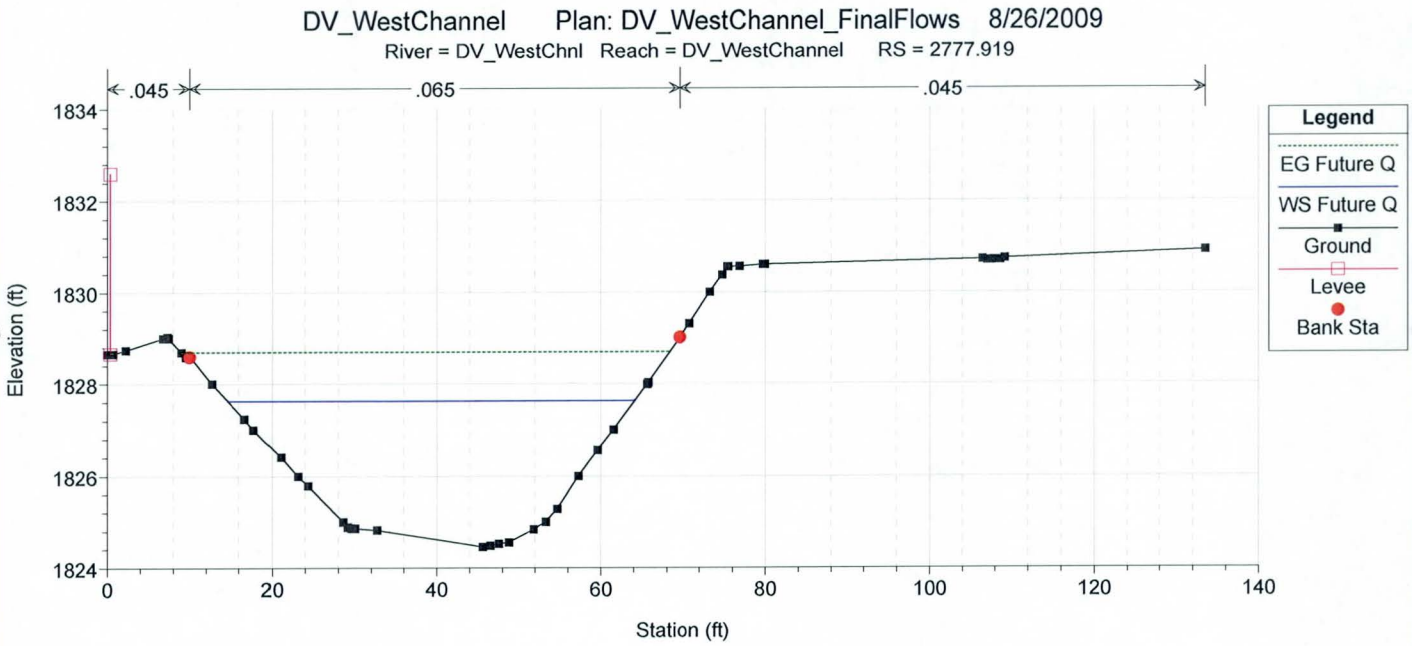


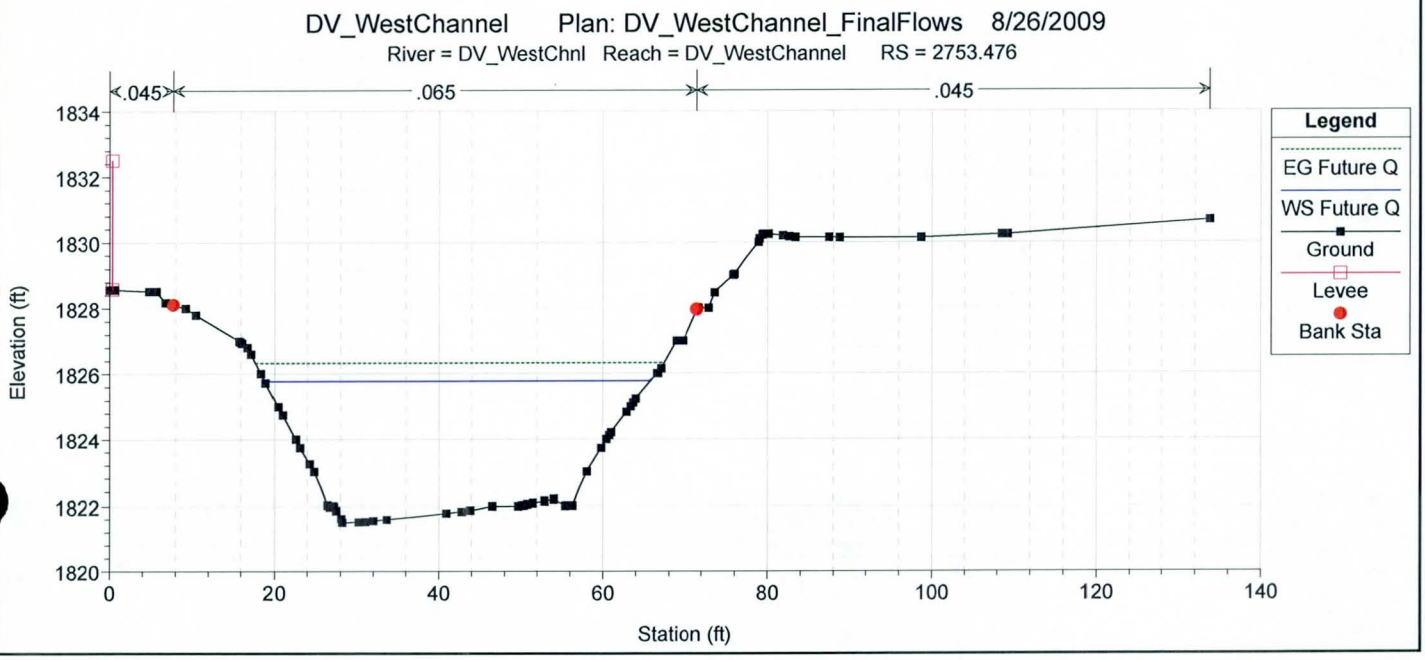

DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2992.393
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2906.351 assumed wall on left side even though gate entrance is there tha
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2856.495
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2820.129
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2777.919
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2753.476
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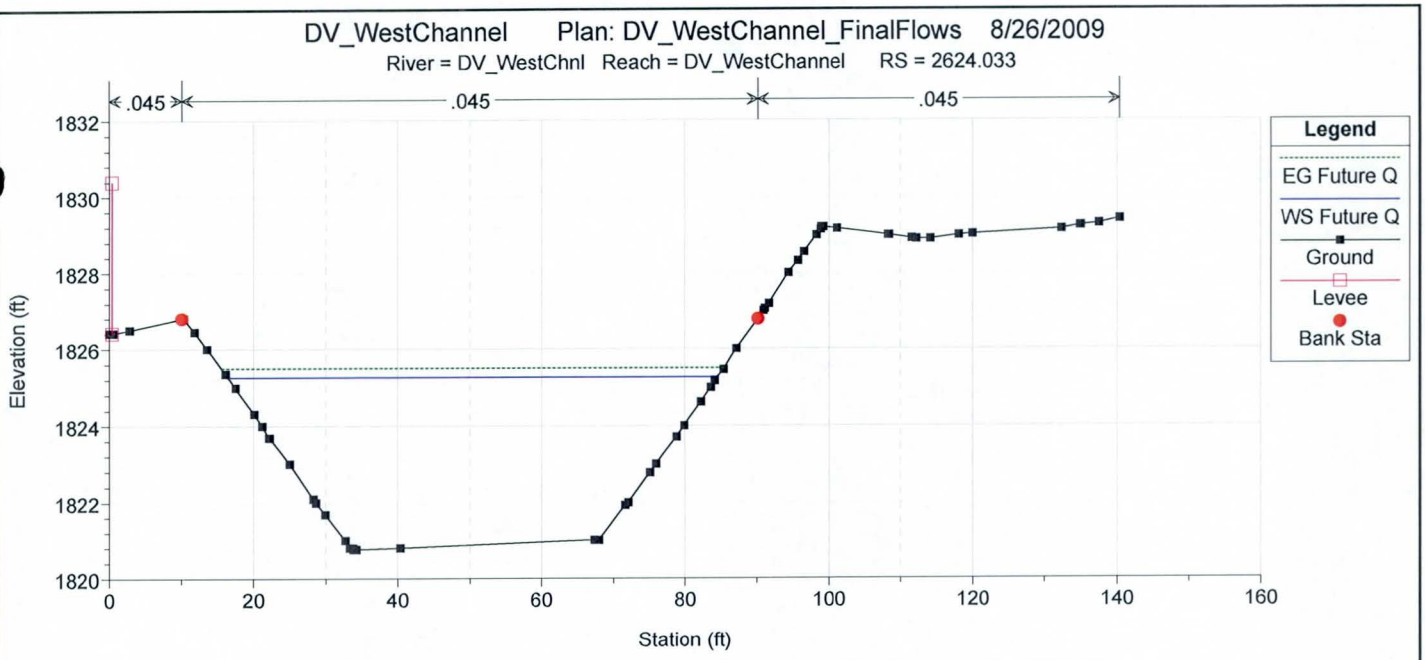
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta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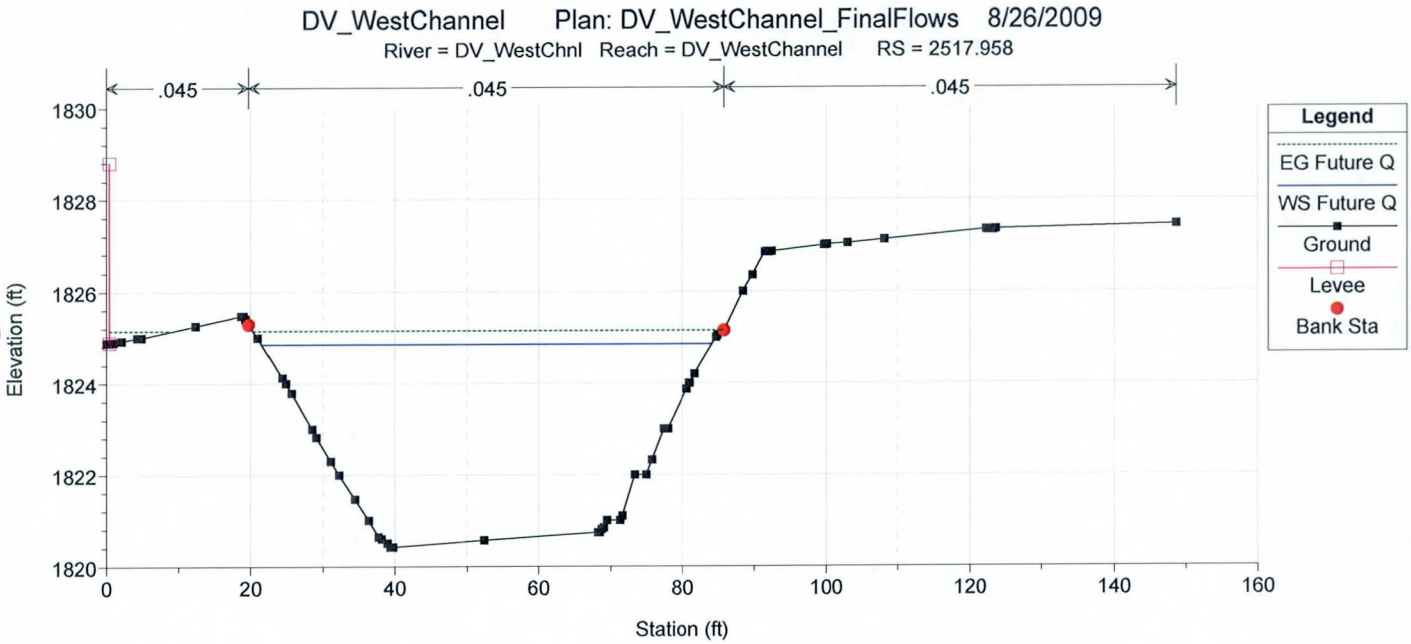
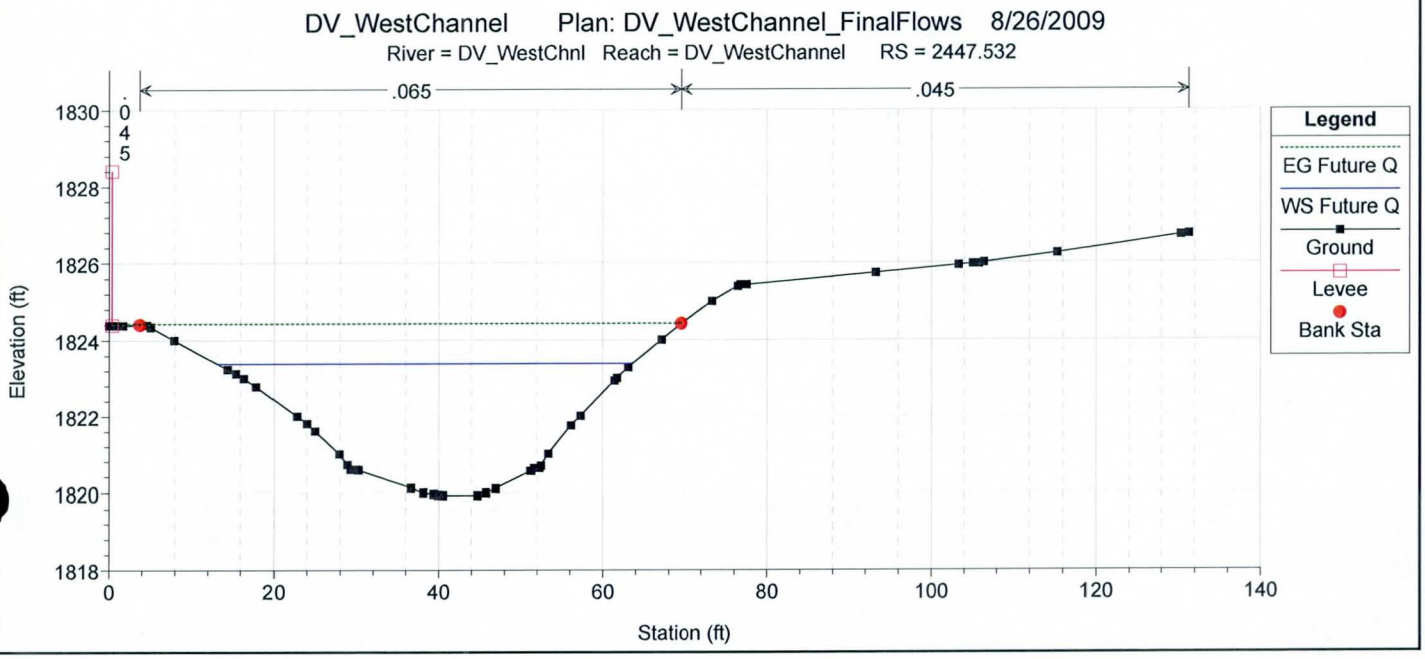
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2517.958
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2447.532
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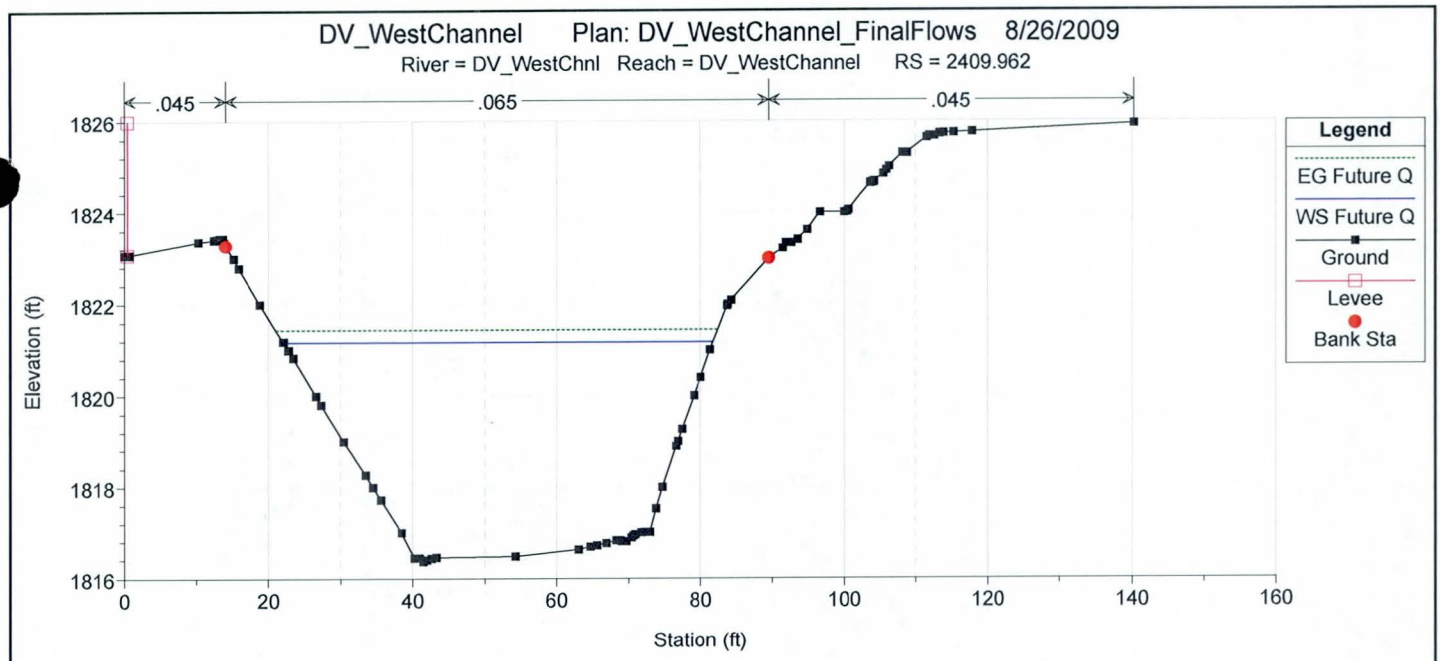
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2409.962
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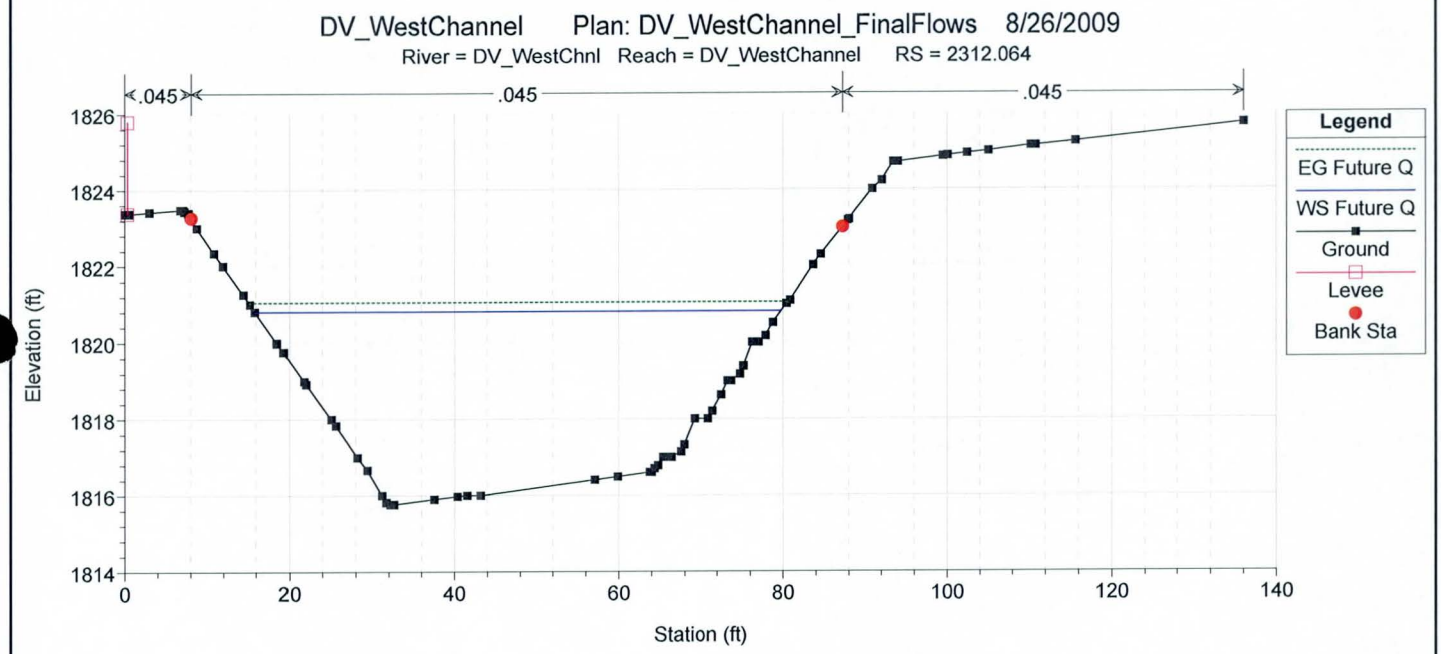
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2312.064
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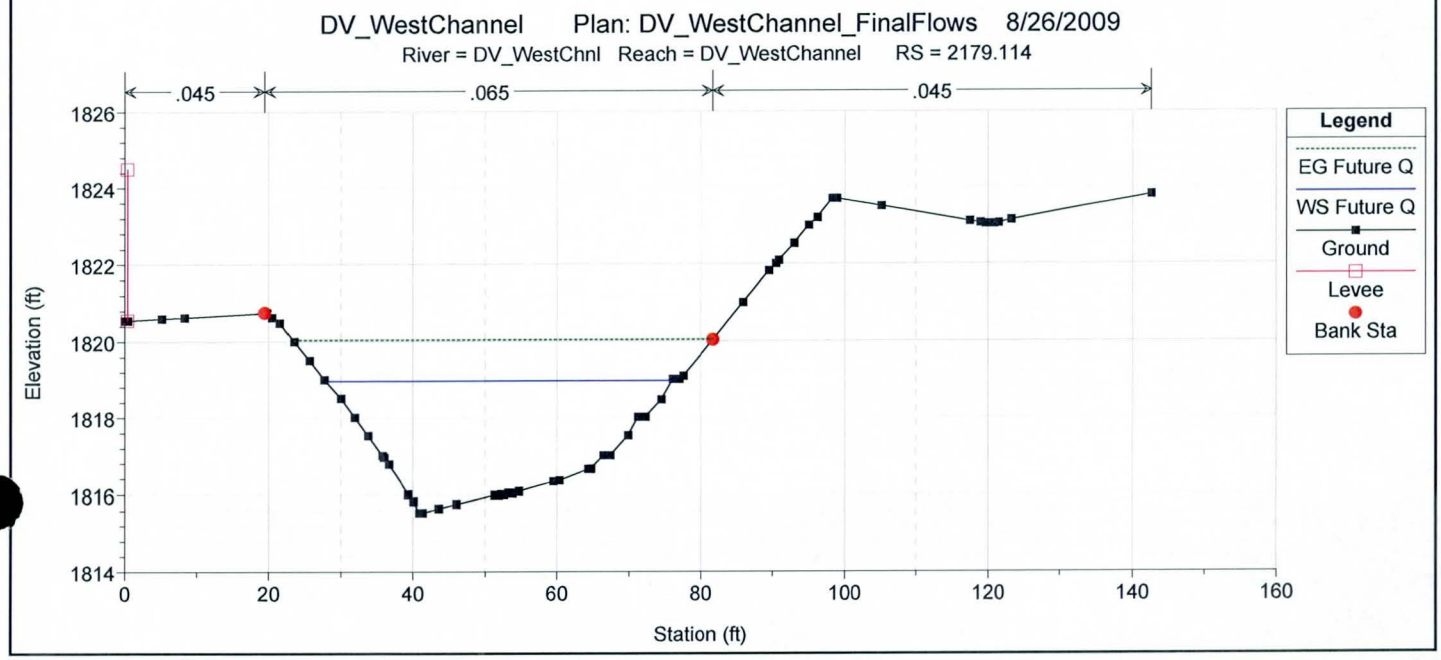
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2179.114
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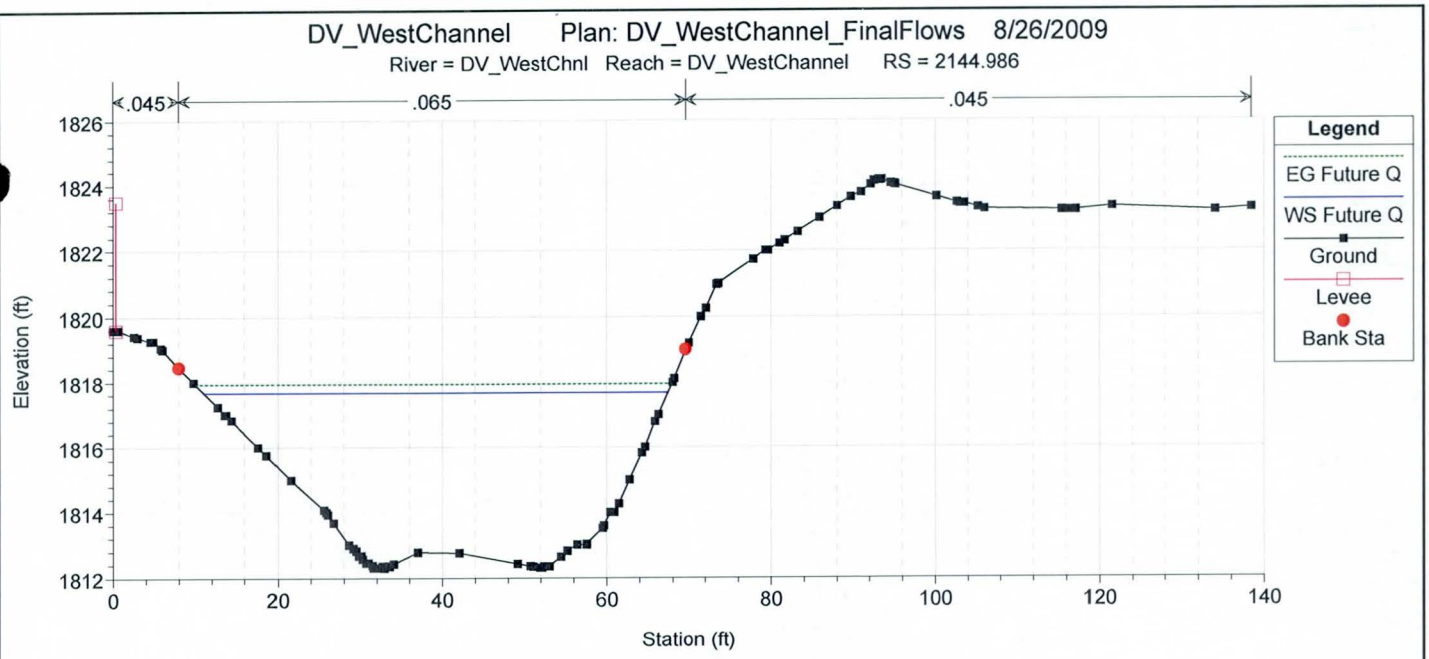
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2144.986
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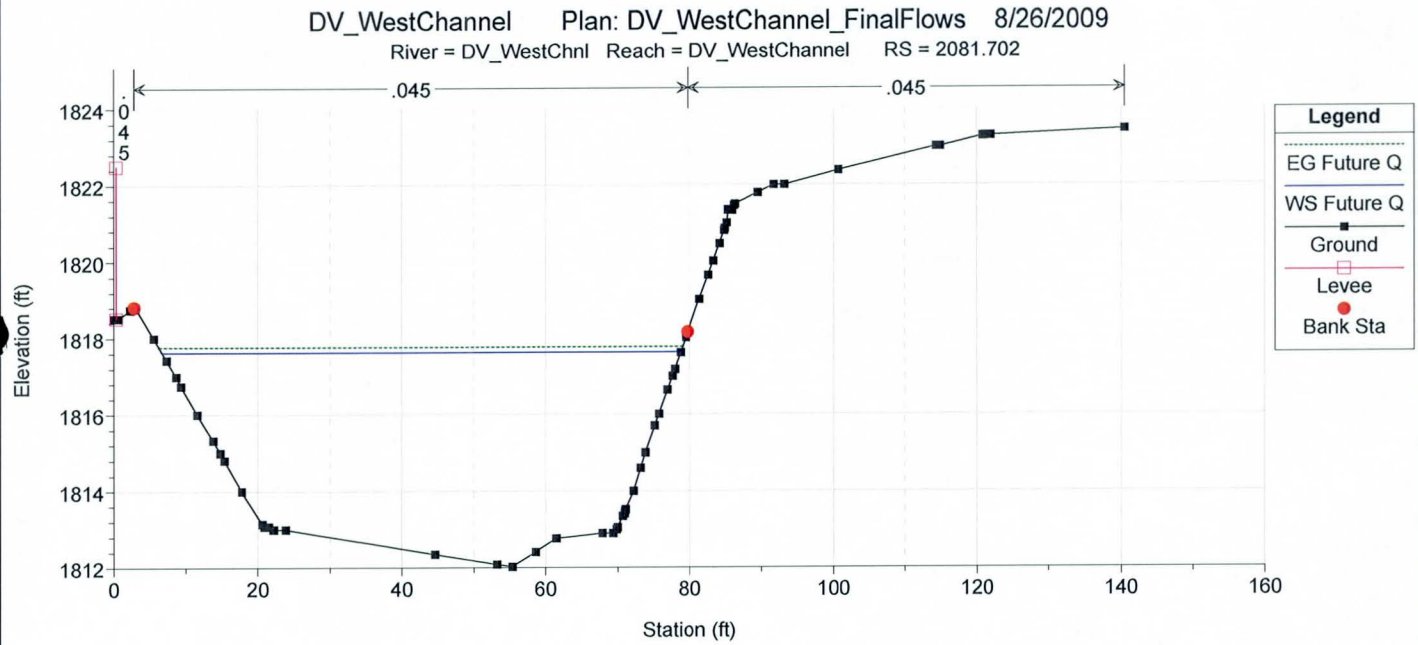
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 2081.702
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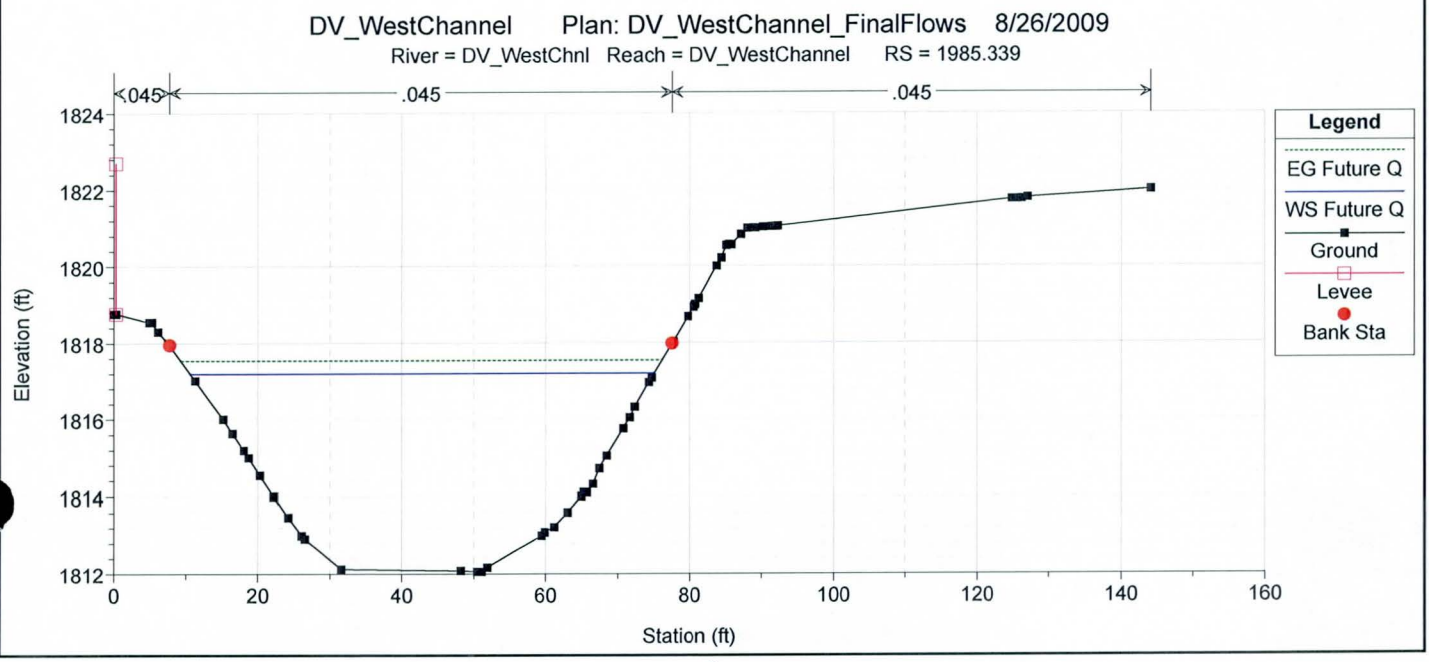
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta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River = DV_WestChnl Reach = DV_WestChannel RS = 1985.339
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.045
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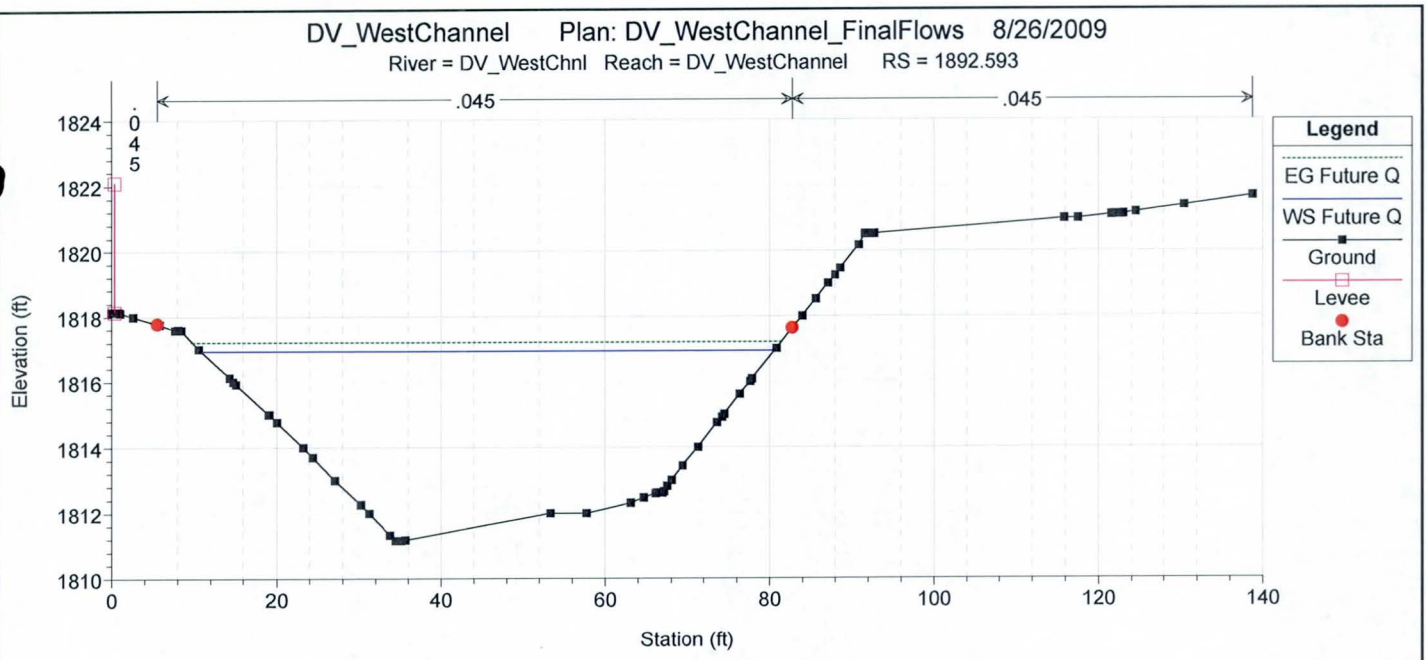
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1892.593
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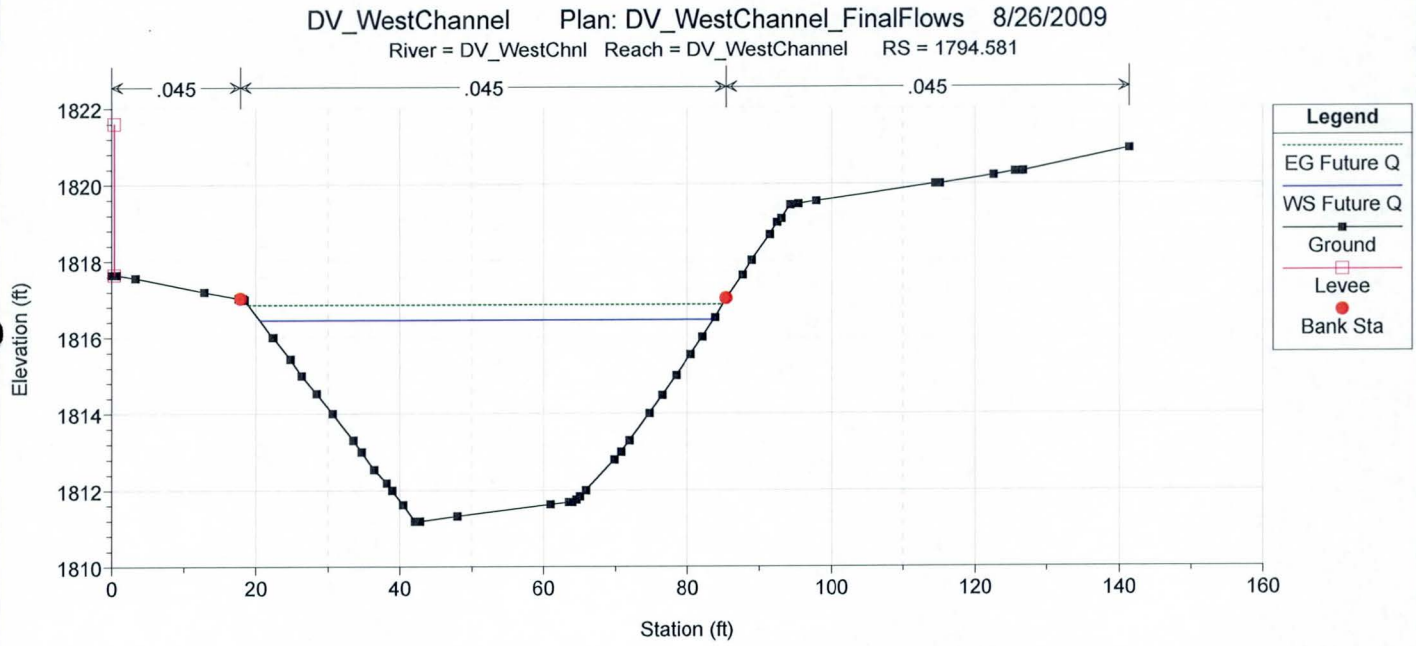
.045
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1794.581
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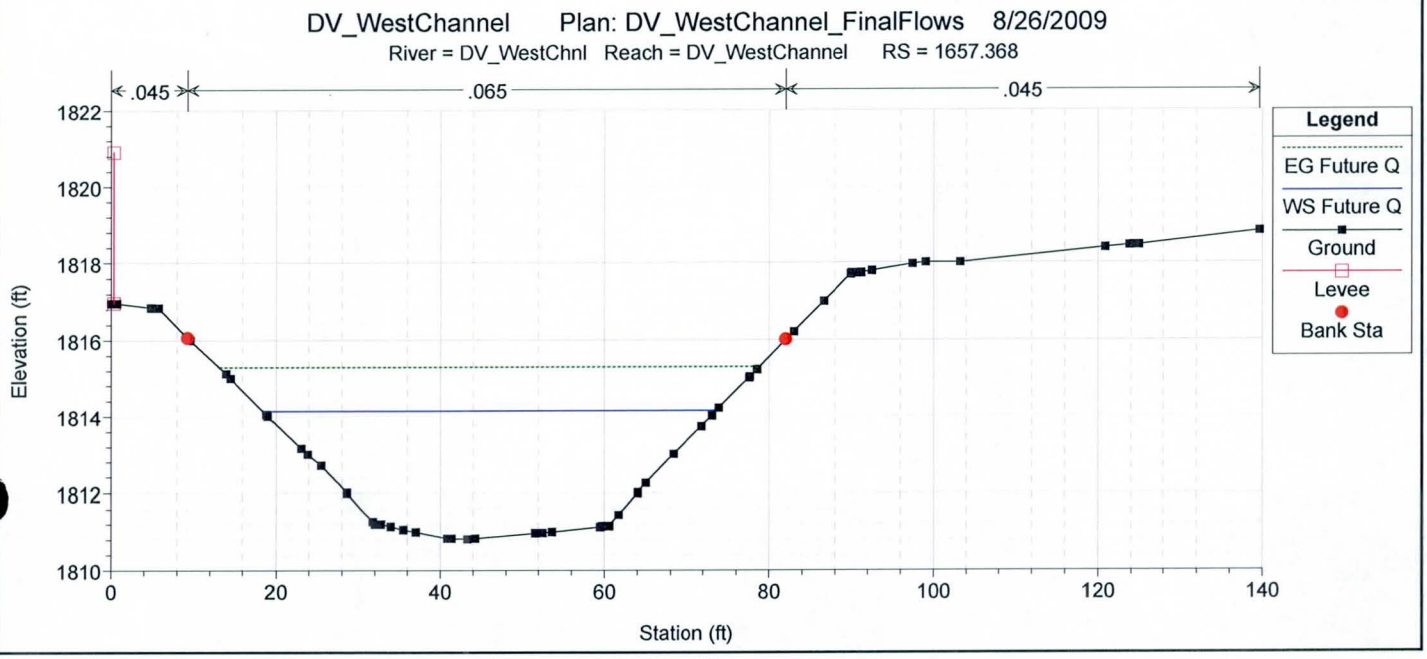
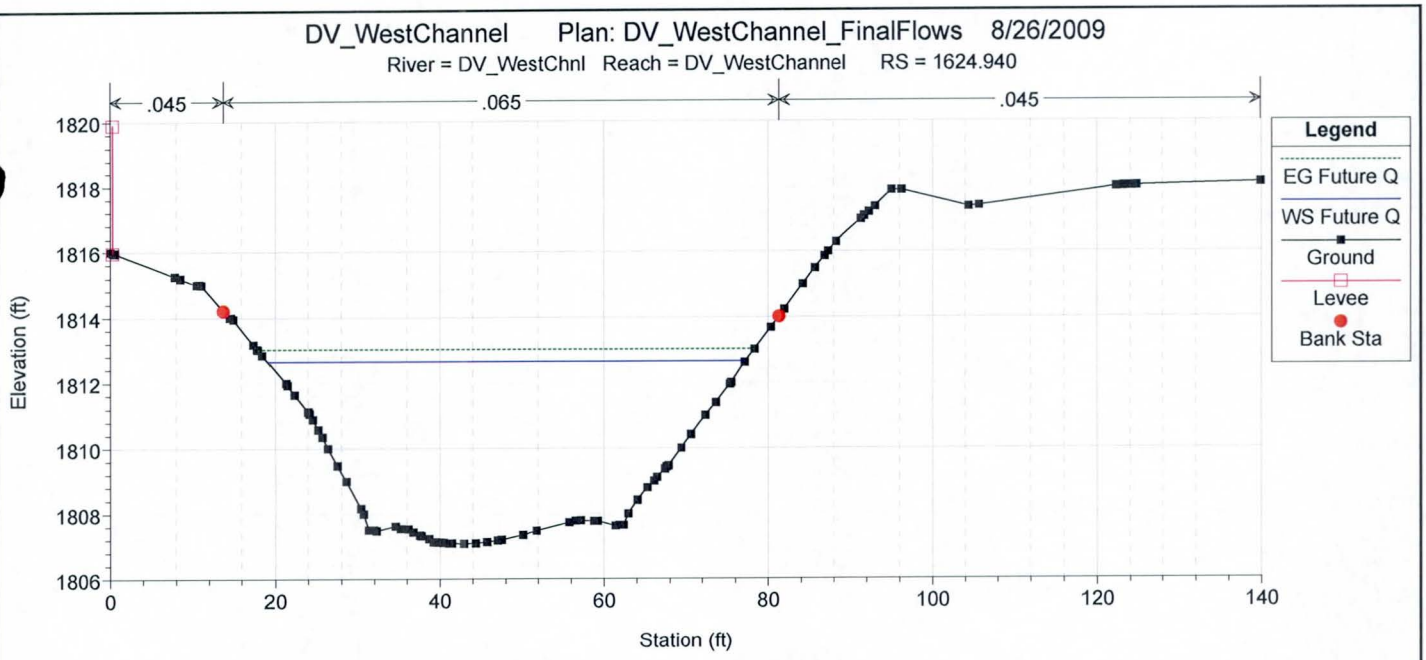
.045
.045
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1657.368
.045
.065
.045
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1624.940
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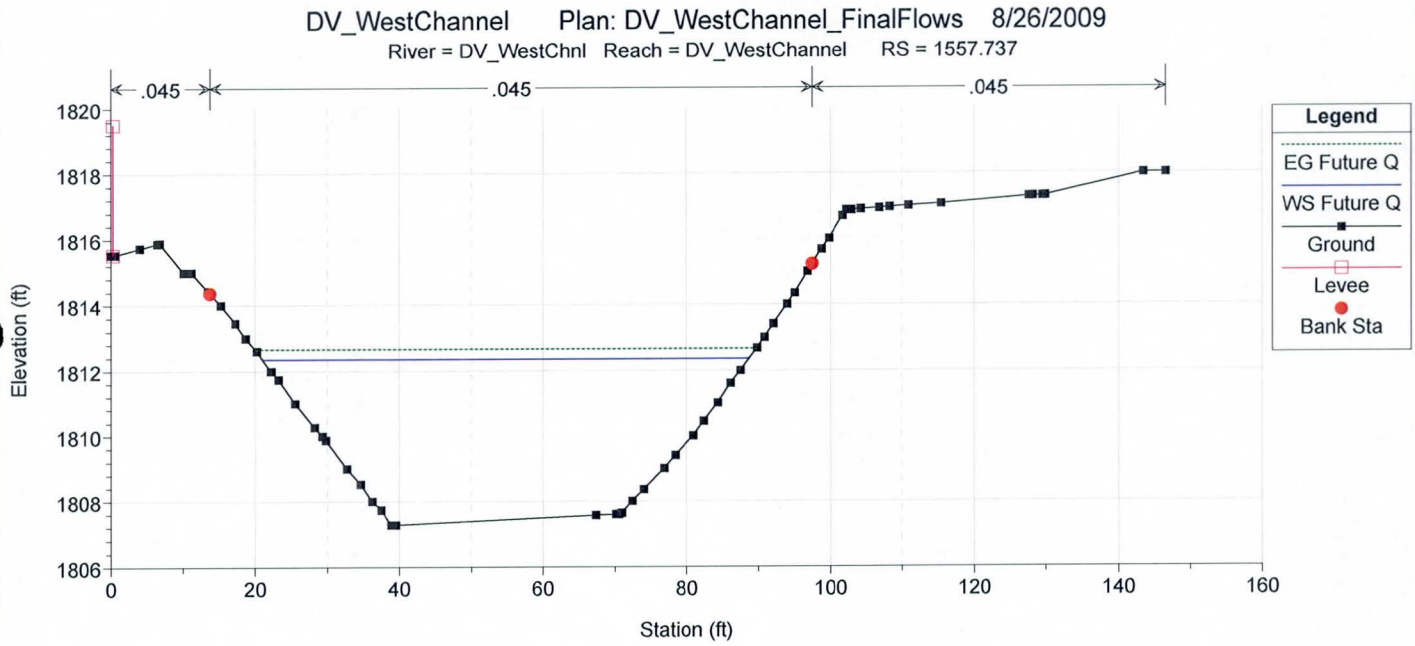
.065
.045
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1557.737
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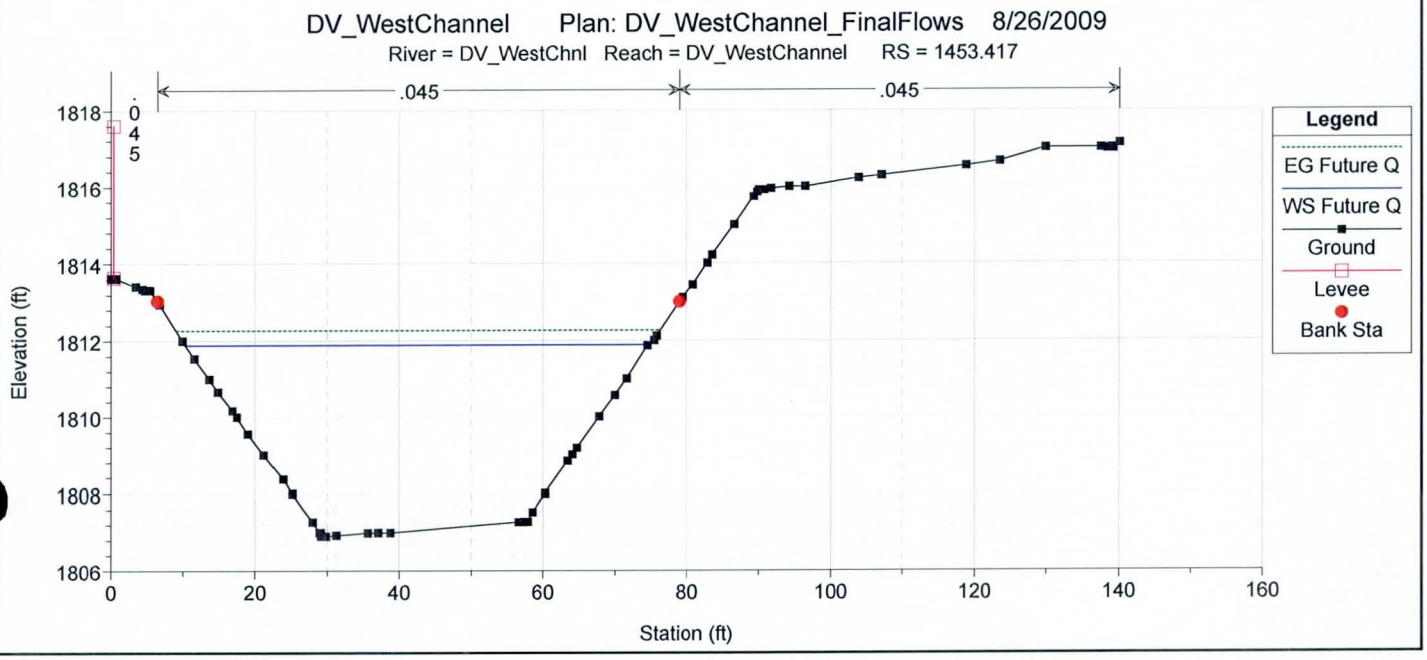
.045
.045
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1453.417
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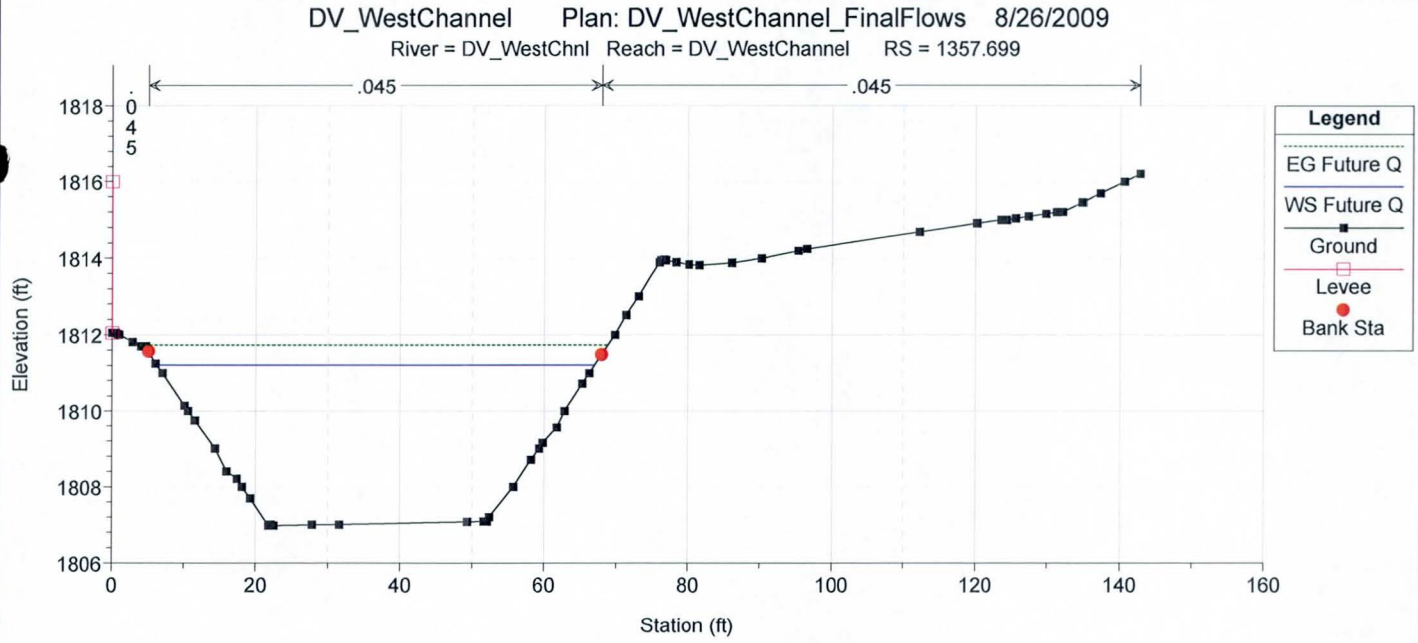
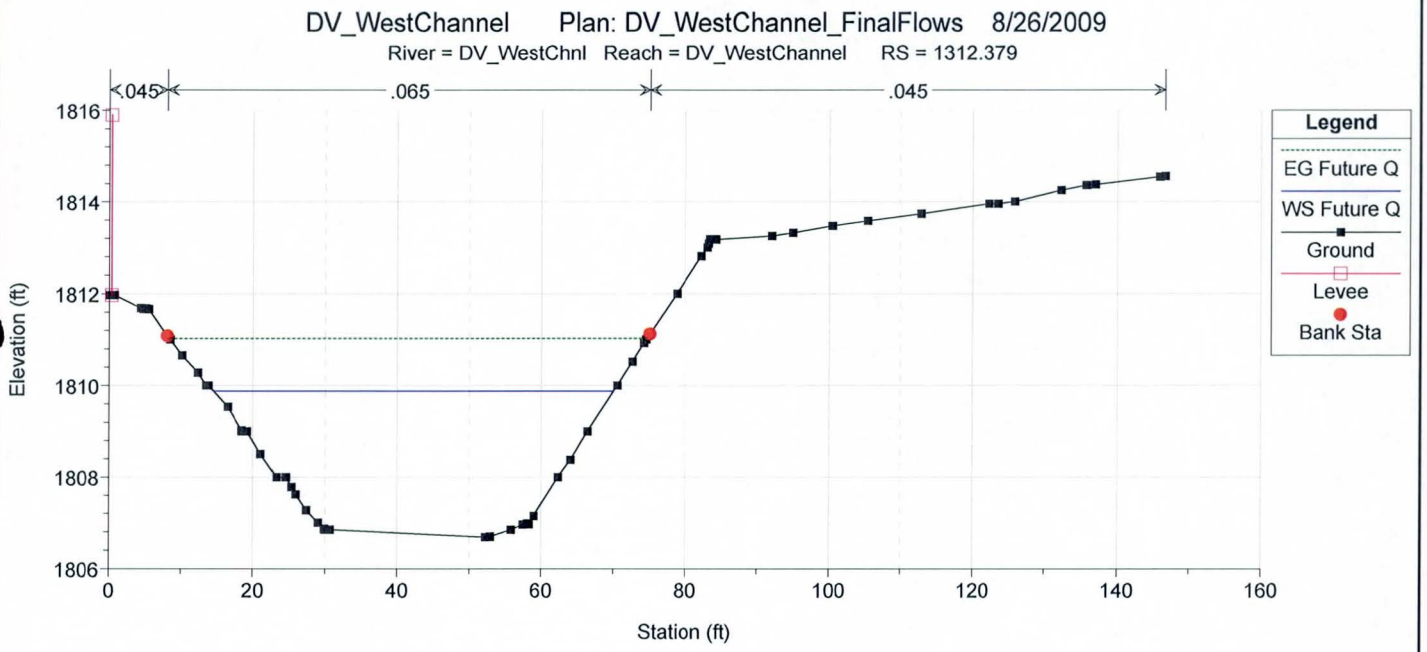
.045
.045
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1357.699
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1312.379
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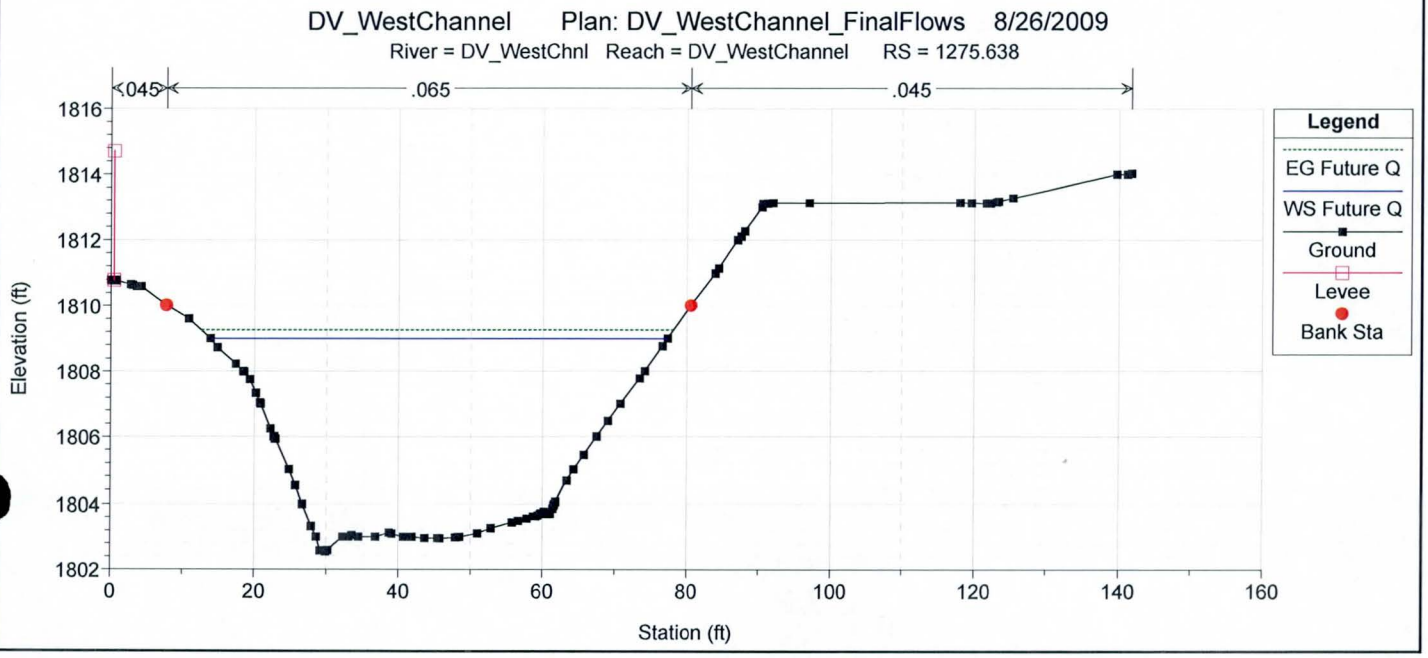
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1275.638
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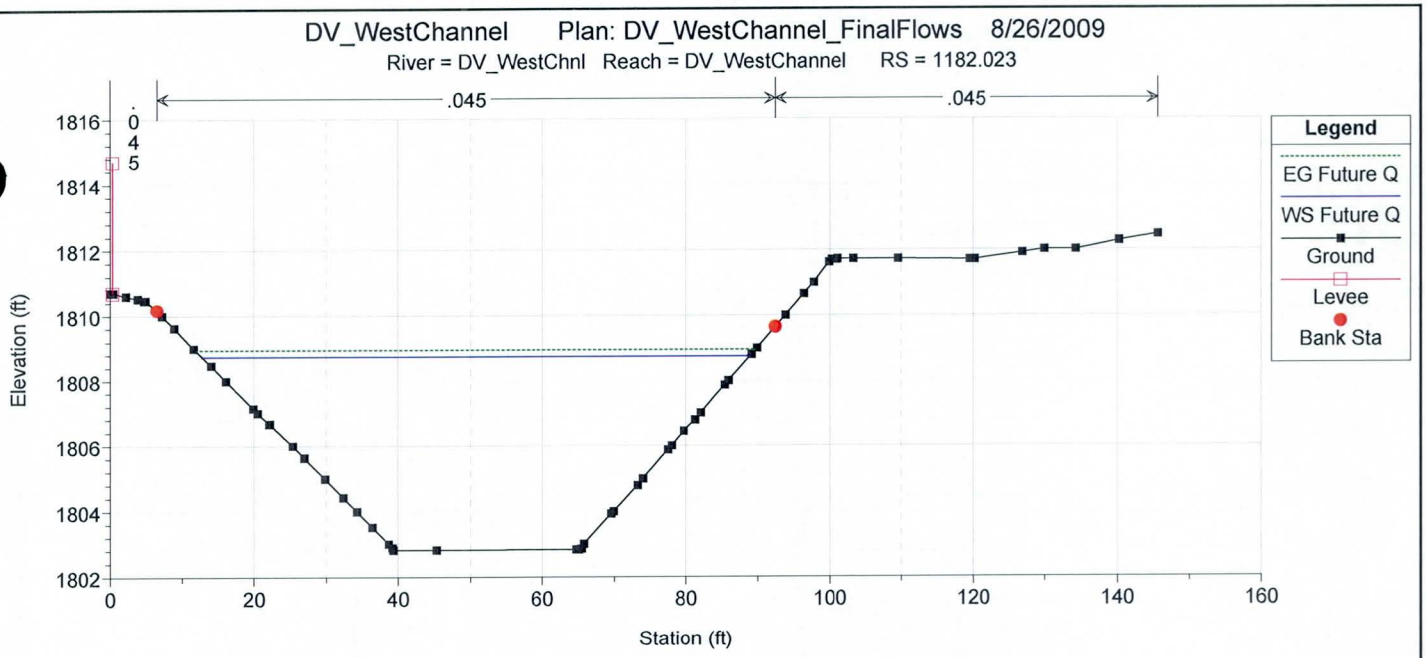
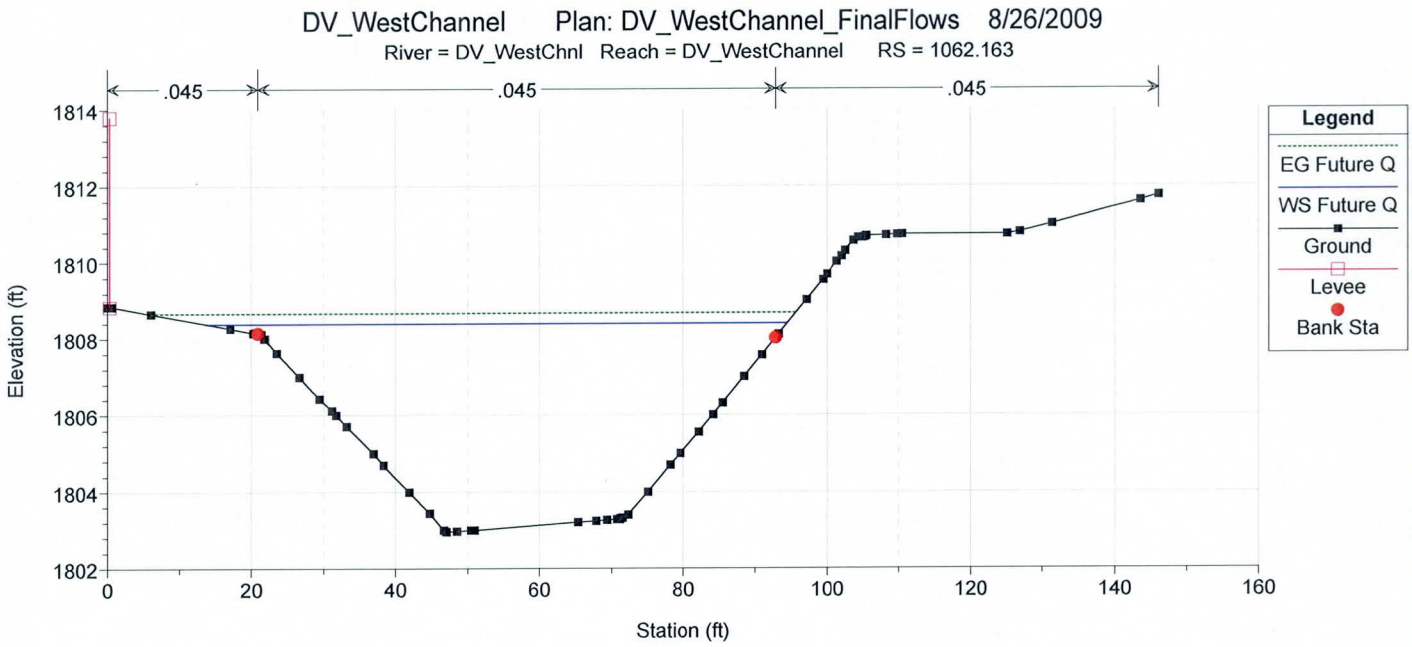
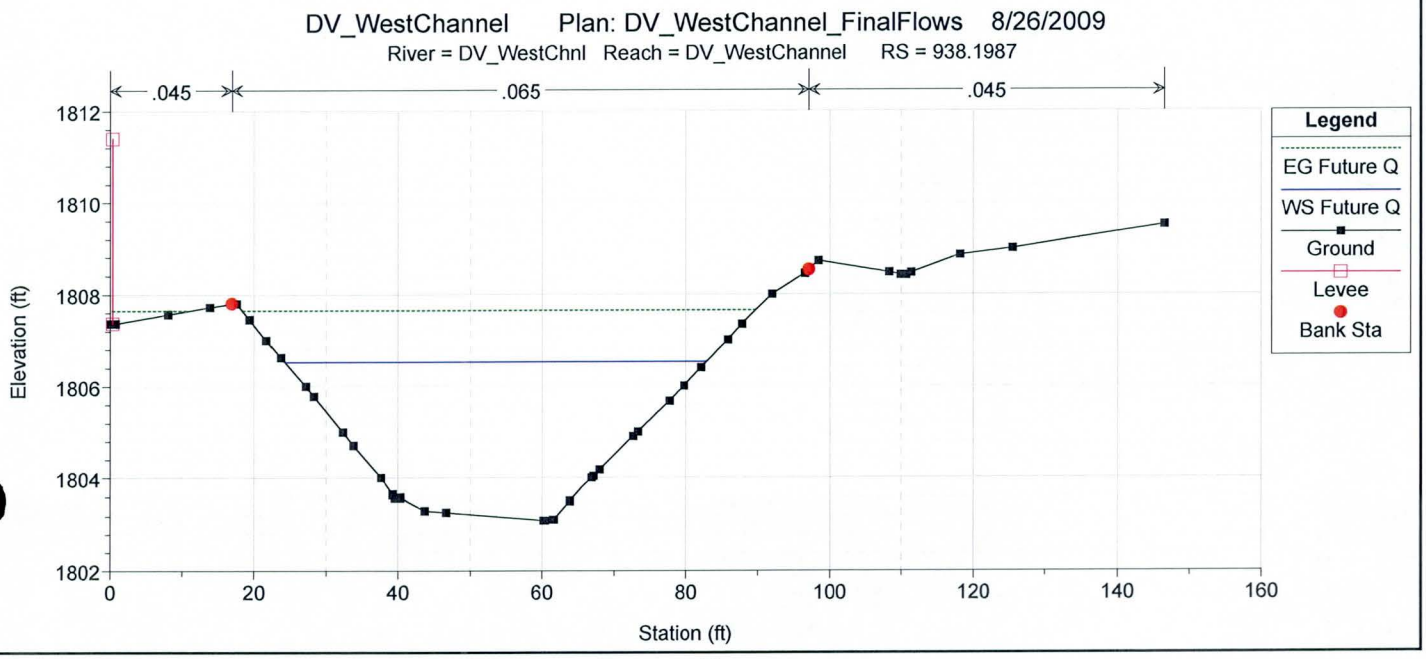
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1182.023
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 1062.163
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 938.1987
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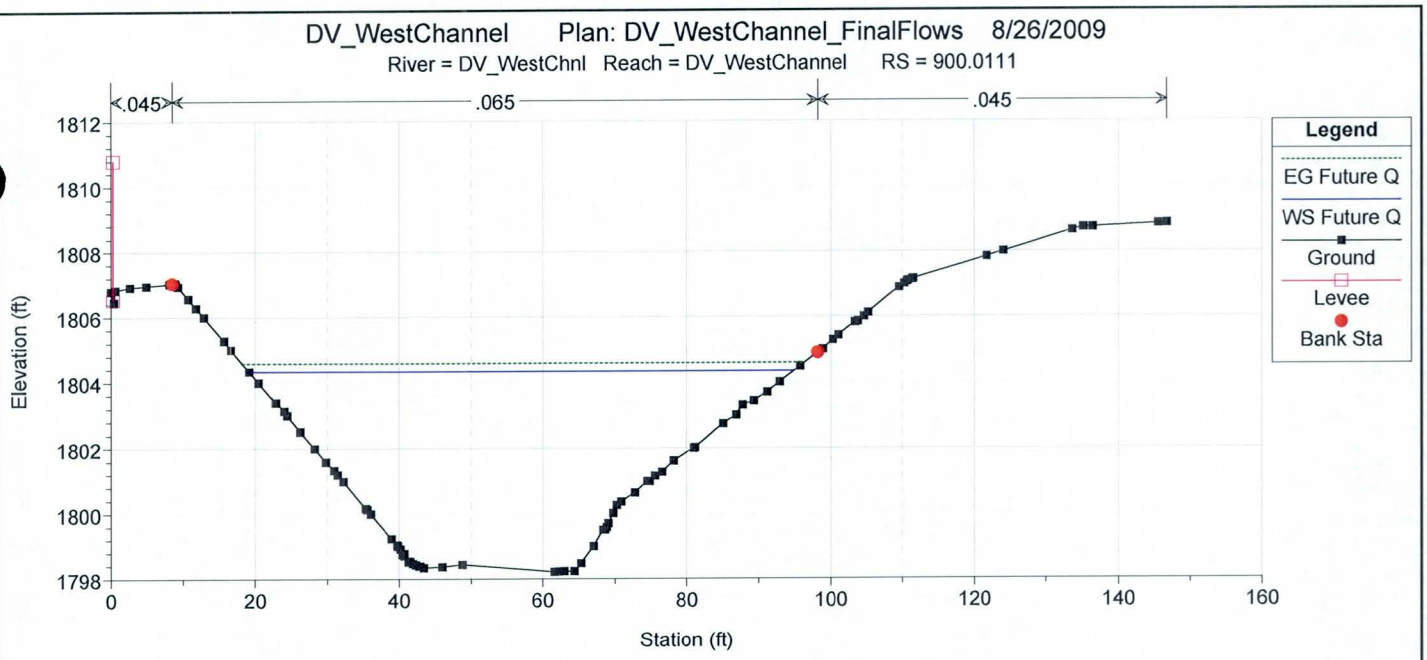
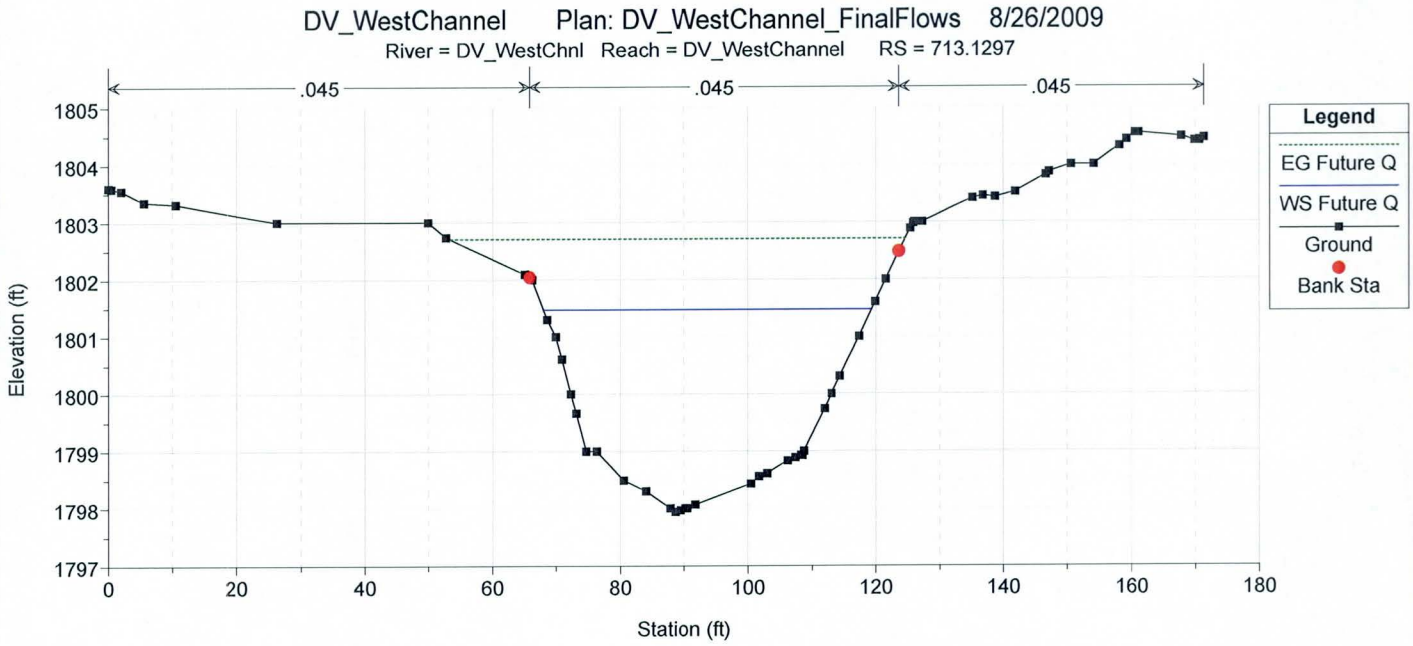
.065
.045
Elevation (ft)
Station (ft)
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 900.0111
.045
.065
.045
Legend
EG Future Q
WS Future Q
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 713.1297
.045
.045
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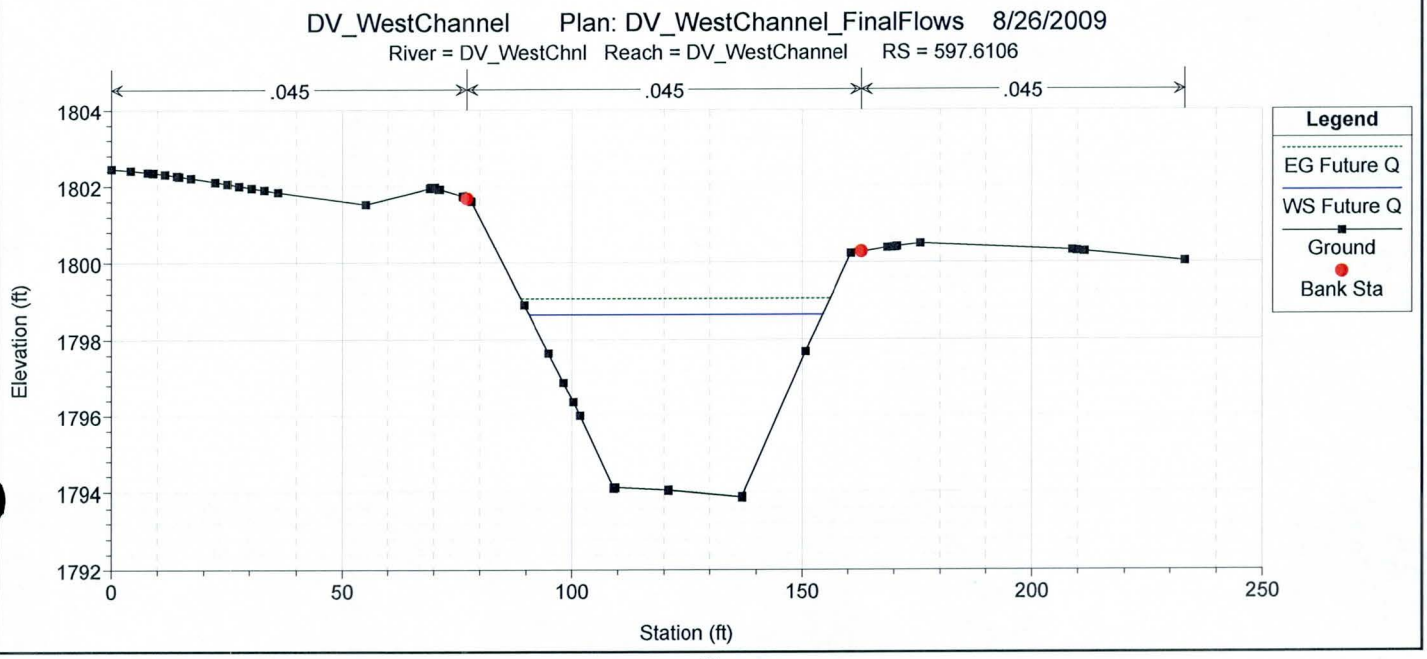
Legend
EG Future Q
WS Future Q
Ground
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 597.6106
.045
.045
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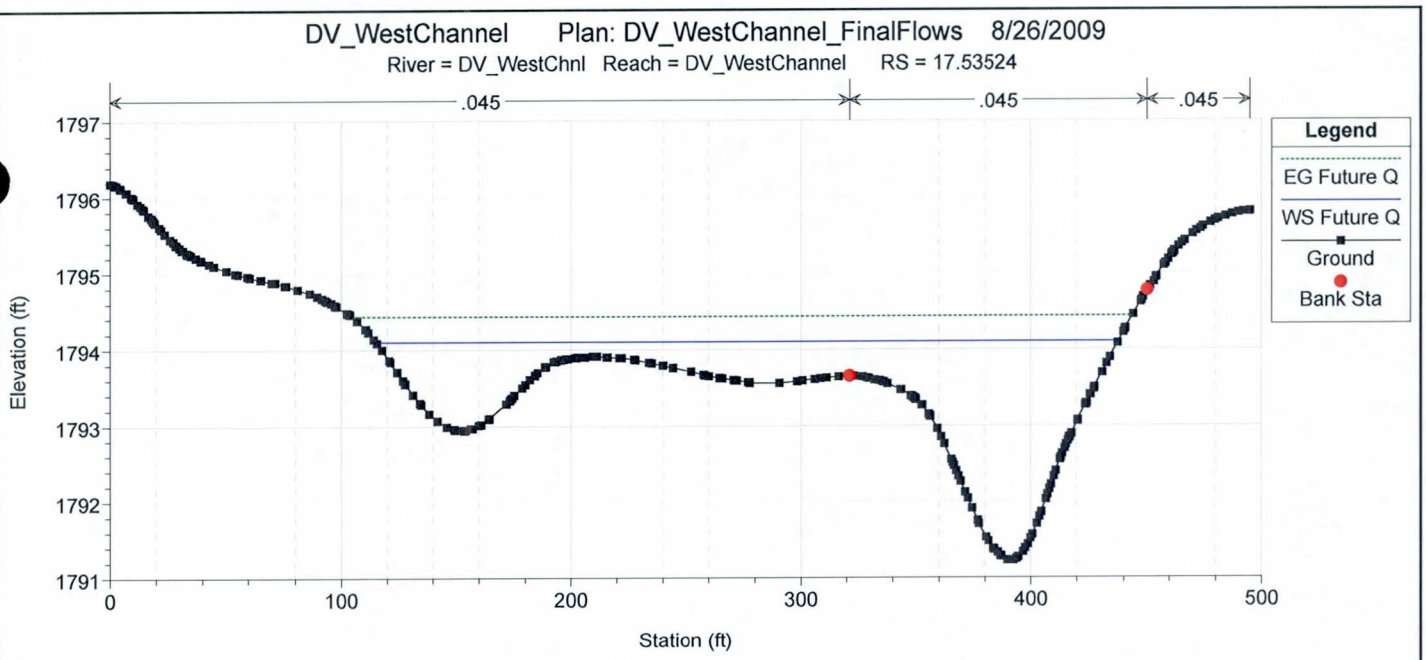
Legend
EG Future Q
WS Future Q
Ground
Bank Sta
Elevation (ft)
Station (ft)


DV_WestChannel Plan: DV_WestChannel_FinalFlows 8/26/2009
River = DV_WestChnl Reach = DV_WestChannel RS = 17.53524
.045
.045
.045
Legend
EG Future Q
WS Future Q
Ground
Bank Sta
Elevation (ft)
1797
1796
1795
1794
1793
1792
1791
0
100
200
300
400
500
Station (ft)

Errors Warnings and Notes for Plan : QFinalAu2009

Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 3073.033 Profile: Future Q
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2992.393 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2906.351 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2856.495 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2820.129 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2777.919 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2753.476 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2517.958 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2447.532 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2409.962 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2312.064 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for

	additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2179.114 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2144.986 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 2081.702 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 1794.581 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 1657.368 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 1624.940 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 1357.699 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 1312.379 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 1275.638 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 1062.163 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 938.1987 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Errors Warnings and Notes for Plan : QFinalAu2009 (Continued)

Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 900.0111 Profile: Future Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 713.1297 Profile: Future Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DV_WestChnl Reach: DV_WestChannel RS: 597.6106 Profile: Future Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.

APPENDIX G: ALTERNATIVES DOCUMENTATION FOR CHANNEL AND STORM DRAIN

Note: See **Appendix B** for cross section geometry and location. For instance, Section 1-A refers to Alternative 1 and the letter A is designated as a cross section. Also, the landscape cross section can be found in **Appendix C**.

Section 1-A

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	500.00
0+19	495.17
0+28	495.00
0+37	495.00
0+46	495.17
0+65	500.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 500.00)	(0+65, 500.00)	0.045

Options

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

Results

Discharge	893.76	ft^3/s
Elevation Range	495.00 to 500.00 ft	
Flow Area	162.61	ft^2
Wetted Perimeter	57.95	ft
Hydraulic Radius	2.81	ft
Top Width	57.00	ft
Normal Depth	4.00	ft
Critical Depth	2.93	ft
Critical Slope	0.02313	ft/ft
Velocity	5.50	ft/s
Velocity Head	0.47	ft
Specific Energy	4.47	ft

Section 1-A

Results

Froude Number	0.57	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	ft
Critical Depth	2.93	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02313	ft/ft

Section 1-B

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	500.00
0+19	495.26
0+32	495.00
0+50	495.00
0+63	495.26
0+82	500.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 500.00)	(0+82, 500.00)	0.045

Options

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

Results

Discharge	1331.09	ft^3/s
Elevation Range	495.00 to 500.00 ft	
Flow Area	228.86	ft^2
Wetted Perimeter	74.93	ft
Hydraulic Radius	3.05	ft
Top Width	74.00	ft
Normal Depth	4.00	ft
Critical Depth	2.91	ft
Critical Slope	0.02251	ft/ft
Velocity	5.82	ft/s
Velocity Head	0.53	ft
Specific Energy	4.53	ft

Section 1-B

Results

Froude Number	0.58	
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	4.00	ft
Critical Depth	2.91	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02251	ft/ft

Section 2-A

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	500.00
0+10	495.17
0+18	495.00
0+32	495.00
0+41	495.17
0+60	500.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 500.00)	(0+41, 495.17)	0.045
(0+41, 495.17)	(0+60, 500.00)	0.055

Options

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

Results

Discharge	906.98	ft^3/s
Elevation Range	495.00 to 500.00 ft	
Flow Area	167.97	ft^2
Wetted Perimeter	55.73	ft
Hydraulic Radius	3.01	ft
Top Width	54.35	ft
Normal Depth	4.00	ft
Critical Depth	2.78	ft
Critical Slope	0.02631	ft/ft
Velocity	5.40	ft/s
Velocity Head	0.45	ft

Section 2-A

Results

Specific Energy		4.45	ft
Froude Number		0.54	
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	4.00	ft
Critical Depth	2.78	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02631	ft/ft

Section 2-B

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	500.00
0+09	495.30
0+25	495.00
0+43	495.00
0+58	495.30
0+77	500.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 500.00)	(0+58, 495.30)	0.045
(0+58, 495.30)	(0+77, 500.00)	0.055

Options

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

Results

Discharge	1312.95	ft^3/s
Elevation Range	495.00 to 500.00 ft	
Flow Area	230.10	ft^2
Wetted Perimeter	71.94	ft
Hydraulic Radius	3.20	ft
Top Width	70.61	ft
Normal Depth	4.00	ft
Critical Depth	2.81	ft
Critical Slope	0.02492	ft/ft
Velocity	5.71	ft/s
Velocity Head	0.51	ft

Section 2-B

Results

Specific Energy	4.51	ft
Froude Number	0.56	
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	4.00	ft
Critical Depth	2.81	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02492	ft/ft

Section 3-A

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.00500	ft/ft
Normal Depth	4.00	ft
Left Side Slope	1.00	ft/ft (H:V)
Right Side Slope	1.00	ft/ft (H:V)
Bottom Width	21.00	ft

Results

Discharge	892.52	ft^3/s
Flow Area	100.00	ft^2
Wetted Perimeter	32.31	ft
Hydraulic Radius	3.09	ft
Top Width	29.00	ft
Critical Depth	3.61	ft
Critical Slope	0.00711	ft/ft
Velocity	8.93	ft/s
Velocity Head	1.24	ft
Specific Energy	5.24	ft
Froude Number	0.85	
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	4.00	ft
Critical Depth	3.61	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00711	ft/ft

Section 3-B

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.025	
Channel Slope	0.00500	ft/ft
Normal Depth	4.00	ft
Left Side Slope	1.00	ft/ft (H:V)
Right Side Slope	1.00	ft/ft (H:V)
Bottom Width	32.00	ft

Results

Discharge	1348.12	ft^3/s
Flow Area	144.00	ft^2
Wetted Perimeter	43.31	ft
Hydraulic Radius	3.32	ft
Top Width	40.00	ft
Critical Depth	3.66	ft
Critical Slope	0.00674	ft/ft
Velocity	9.36	ft/s
Velocity Head	1.36	ft
Specific Energy	5.36	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	4.00	ft
Critical Depth	3.66	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00674	ft/ft

Section 4-A

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	500.00
0+19	495.17
0+28	495.00
0+37	495.00
0+46	495.17
0+65	500.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 500.00)	(0+65, 500.00)	0.045

Options

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

Results

Discharge	893.76	ft^3/s
Elevation Range	495.00 to 500.00 ft	
Flow Area	162.61	ft^2
Wetted Perimeter	57.95	ft
Hydraulic Radius	2.81	ft
Top Width	57.00	ft
Normal Depth	4.00	ft
Critical Depth	2.93	ft
Critical Slope	0.02313	ft/ft
Velocity	5.50	ft/s
Velocity Head	0.47	ft
Specific Energy	4.47	ft

Results

Froude Number	0.57	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	ft
Critical Depth	2.93	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02313	ft/ft

Section 4-B

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	500.00
0+19	495.24
0+31	495.00
0+43	495.00
0+55	495.24
0+74	500.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 500.00)	(0+74, 500.00)	0.045

Options

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

Results

Discharge	1121.34	ft^3/s
Elevation Range	495.00 to 500.00 ft	
Flow Area	197.38	ft^2
Wetted Perimeter	66.93	ft
Hydraulic Radius	2.95	ft
Top Width	66.00	ft
Normal Depth	4.00	ft
Critical Depth	2.92	ft
Critical Slope	0.02276	ft/ft
Velocity	5.68	ft/s
Velocity Head	0.50	ft
Specific Energy	4.50	ft

Results

Froude Number	0.58	
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	4.00	ft
Critical Depth	2.92	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02276	ft/ft

Section 4-C

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00700	ft/ft
Normal Depth	4.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	500.00
0+19	495.26
0+32	495.00
0+50	495.00
0+63	495.26
0+82	500.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 500.00)	(0+82, 500.00)	0.045

Options

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

Results

Discharge	1331.09	ft^3/s
Elevation Range	495.00 to 500.00 ft	
Flow Area	228.86	ft^2
Wetted Perimeter	74.93	ft
Hydraulic Radius	3.05	ft
Top Width	74.00	ft
Normal Depth	4.00	ft
Critical Depth	2.91	ft
Critical Slope	0.02251	ft/ft
Velocity	5.82	ft/s
Velocity Head	0.53	ft
Specific Energy	4.53	ft

Results

Froude Number	0.58	
Flow Type	Subcritical	

GVF Input Data

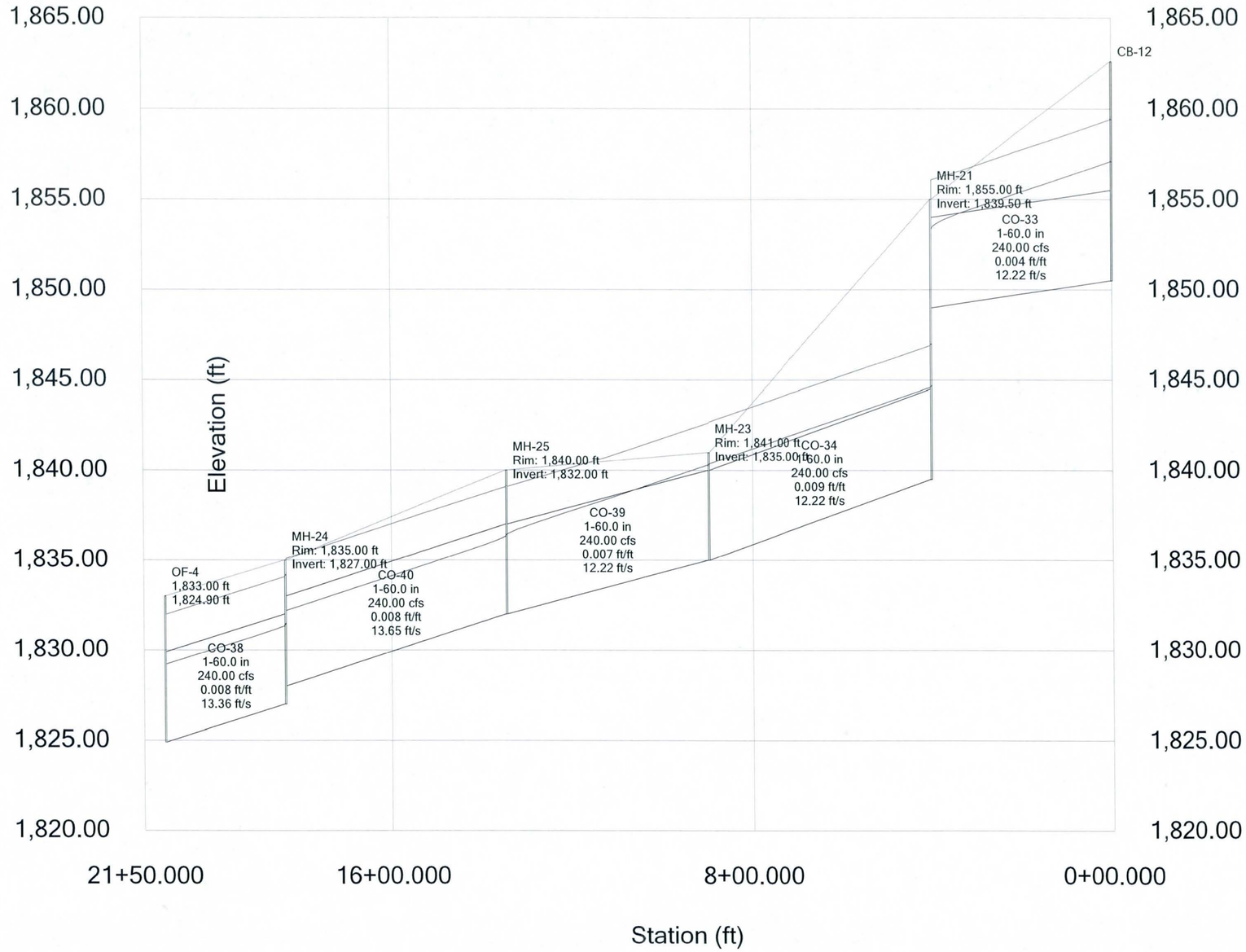
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

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	4.00	ft
Critical Depth	2.91	ft
Channel Slope	0.00700	ft/ft
Critical Slope	0.02251	ft/ft

Profile Report

Engineering Profile - Deer Valley Road-Pima Rd to Outlet (Final - Deer Valley Rd. Storm Drain Pima Rd to Outlet.stc)



APPENDIX H: CALCULATIONS FOR FLOW CONTROL STRUCTURE

Low Flow trapezoidal Weir	
Base Height	0
Height of Weir (h)	3
Base Width of Weir	6
Weir Side Slope	4
Total Top Width	30

High Flow Trapezoidal Weir	
Base Height	3
Height over Weir (h)	1
Base Width of Weir	55
Weir Side Slope	4
Total Top Width	63

Cd	0.56

Deer Valley Channel

1	2	3	4	5	6	7	8	9	10	11	12						
Totals									Low Flow Rectangle			High Flow Trapezoidal			Flow Summary			
Stage	dh	(2gh)^0	equivalent Cw	dA	dQ	Q (una	Q		dh	dA	A	H	dA	A	Stage	Q, DV Cha	Q, Golf Co	QTotal
0	0	0	3	0	0	0	0		0	0	0	0	0	0	0	0	0	0
0.5	0.5	5.675	3	3	17	17	10		0.5	3	4	0	0	0	0.5	10	10	20
1	0.5	8.025	3	3	24.1	41.1	23		0.5	3	10	0	0	0	1	23	23	46
1.5	0.5	9.829	3	3	29.5	70.6	40		0.5	3	18	0	0	0	1.5	40	40	80
2	0.5	11.35	3	3	34	104.6	59		0.5	3	28	0	0	0	2	59	59	118
2.5	0.5	12.69	3	3	38.1	142.7	80		0.5	3	40	0	0	0	2.5	80	80	160
3	0.5	13.9	3	3	41.7	184.4	103		0.5	3	54	0	0	0	3	103	103	206
3.5	0.5	15.01	3	31.5	473	657.3	368		0.5	3	69	0.5	28.5	28.5	3.5	368	353	721
4	0.5	16.05	3	33.5	538	1195	669		0.5	3	84	1	30.5	59	4	669	639	1308
4.5	0.5	17.02	3	35.5	604	1799	1008		0.5	3	99	1.5	32.5	91.5	4.5	1008	961	1969
5	0.5	17.94	3	37.5	673	2472	1384		0.5	3	114	2	34.5	126	5	1384	1320	2704
5.5	0.5	18.82	3	39.5	743	3216	1801		0.5	3	129	2.5	36.5	162.5	5.5	1801	1718	3519
6	0.5	19.66	3	41.5	816	4032	2258		0.5	3	144	3	38.5	201	6	2258	2155	4413
6.5	0.5	20.46	3	43.5	890	4922	2756		0.5	3	159	3.5	40.5	241.5	6.5	2756	2634	5390

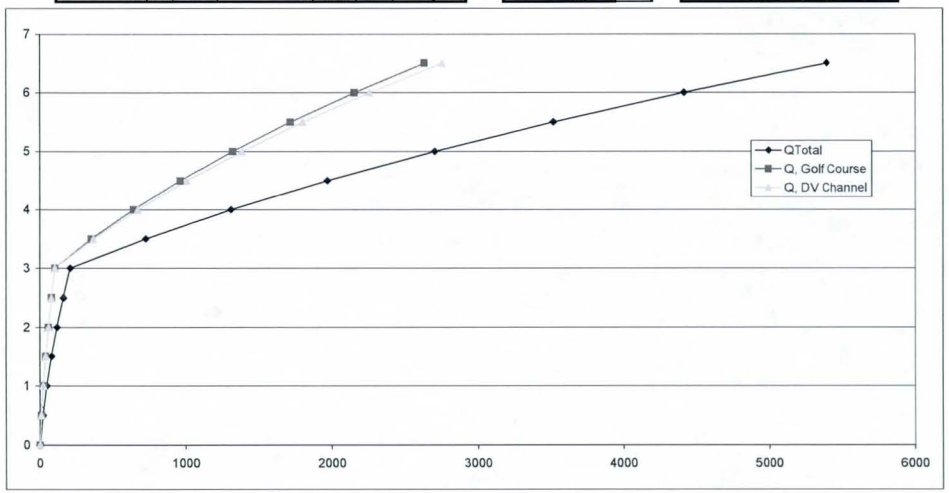
Low Flow Rectangular Weir	
Base Height	0
Height of Weir (h)	3
Base Width of Weir	6
Weir Side Slope	4
Total Top Width	30

High Flow Trapezoidal Weir	
Base Height	3
Height of Weir (h)	1
Base Width of Weir	51.5
Weir Side Slope	4
Total Top Width	59.5

Cd	0.56

Golf Course

1	2	3	4	5	6	7	8	9	10	11	12			
Totals									Low Flow Rectangle			High Flow Trapezoidal		
Stage	dh	(2gh)^0	equivalent Cw	dA	dQ	Q (una	Q		dh	dA	A	H	dA	A
0	0	0	3	0	0	0	0		0	0	0	0	0	0
0.5	0.5	5.675	3	3	17	17	10		0.5	3	4	0	0	0
1	0.5	8.025	3	3	24.1	41.1	23		0.5	3	10	0	0	0
1.5	0.5	9.829	3	3	29.5	70.6	40		0.5	3	18	0	0	0
2	0.5	11.35	3	3	34	104.6	59		0.5	3	28	0	0	0
2.5	0.5	12.69	3	3	38.1	142.7	80		0.5	3	40	0	0	0
3	0.5	13.9	3	3	41.7	184.4	103		0.5	3	54	0	0	0
3.5	0.5	15.01	3	29.75	447	631	353		0.5	3	69	0.5	26.75	26.75
4	0.5	16.05	3	31.75	510	1141	639		0.5	3	84	1	28.75	55.5
4.5	0.5	17.02	3	33.75	575	1715	961		0.5	3	99	1.5	30.75	86.25
5	0.5	17.94	3	35.75	642	2357	1320		0.5	3	114	2	32.75	119
5.5	0.5	18.82	3	37.75	711	3067	1718		0.5	3	129	2.5	34.75	153.75
6	0.5	19.66	3	39.75	781	3849	2155		0.5	3	144	3	36.75	190.5
6.5	0.5	20.46	3	41.75	854	4703	2634		0.5	3	159	3.5	38.75	229.25



APPENDIX I: SEDIMENTATION ANALYSIS

6-hour Storm Distribution		2-yr, 6-hr			100-yr, 6-hr		
Time Step [hr]	Rainfall Depth Fraction	Cumulative Rainfall Depth [in]	Incremental Rainfall Depth [in]	EI	Cumulative Rainfall Depth [in]	Incremental Rainfall Depth [in]	EI
0.00	0.000	0.000	0.000	0.00	0.000	0.000	0.00
0.25	0.015	0.021	0.021	7.57	0.051	0.051	24.90
0.50	0.020	0.028	0.007	1.42	0.068	0.017	5.61
0.75	0.030	0.042	0.014	4.23	0.102	0.034	14.62
1.00	0.048	0.067	0.025	9.75	0.163	0.061	31.48
1.25	0.063	0.088	0.021	7.57	0.214	0.051	24.90
1.50	0.076	0.106	0.018	6.19	0.258	0.044	20.67
1.75	0.090	0.126	0.020	6.87	0.306	0.048	22.77
2.00	0.105	0.147	0.021	7.57	0.357	0.051	24.90
2.25	0.119	0.167	0.020	6.87	0.405	0.048	22.77
2.50	0.135	0.189	0.022	8.29	0.459	0.054	27.06
2.75	0.152	0.213	0.024	9.01	0.517	0.058	29.26
3.00	0.175	0.245	0.032	13.59	0.595	0.078	42.98
3.25	0.222	0.311	0.066	34.53	0.755	0.160	104.25
3.50	0.304	0.426	0.115	69.44	1.034	0.279	204.19
3.75	0.472	0.661	0.235	166.51	1.605	0.571	477.24
4.00	0.670	0.938	0.277	202.79	2.278	0.673	578.36
4.25	0.796	1.114	0.176	117.59	2.706	0.428	340.21
4.50	0.868	1.215	0.101	59.08	2.951	0.245	174.71
4.75	0.912	1.277	0.062	31.75	3.101	0.150	96.18
5.00	0.946	1.324	0.048	22.77	3.216	0.116	70.03
5.25	0.960	1.344	0.020	6.87	3.264	0.048	22.77
5.50	0.973	1.362	0.018	6.19	3.308	0.044	20.67
5.75	0.987	1.382	0.020	6.87	3.356	0.048	22.77
6.00	1.000	1.400	0.018	6.19	3.400	0.044	20.67
			R	**8.20**		**R**	**24.24**

Procedure follows USDA AH 537 - Predicting Railfall Erosion Losses, 1978															
Universal Soil Loss Equation (USLE) A = RKLSCP [1]															
ID	**Area Contributing**	**Area [acre]**	**$R_{annually}$**	**$R_{2\text{-}yr,6\text{-}hr}$**	**$R_{100\text{-}yr,6\text{-}hr}$**	**K**	**LS**	**C**	**P**	**$A_{annually}$ [tons/acre/year]**	**$A_{2\text{-}yr,6\text{-}hr}$ [tons/acre]**	**$A_{100\text{-}yr,6\text{-}hr}$ [tons/acre]**	**Soil $Loss_{annually}$ [tons]**	**Soil $Loss_{2\text{-}yr,6\text{-}hr}$ [tons]**	**Soil $Loss_{100\text{-}yr,6\text{-}hr}$ [tons]**
1	Deer Valley Channel	342.4	50	8.20	24.24	0.15	0.400	0.17	1	0.51	0.084	0.247	174.6	28.6	84.6
2	Deer Valley Channel	106.6	50	8.20	24.24	0.15	0.400	0.17	1	0.51	0.084	0.247	54.4	8.9	26.4

[1] R – Rainfall and Runoff factor (**Figure-1**, or **R = 0.01*Σ[EI],** where E = 916 + 331 Log_{10}[I], and I = rainfall intensity [in/hr])

K – Soil erodibility factor (**SCS Soil Survey**)

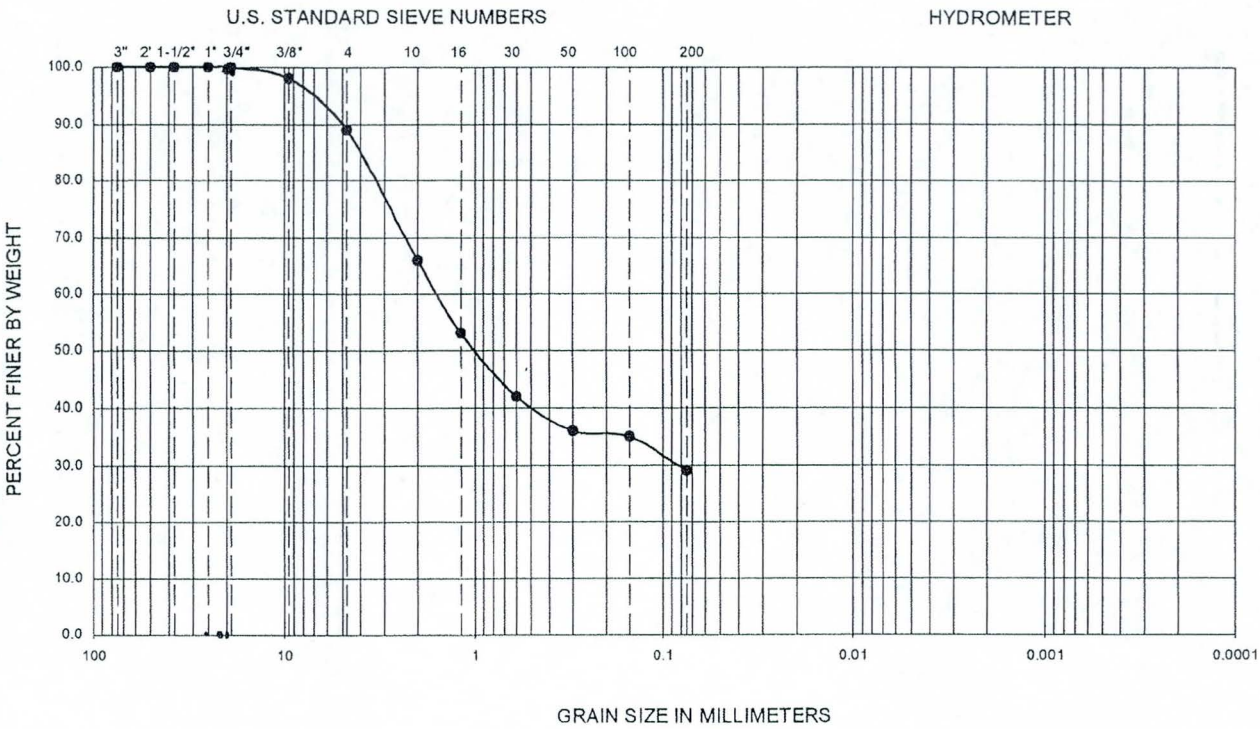
LS – Topographic factor (**Table-3**)

C – Cover management factor (**Table-10**)

P – Support practice factor

A – Soil loss

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (%)	USCS
●	B-1	6-6.8	31	16	15	--	--	--	--	--	29	SC

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore	GRADATION TEST RESULTS	FIGURE
PROJECT NO. 601971001 / DATE 11/07	PIMA ROAD DRAINAGE JUNCTION STRUCTURE SOUTHWEST CORNER OF PIMA ROAD AND SIERRA PINTA DRIVE SCOTTSDALE, ARIZONA	B-1

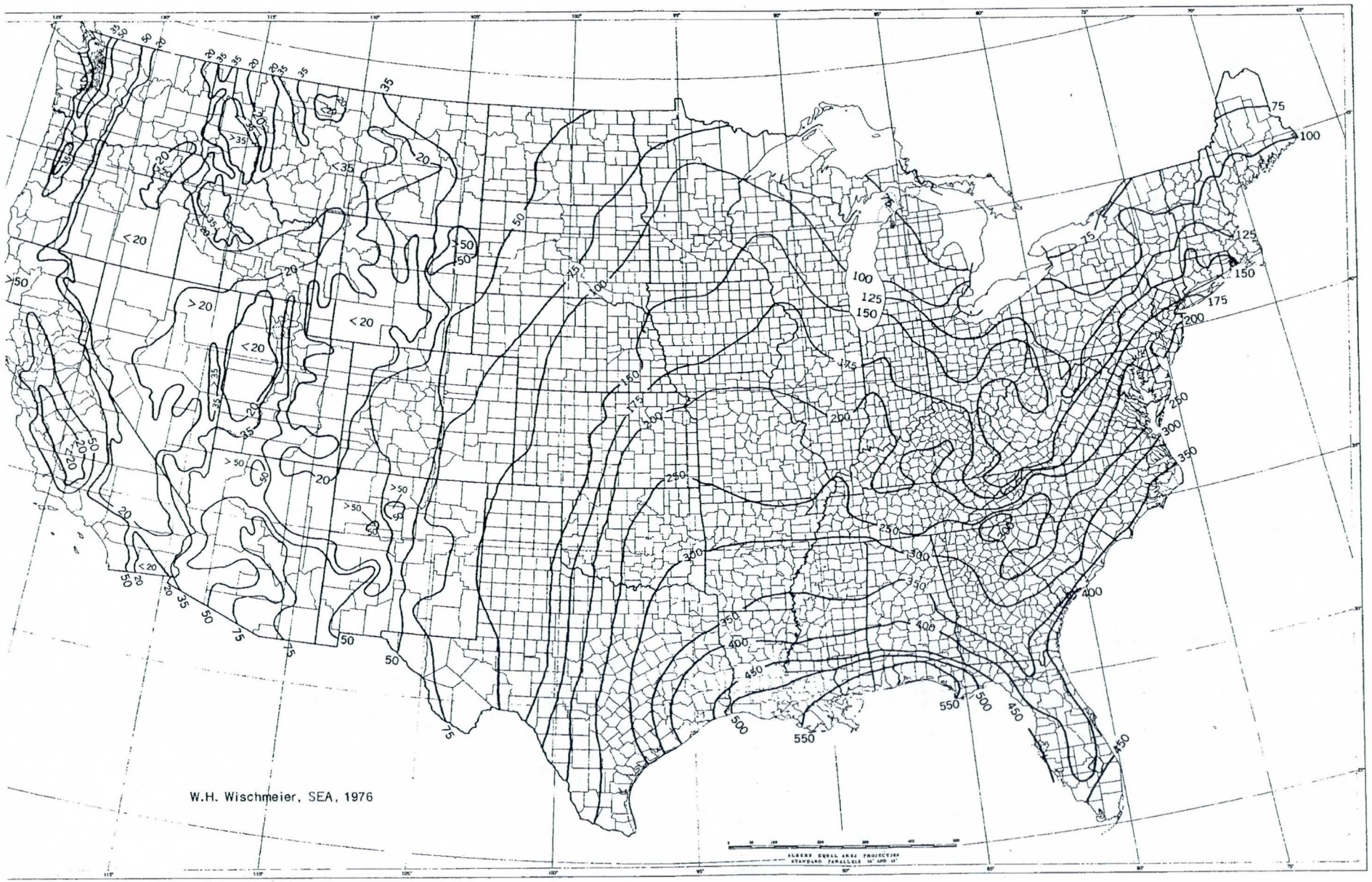


FIGURE 1.—Average annual values of the rainfall erosion index.

TABLE 3.—*Values of the topographic factor,* **LS**, *for specific combinations of slope length and steepness*[1]

Percent slope	Slope length (feet)											
	25	50	75	100	150	200	300	400	500	600	800	1,000
0.2	0.060	0.069	0.075	0.080	0.086	0.092	0.099	0.105	0.110	0.114	0.121	0.126
0.5	.073	.083	.090	.096	.104	.110	.119	.126	.132	.137	.145	.152
0.8	.086	.098	.107	.113	.123	.130	.141	.149	.156	.162	.171	.179
2	.133	.163	.185	.201	.227	.248	.280	.305	.326	.344	.376	.402
3	.190	.233	.264	.287	.325	.354	.400	.437	.466	.492	.536	.573
4	.230	.303	.357	.400	.471	.528	.621	.697	.762	.820	.920	1.01
5	.268	.379	.464	.536	.656	.758	.928	1.07	1.20	1.31	1.52	1.69
6	.336	.476	.583	.673	.824	.952	1.17	1.35	1.50	1.65	1.90	2.13
8	.496	.701	.859	.992	1.21	1.41	1.72	1.98	2.22	2.43	2.81	3.14
10	.685	.968	1.19	1.37	1.68	1.94	2.37	2.74	3.06	3.36	3.87	4.33
12	.903	1.28	1.56	1.80	2.21	2.55	3.13	3.61	4.04	4.42	5.11	5.71
14	1.15	1.62	1.99	2.30	2.81	3.25	3.98	4.59	5.13	5.62	6.49	7.26
16	1.42	2.01	2.46	2.84	3.48	4.01	4.92	5.68	6.35	6.95	8.03	8.98
18	1.72	2.43	2.97	3.43	4.21	3.86	5.95	6.87	7.68	8.41	9.71	10.9
20	2.04	2.88	3.53	4.08	5.00	5.77	7.07	8.16	9.12	10.0	11.5	12.9

[1] $LS = (\lambda/72.6)^m\ (65.41\ \sin^2\theta + 4.56\ \sin\theta + 0.065)$ where λ = slope length in feet; $m = 0.2$ for gradients $<$ 1 percent, 0.3 for 1 to 3 percent slopes, 0.4 for 3.5 to 4.5 percent slopes, 0.5 for 5 percent slopes and steeper; and θ = angle of slope. (For other combinations of length and gradient, interpolate between adjacent values or see fig. 4.)

TABLE 10.—*Factor* **C** *for permanent pasture, range, and idle land*[1]

Vegetative canopy		Cover that contacts the soil surface						
			Percent ground cover					
Type and height[2]	Percent cover[3]	Type[4]	0	20	40	60	80	95+
No appreciable canopy		G	0.45	0.20	0.10	0.042	0.013	0.003
		W	.45	.24	.15	.091	.043	.011
Tall weeds or short brush with average drop fall height of 20 in	25	G	.36	.17	.09	.038	.013	.003
		W	.36	.20	.13	.083	.041	.011
	50	G	.26	.13	.07	.035	.012	.003
		W	.26	.16	.11	.076	.039	.011
	75	G	.17	.10	.06	.032	.011	.003
		W	.17	.12	.09	.068	.038	.011
Appreciable brush or bushes, with average drop fall height of 6½ ft	25	G	.40	.18	.09	.040	.013	.003
		W	.40	.22	.14	.087	.042	.011
	50	G	.34	.16	.08	.038	.012	.003
		W	.34	.19	.13	.082	.041	.011
	75	G	.28	.14	.08	.036	.012	.003
		W	.28	.17	.12	.078	.040	.011
Trees, but no appreciable low brush. Average drop fall height of 13 ft	25	G	.42	.19	.10	.041	.013	.003
		W	.42	.23	.14	.089	.042	.011
	50	G	.39	.18	.09	.040	.013	.003
		W	.39	.21	.14	.087	.042	.011
	75	G	.36	.17	.09	.039	.012	.003
		W	.36	.20	.13	.084	.041	.011

[1] The listed **C** values assume that the vegetation and mulch are randomly distributed over the entire area.

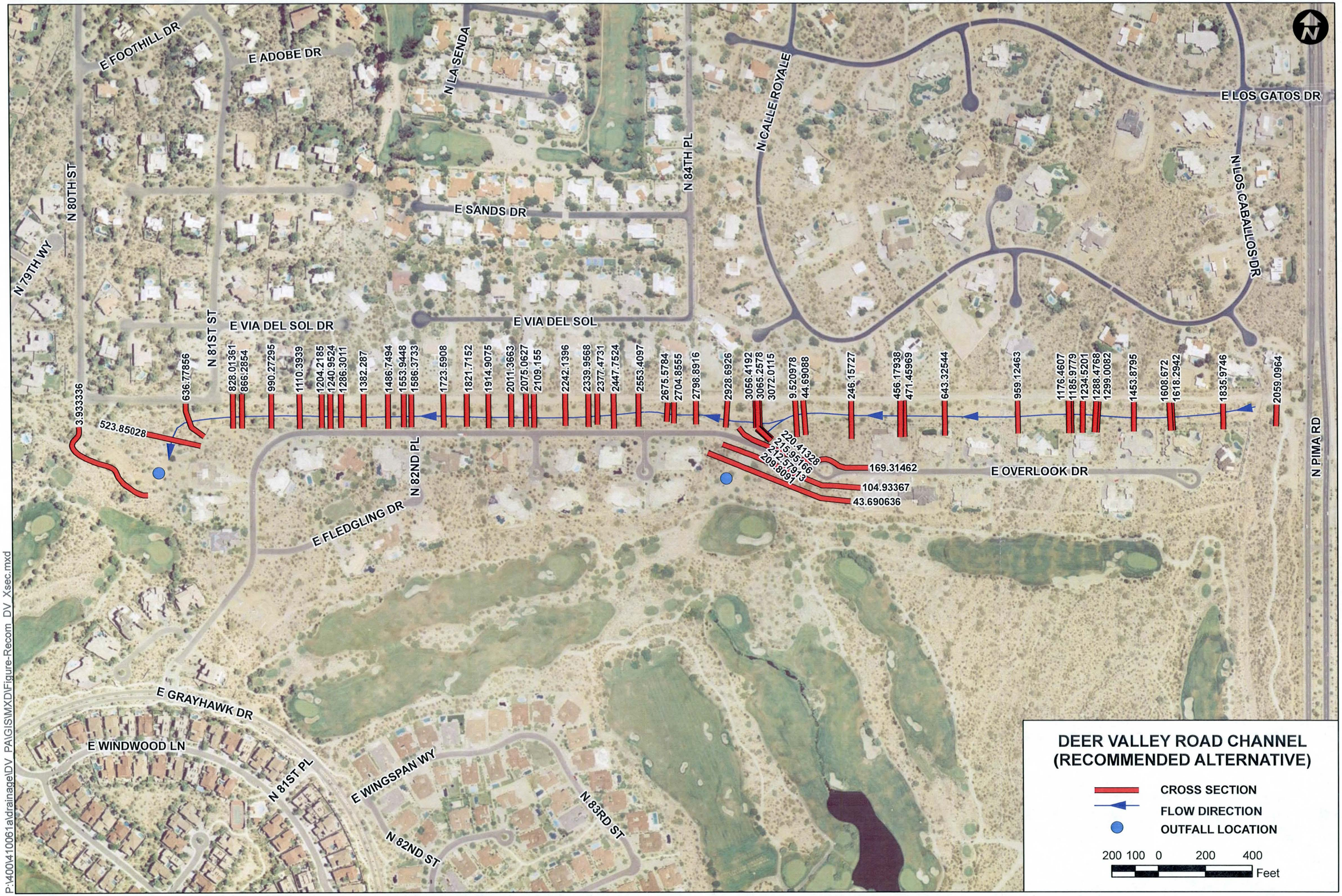
[2] Canopy height is measured as the average fall height of water drops falling from the canopy to the ground. Canopy effect is inversely proportional to drop fall height and is negligible if fall height exceeds 33 ft.

[3] Portion of total-area surface that would be hidden from view by canopy in a vertical projection (a bird's-eye view).

[4] G: cover at surface is grass, grasslike plants, decaying compacted duff, or litter at least 2 in deep.

W: cover at surface is mostly broadleaf herbaceous plants (as weeds with little lateral-root network near the surface) or undecayed residues or both.

APPENDIX J: RECOMMENDED ALTERNATIVE HYDRAULIC DOCUMENTATION



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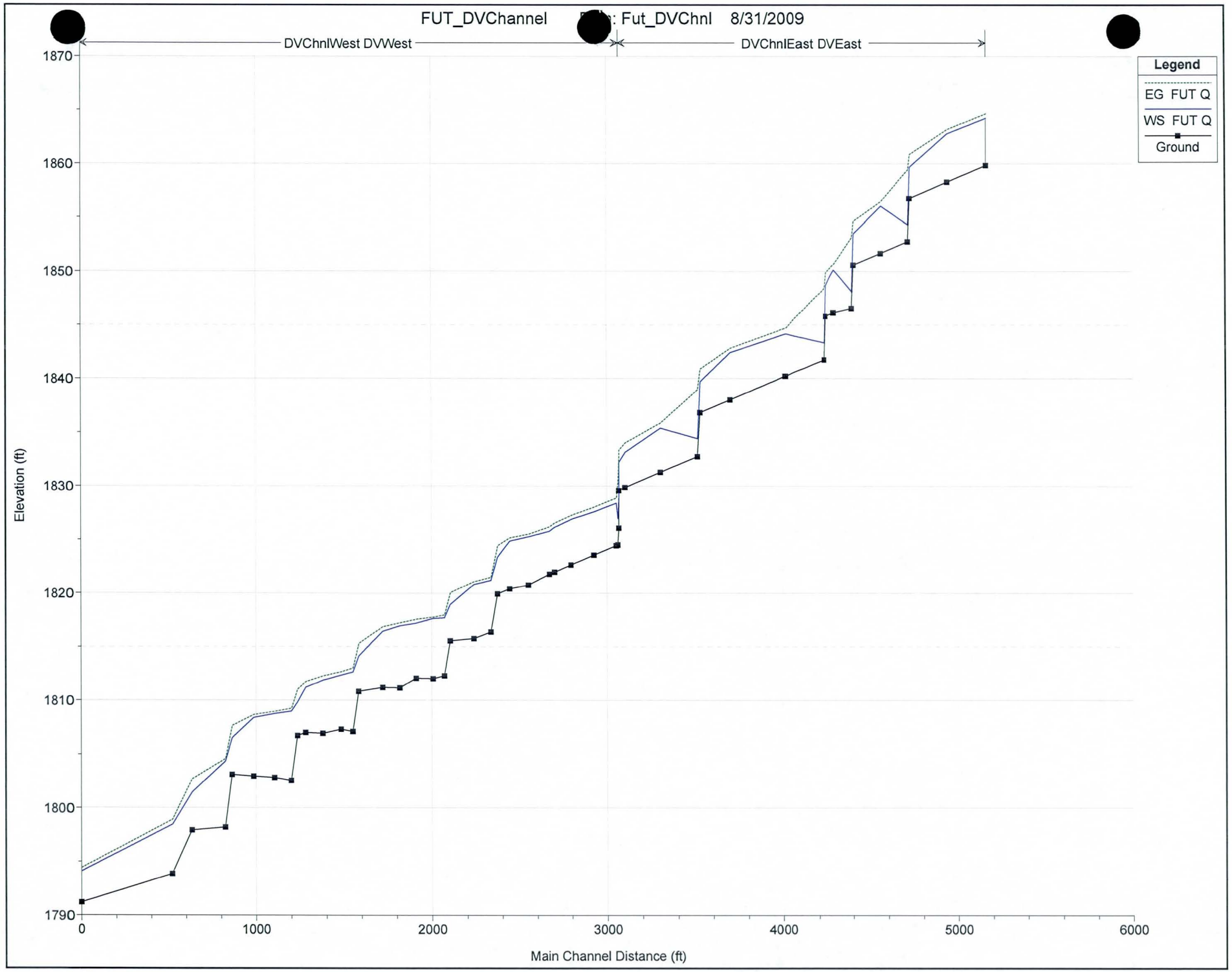
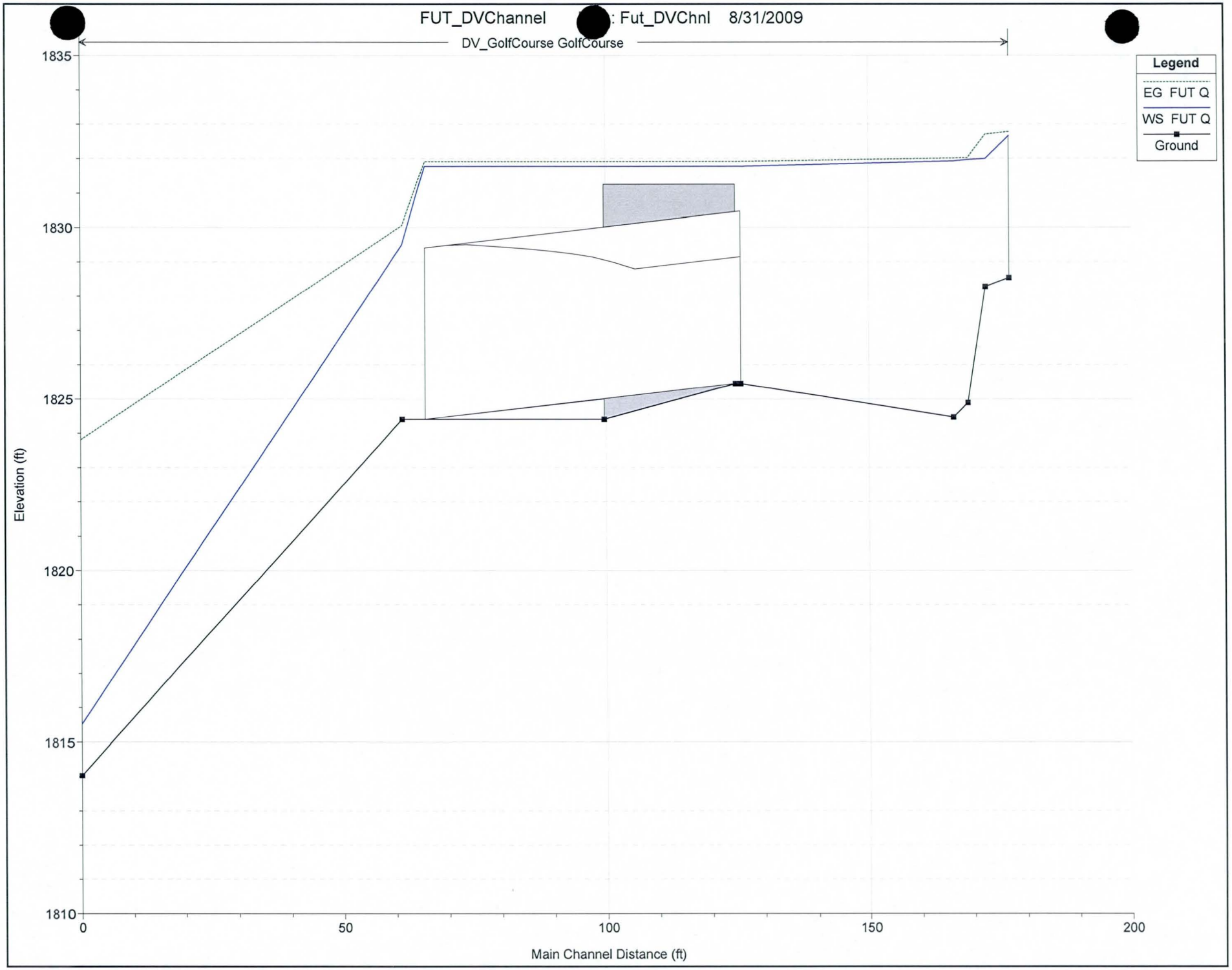
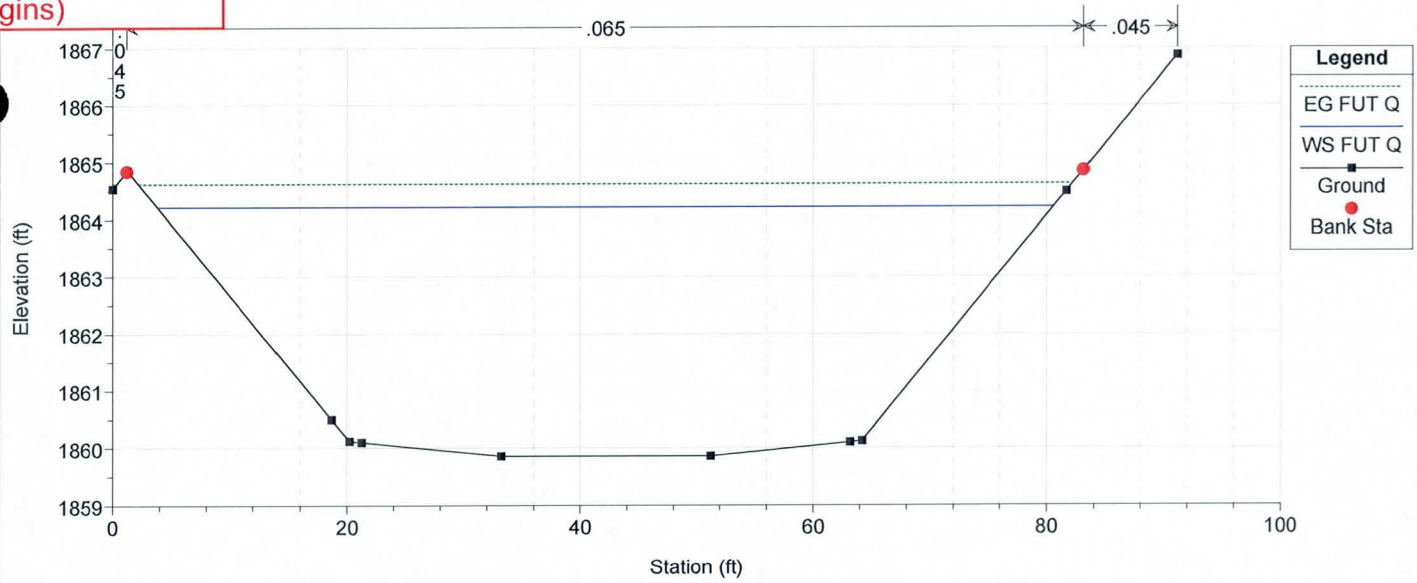
HEC-RAS Plan: FUT Profile: FUT Q

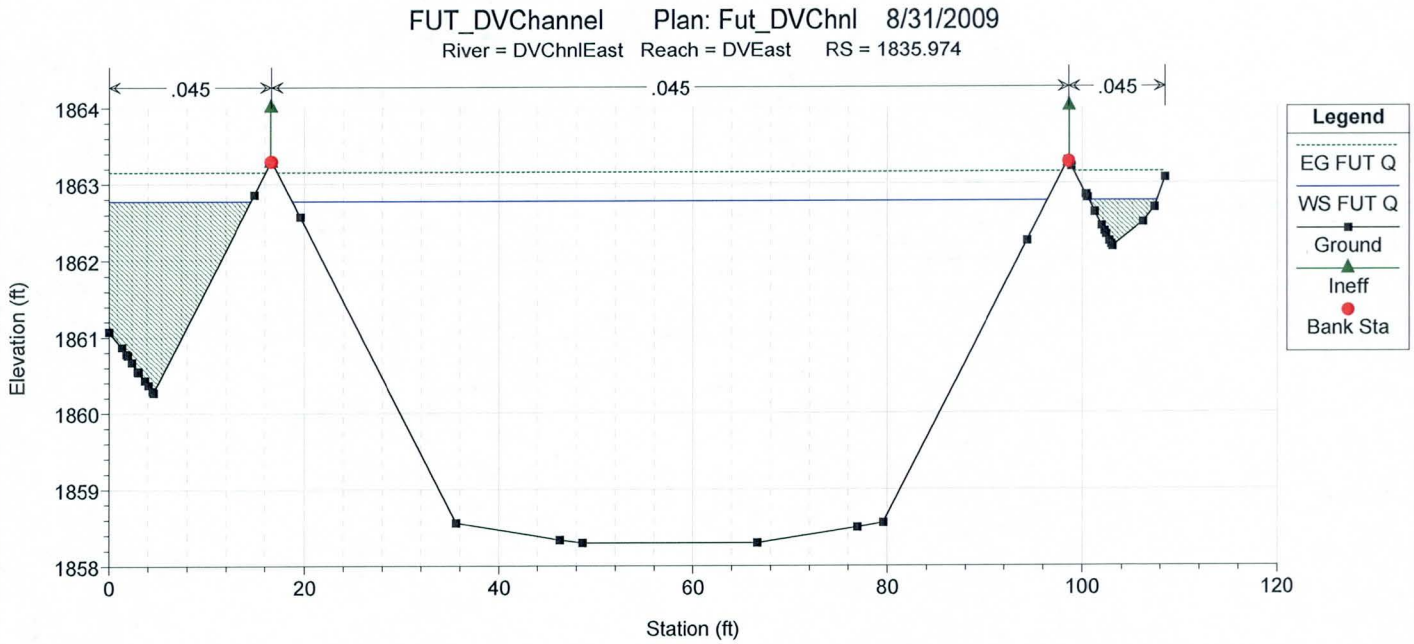
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Right	Max Chl Dpth
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft/s)	(ft)
DVChnlEast	DVEast	9.520977	FUT Q	1310.00	1829.58	1832.21	1832.21	1833.32	0.023107	8.46	154.87	104.79	1.00		2.63
DVChnlEast	DVEast	44.69087	FUT Q	1310.00	1829.87	1833.12	1832.76	1833.99	0.014640	7.47	175.44	89.59	0.82		3.25
DVChnlEast	DVEast	246.1572	FUT Q	1310.00	1831.28	1835.38	1834.17	1835.86	0.006180	5.54	236.45	100.38	0.55		4.10
DVChnlEast	DVEast	456.1793	FUT Q	1310.00	1832.75	1834.39	1835.65	1838.98	0.369094	17.19	76.21	55.00	2.57		1.64
DVChnlEast	DVEast	471.4596	FUT Q	1310.00	1836.83	1839.72	1839.72	1840.88	0.047178	8.66	151.29	102.45	1.00		2.89
DVChnlEast	DVEast	643.3254	FUT Q	1310.00	1838.03	1842.44	1840.92	1842.84	0.004733	5.05	259.34	121.13	0.49		4.41
DVChnlEast	DVEast	959.1246	FUT Q	1310.00	1840.24	1844.17	1843.12	1844.71	0.007240	5.86	223.71	73.44	0.59		3.93
DVChnlEast	DVEast	1176.460	FUT Q	1310.00	1841.76	1843.32	1844.65	1848.44	0.436312	18.16	72.15	54.39	2.78		1.56
DVChnlEast	DVEast	1185.977	FUT Q	1310.00	1845.80	1848.69	1848.69	1849.85	0.046856	8.64	151.63	69.53	1.00		2.89
DVChnlEast	DVEast	1234.520	FUT Q	1310.00	1846.14	1850.10	1849.03	1850.63	0.007036	5.80	225.87	98.32	0.58		3.96
DVChnlEast	DVEast	1288.476	FUT Q	1310.00	1846.52	1848.10	1849.41	1853.12	0.424701	17.99	72.82	54.55	2.74		1.58
DVChnlEast	DVEast	1299.008	FUT Q	1310.00	1850.57	1853.46	1853.46	1854.62	0.046802	8.63	151.71	97.68	1.00		2.92
DVChnlEast	DVEast	1453.879	FUT Q	1310.00	1851.65	1856.02	1854.54	1856.42	0.004888	5.11	256.44	113.97	0.49		4.37
DVChnlEast	DVEast	1608.671	FUT Q	1310.00	1852.73	1854.30	1855.63	1859.41	0.435662	18.14	72.20	54.43	2.78		1.56
DVChnlEast	DVEast	1618.294	FUT Q	1310.00	1856.77	1859.67	1859.67	1860.82	0.046733	8.63	151.74	89.48	1.00		3.37
DVChnlEast	DVEast	1835.974	FUT Q	1310.00	1858.30	1862.77	1861.18	1863.15	0.004496	4.96	264.03	99.21	0.47		4.47
DVChnlEast	DVEast	2059.096	FUT Q	1310.00	1859.86	1864.21	1862.74	1864.62	0.010374	5.14	254.91	76.73	0.50		4.35
DVChnlWest	DVWest	3.933336	FUT Q	1100.00	1791.22	1794.10	1794.05	1794.42	0.015014	5.06	268.84	322.42	0.75		2.88
DVChnlWest	DVWest	523.8502	FUT Q	1100.00	1793.87	1798.45	1797.12	1798.92	0.006008	5.50	199.89	62.25	0.54		4.58
DVChnlWest	DVWest	636.7785	FUT Q	1100.00	1797.94	1801.47	1801.47	1802.69	0.022827	8.88	123.82	51.27	1.01		3.53
DVChnlWest	DVWest	828.0136	FUT Q	1100.00	1798.21	1804.36	1801.83	1804.59	0.005092	3.88	283.78	75.88	0.35		6.15
DVChnlWest	DVWest	866.2854	FUT Q	1100.00	1803.10	1806.51	1806.51	1807.63	0.048676	8.51	129.29	58.45	1.01		3.41
DVChnlWest	DVWest	990.2729	FUT Q	1100.00	1802.96	1808.38		1808.65	0.002936	4.20	263.18	80.58	0.39	0.58	5.42
DVChnlWest	DVWest	1110.393	FUT Q	1100.00	1802.82	1808.74		1808.95	0.001998	3.65	301.35	76.07	0.32		5.92
DVChnlWest	DVWest	1204.218	FUT Q	1100.00	1802.55	1808.98	1806.24	1809.25	0.004961	4.11	267.95	63.39	0.35		6.43
DVChnlWest	DVWest	1240.952	FUT Q	1100.00	1806.69	1809.85	1809.85	1811.02	0.048142	8.66	126.98	55.23	1.01		3.16
DVChnlWest	DVWest	1286.301	FUT Q	1100.00	1806.98	1811.21		1811.73	0.006700	5.74	191.72	60.83	0.57		4.23
DVChnlWest	DVWest	1382.286	FUT Q	1100.00	1806.91	1811.87		1812.25	0.004398	4.94	222.47	64.25	0.47		4.96
DVChnlWest	DVWest	1486.749	FUT Q	1100.00	1807.28	1812.35		1812.66	0.003297	4.45	247.45	67.59	0.41		5.07
DVChnlWest	DVWest	1553.944	FUT Q	1100.00	1807.08	1812.63	1810.59	1813.00	0.007824	4.88	225.37	58.09	0.44		5.55
DVChnlWest	DVWest	1586.373	FUT Q	1100.00	1810.82	1814.11	1814.11	1815.27	0.047364	8.64	127.32	54.98	1.00		3.29
DVChnlWest	DVWest	1723.590	FUT Q	1100.00	1811.19	1816.44		1816.84	0.004691	5.08	216.41	63.01	0.48		5.25
DVChnlWest	DVWest	1821.715	FUT Q	1100.00	1811.16	1816.93		1817.20	0.002847	4.20	261.89	69.74	0.38		5.77
DVChnlWest	DVWest	1914.907	FUT Q	1100.00	1812.06	1817.18		1817.53	0.003773	4.72	233.23	64.48	0.44		5.12
DVChnlWest	DVWest	2011.366	FUT Q	870.00	1812.02	1817.62		1817.75	0.001184	2.89	300.71	72.09	0.25		5.60
DVChnlWest	DVWest	2075.062	FUT Q	870.00	1812.30	1817.67	1815.45	1817.93	0.005783	4.10	211.99	56.42	0.37		5.37
DVChnlWest	DVWest	2109.155	FUT Q	870.00	1815.54	1818.93	1818.93	1820.02	0.048913	8.38	103.84	47.91	1.00		3.39
DVChnlWest	DVWest	2242.139	FUT Q	870.00	1815.76	1820.81		1821.04	0.002670	3.88	224.44	63.93	0.36		5.05
DVChnlWest	DVWest	2339.956	FUT Q	870.00	1816.37	1821.17	1819.19	1821.44	0.006392	4.15	209.50	59.59	0.39		4.80
DVChnlWest	DVWest	2377.473	FUT Q	870.00	1819.93	1823.35	1823.35	1824.41	0.049371	8.26	105.34	50.16	1.00		3.42
DVChnlWest	DVWest	2447.752	FUT Q	870.00	1820.42	1824.85		1825.14	0.003776	4.35	200.15	62.53	0.43		4.42
DVChnlWest	DVWest	2553.409	FUT Q	870.00	1820.76	1825.26		1825.49	0.002835	3.86	225.15	67.98	0.37		4.50
DVChnlWest	DVWest	2675.578	FUT Q	870.00	1821.78	1825.78		1826.17	0.012586	5.05	172.35	61.57	0.53		4.00
DVChnlWest	DVWest	2704.855	FUT Q	870.00	1821.98	1826.14		1826.53	0.011515	5.00	174.01	58.82	0.51		4.16
DVChnlWest	DVWest	2798.891	FUT Q	870.00	1822.64	1826.86		1827.23	0.005227	4.90	177.47	59.31	0.50		4.22
DVChnlWest	DVWest	2928.692	FUT Q	870.00	1823.55	1827.57		1827.99	0.006343	5.25	165.63	57.73	0.55		4.01
DVChnlWest	DVWest	3056.419	FUT Q	870.00	1824.44	1828.39	1827.29	1828.84	0.006787	5.38	161.58	57.09	0.56		3.95
DVChnlWest	DVWest	3065.257	FUT Q	870.00	1824.51	1826.92	1827.91	1830.44	0.328354	15.05	57.82	46.38	2.38		2.41
DVChnlWest	DVWest	3072.011	FUT Q	870.00	1826.08	1829.06	1830.07	1833.04	0.390258	16.00	54.37	45.10	2.57		2.98
DV_GolfCourse	GolfCourse	43.69063	FUT Q	640.00	1814.03	1815.53	1817.11	1823.82	0.450676	23.11	27.70	25.72	3.92		1.50
DV_GolfCourse	GolfCourse	104.9336	FUT Q	640.00	1824.41	1829.50	1829.50	1830.05	0.024095	6.74	113.66	204.07	0.68	4.19	5.09
DV_GolfCourse	GolfCourse	125		Culvert											
DV_GolfCourse	GolfCourse	169.3146	FUT Q	640.00	1825.45	1831.77	1831.28	1831.91	0.008013	3.36	218.33	221.13	0.35	3.07	6.32
DV_GolfCourse	GolfCourse	209.8090	FUT Q	640.00	1824.47	1831.92	1827.66	1832.01	0.000999	2.37	277.72	76.81	0.17	2.19	7.45
DV_GolfCourse	GolfCourse	212.5791	FUT Q	640.00	1824.89	1831.97	1828.57	1832.02	0.000611	1.81	352.44	77.81	0.13	1.79	7.08
DV_GolfCourse	GolfCourse	215.9516	FUT Q	640.00	1828.28	1832.00	1832.00	1832.70	0.029178	7.10	98.87	69.59	0.79	4.48	3.72
DV_GolfCourse	GolfCourse	220.4132	FUT Q	640.00	1828.54	1832.66	1830.35	1832.78	0.001363	2.76	232.96	67.96	0.26		4.12

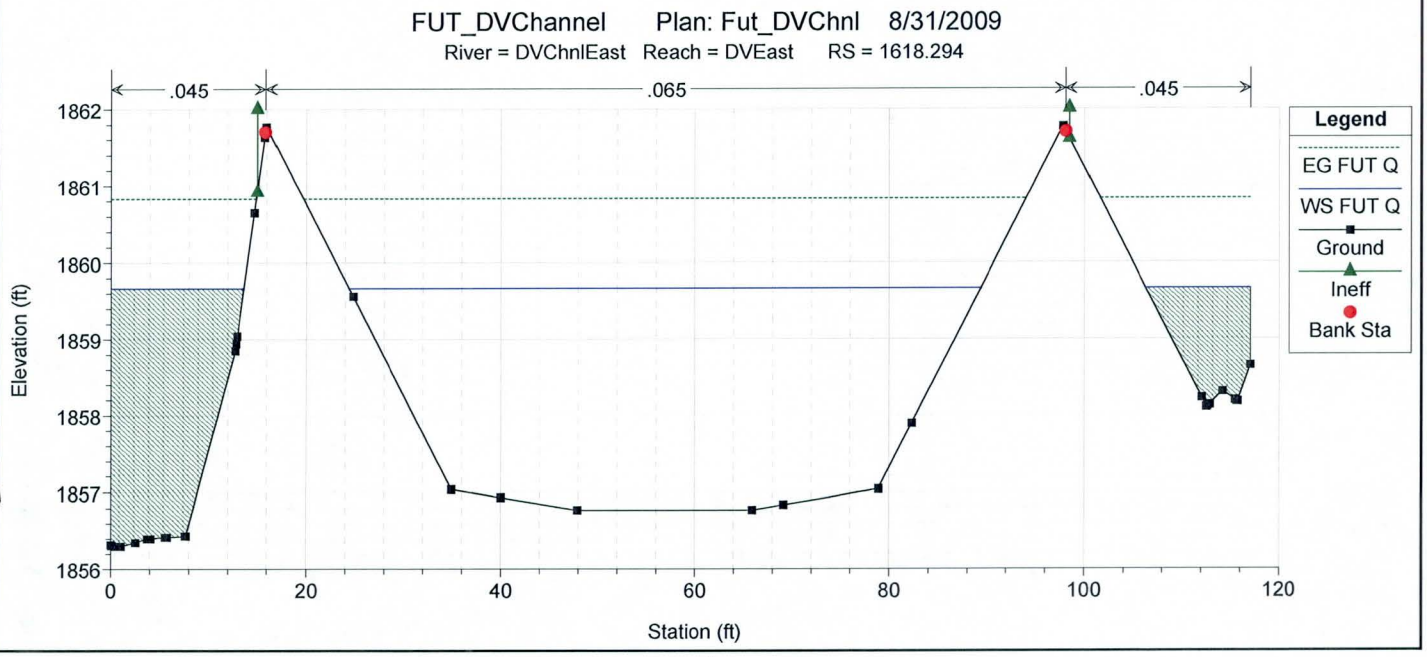

FUT_DVChannel
File: Fut_DVChnl 8/31/2009
DVChnlWest DVWest
DVChnlEast DVEast
Legend
EG FUT Q
WS FUT Q
Ground
Elevation (ft)
1870
1860
1850
1840
1830
1820
1810
1800
1790
0
1000
2000
3000
4000
5000
6000
Main Channel Distance (ft)

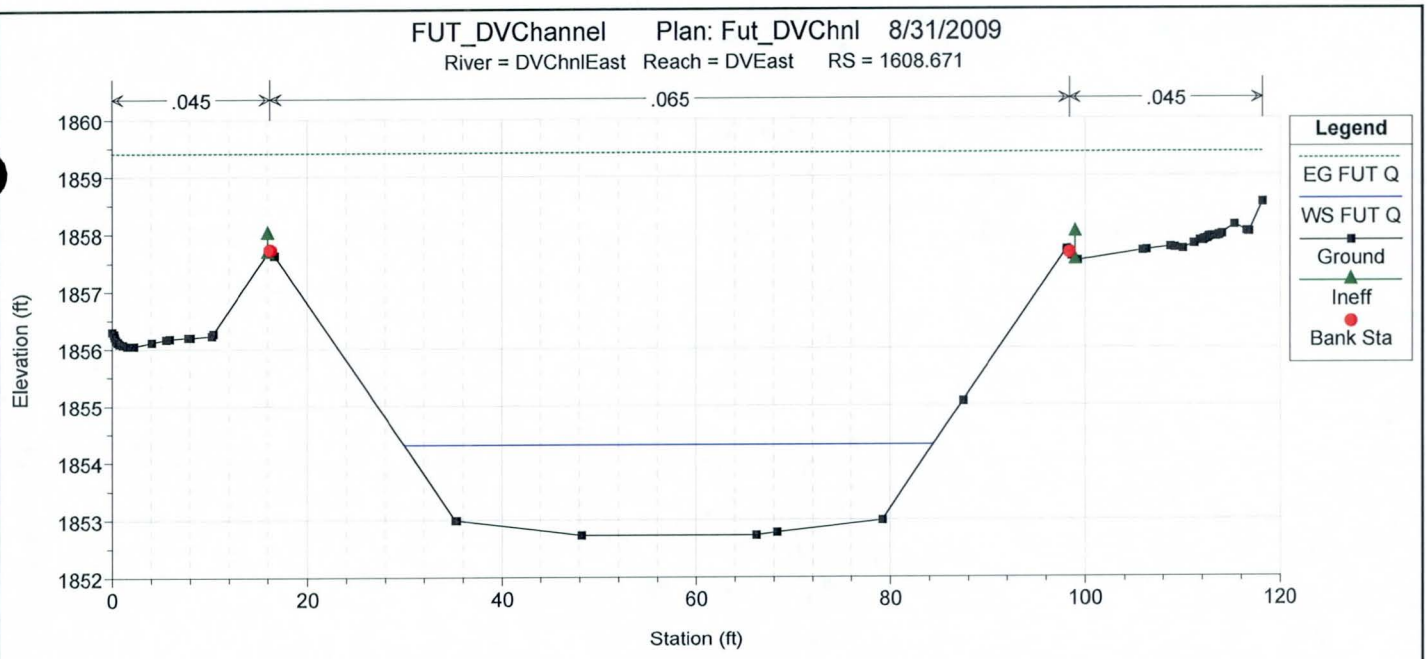

FUT_DVChannel : Fut_DVChnl 8/31/2009
DV_GolfCourse GolfCourse
Legend
EG FUT Q
WS FUT Q
Ground
Elevation (ft)
1835
1830
1825
1820
1815
1810
0
50
100
150
200
Main Channel Distance (ft)

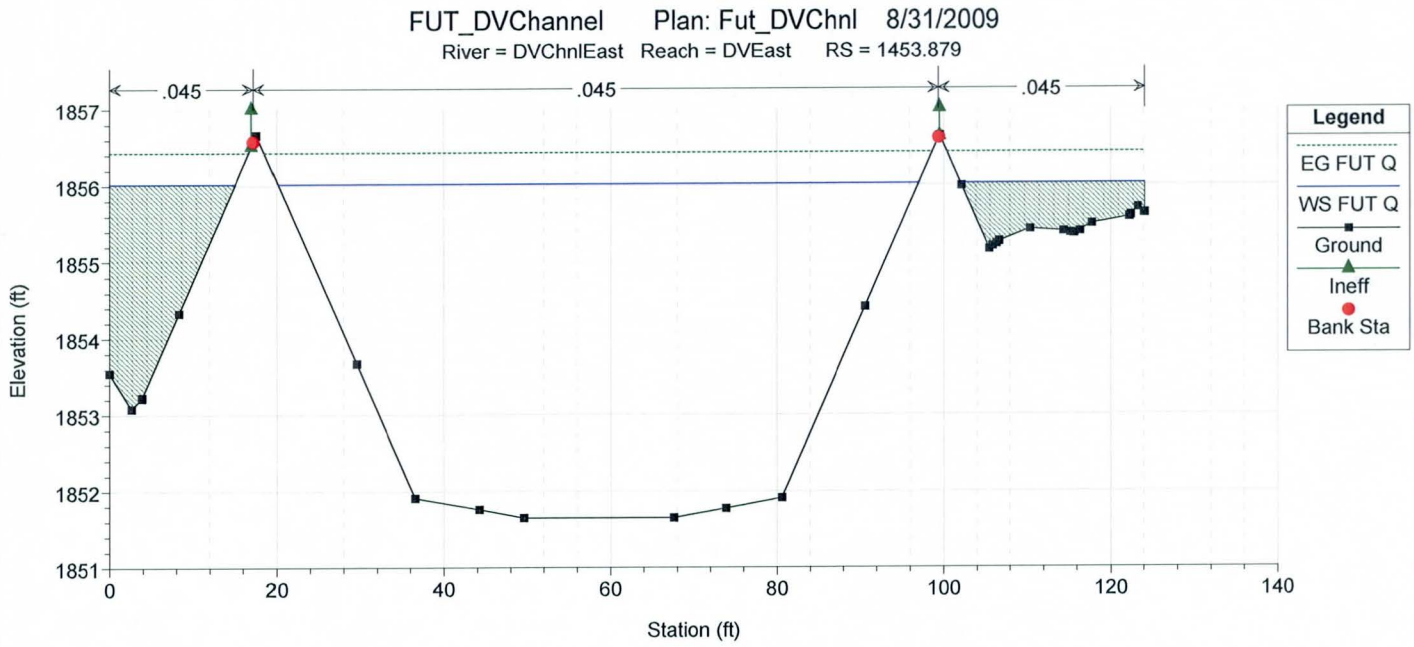
Deer Valley West Cross Sections (begins)

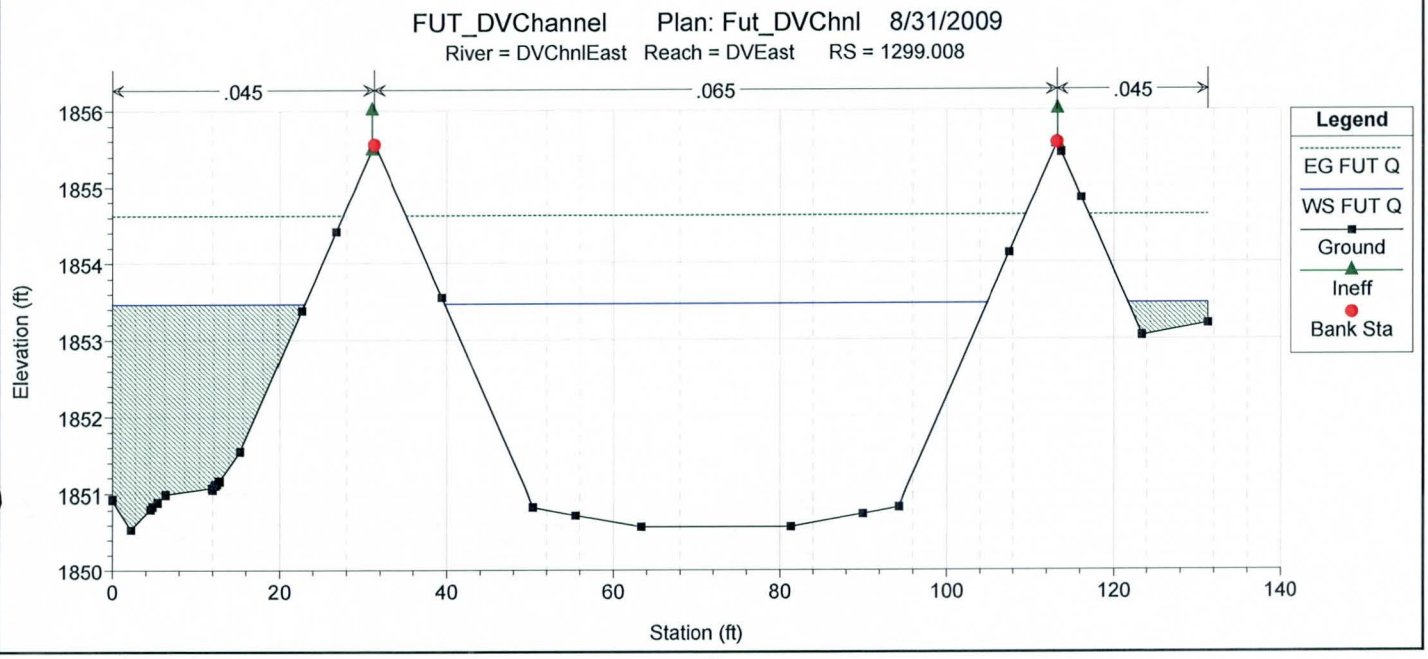


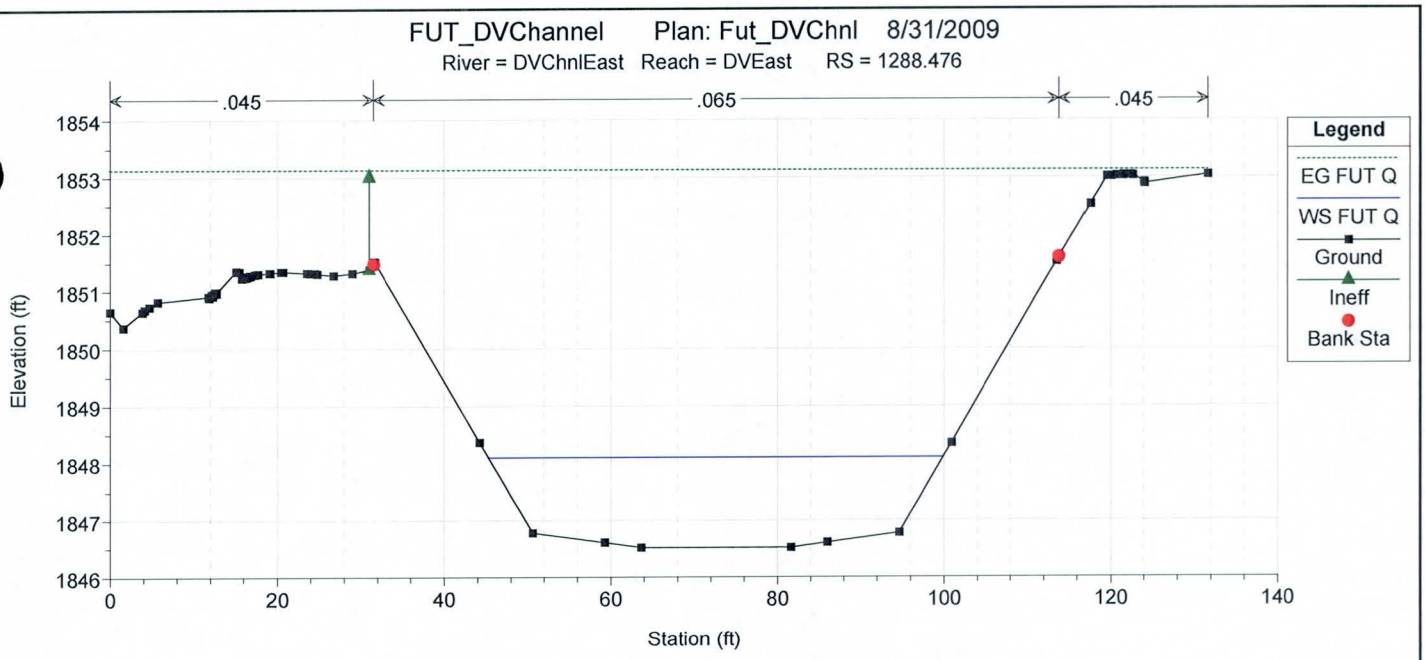


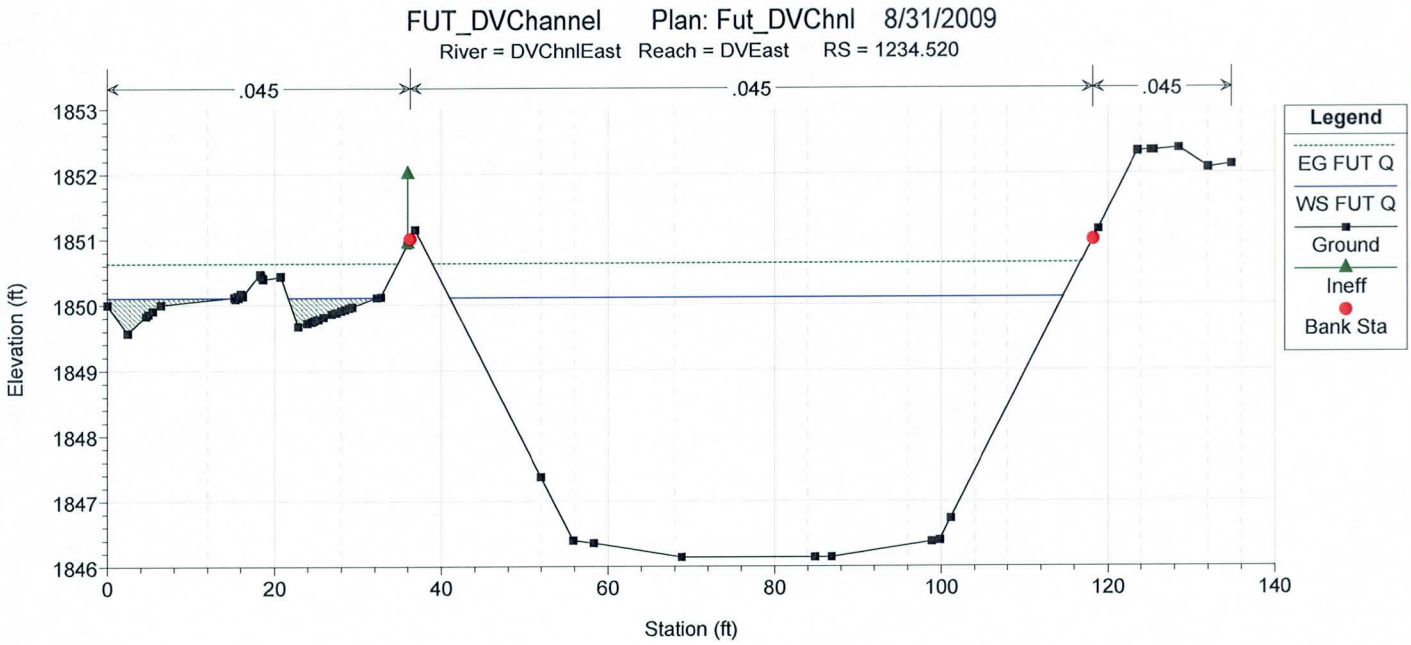


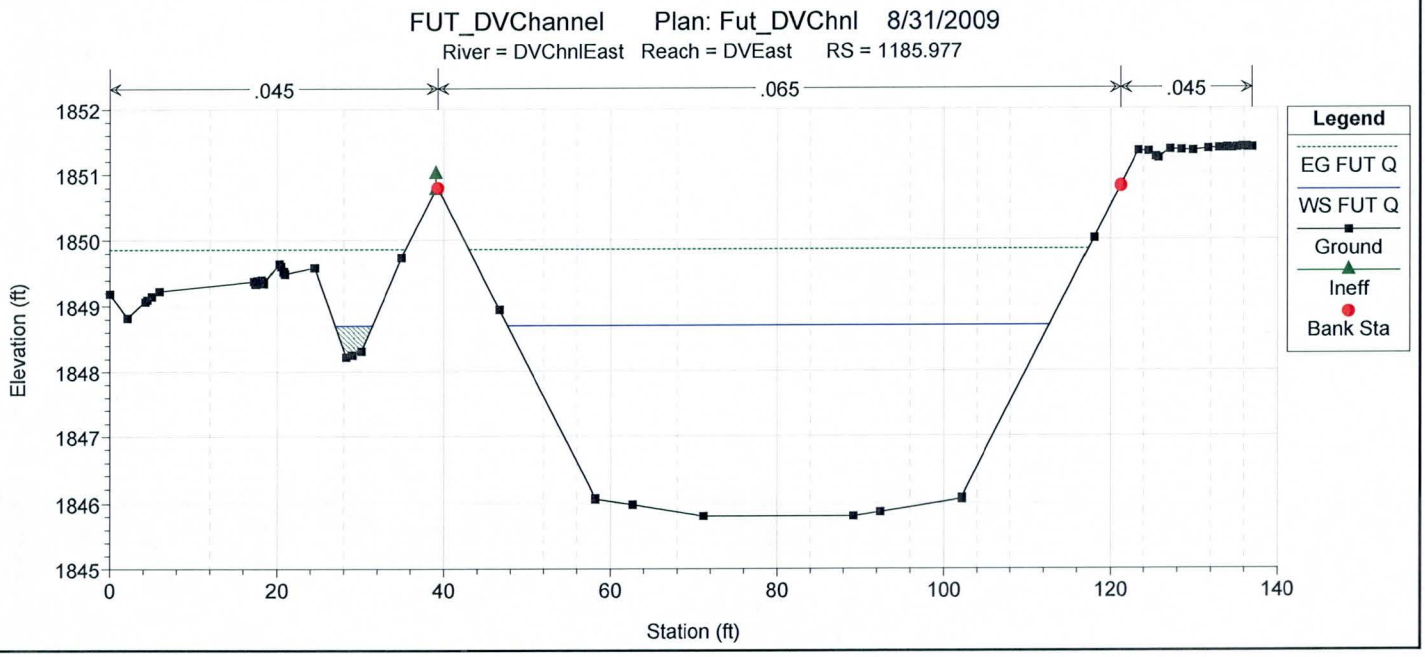

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 1608.671
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

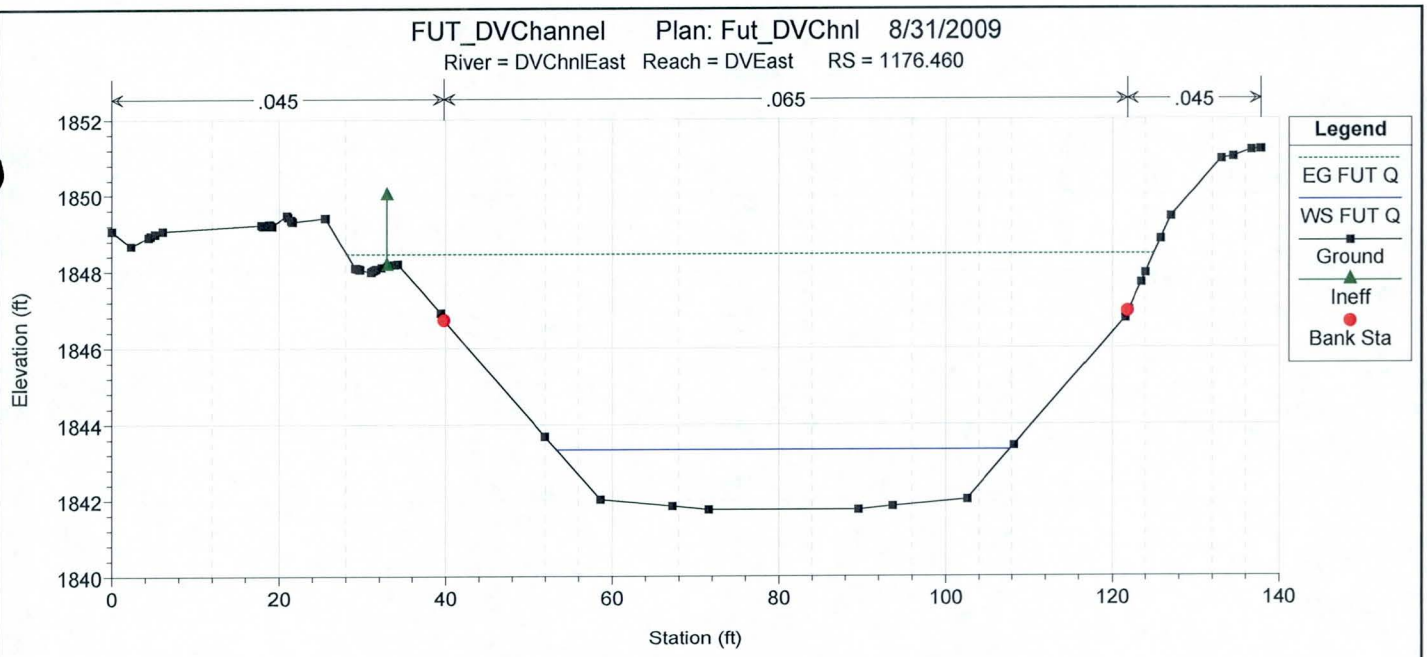

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 1453.879
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

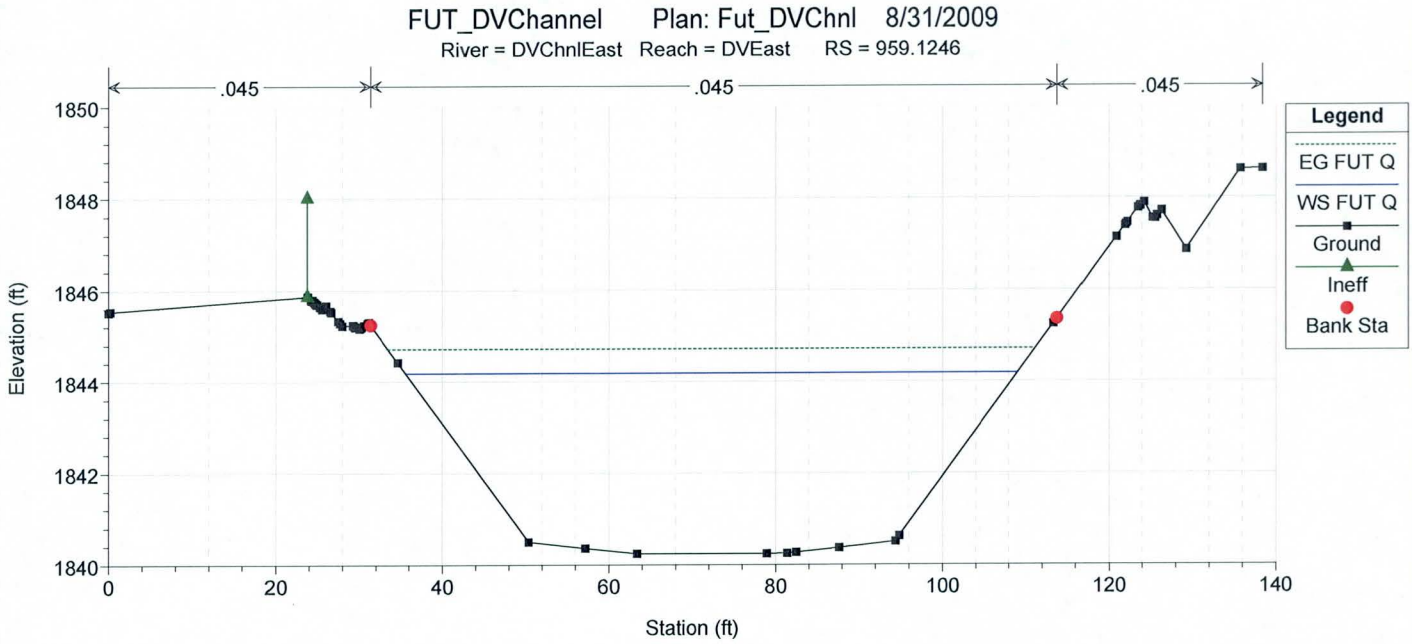

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 1299.008
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

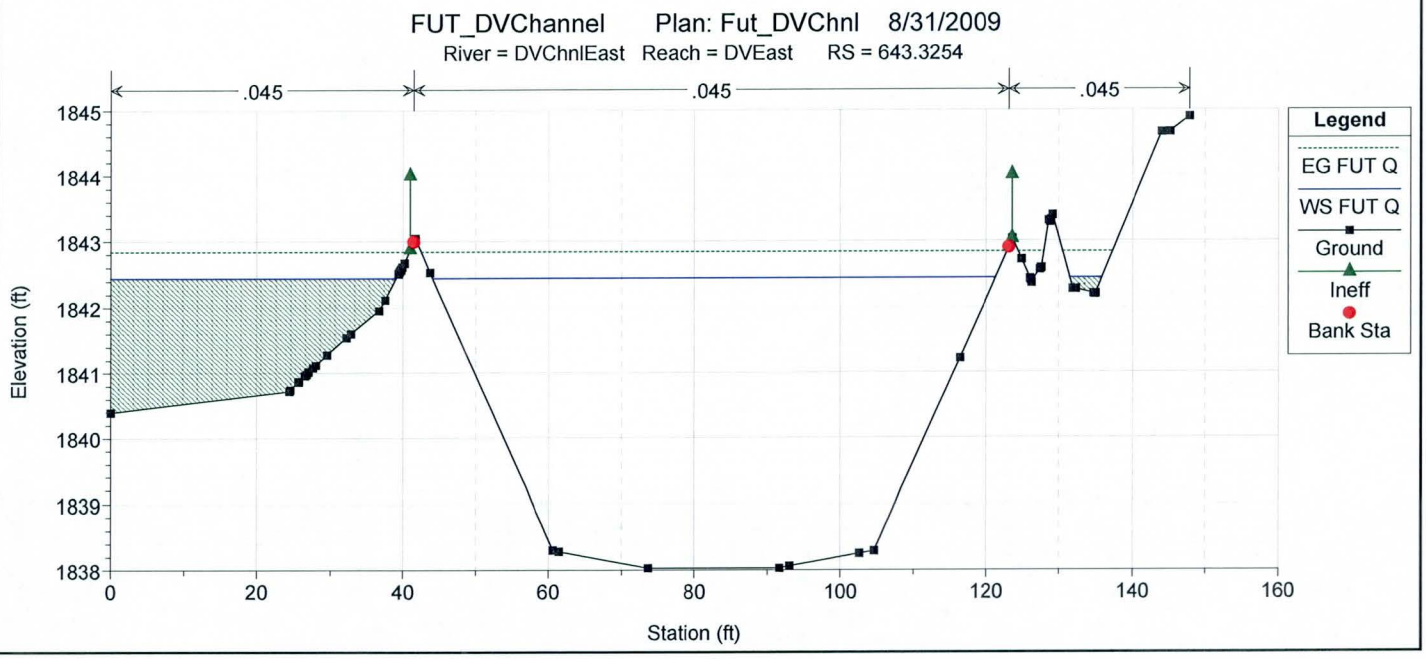

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 1288.476
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

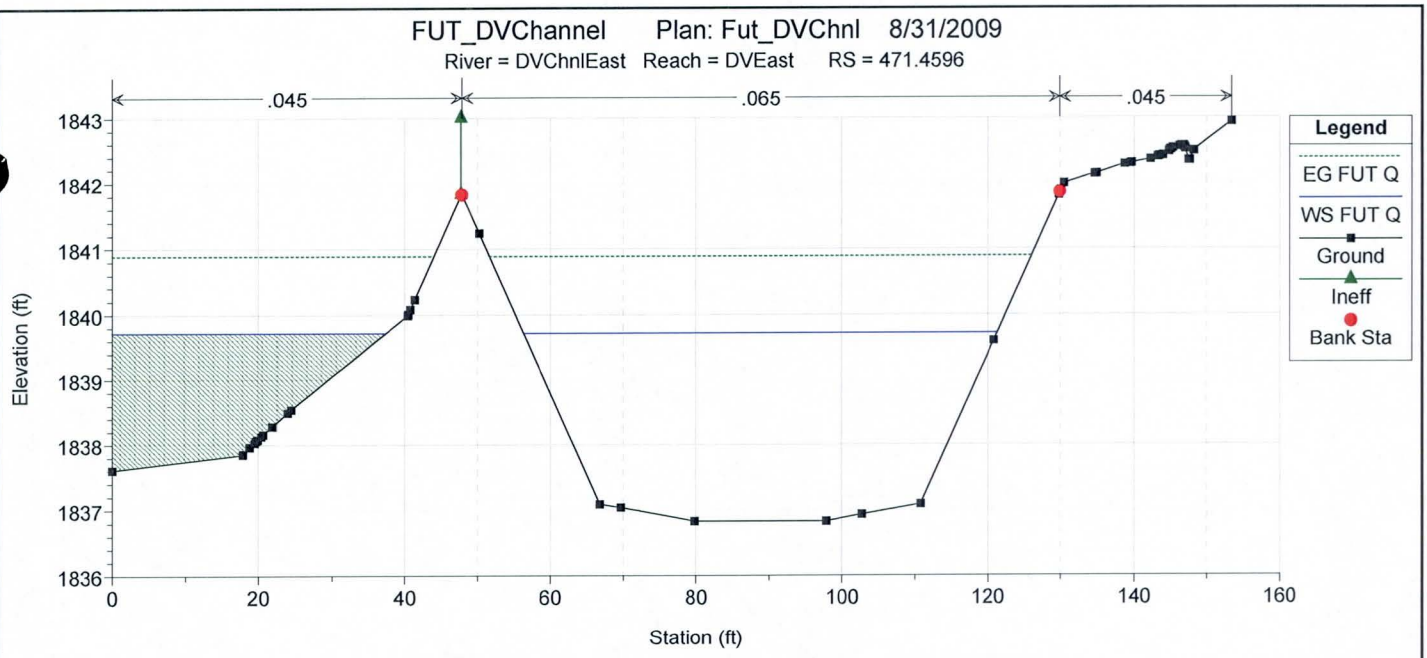

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 1234.520
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

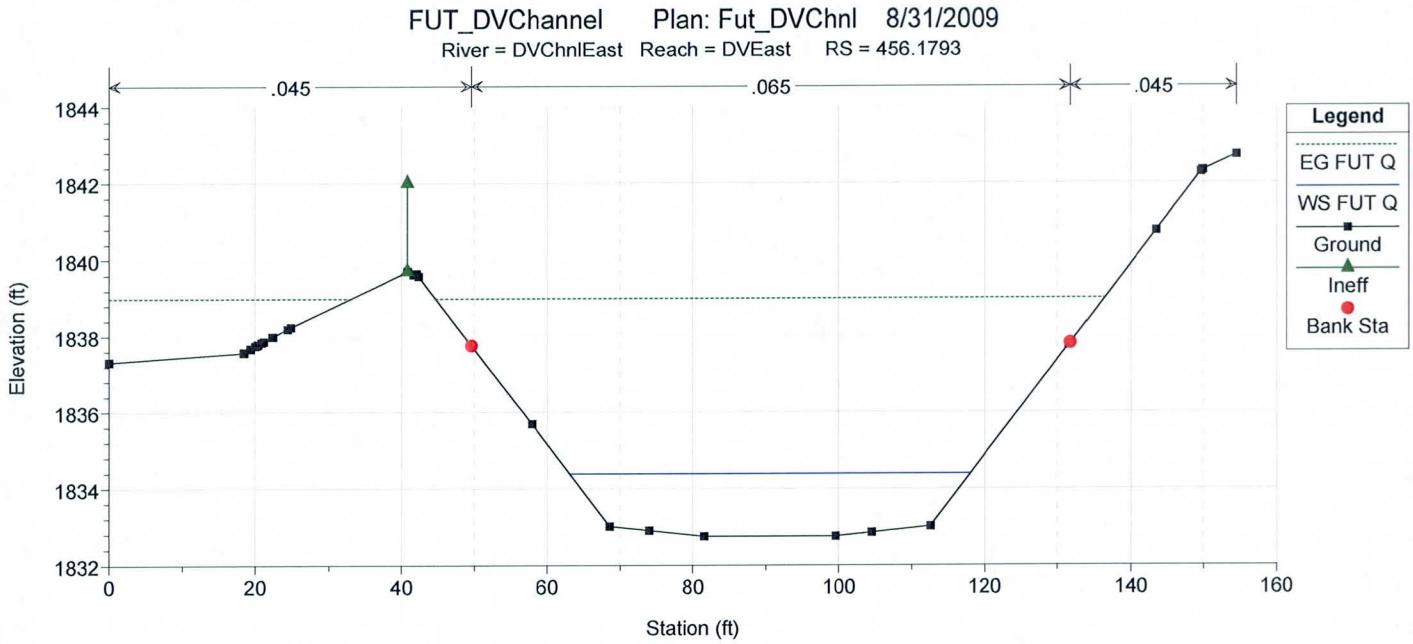

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 1185.977
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

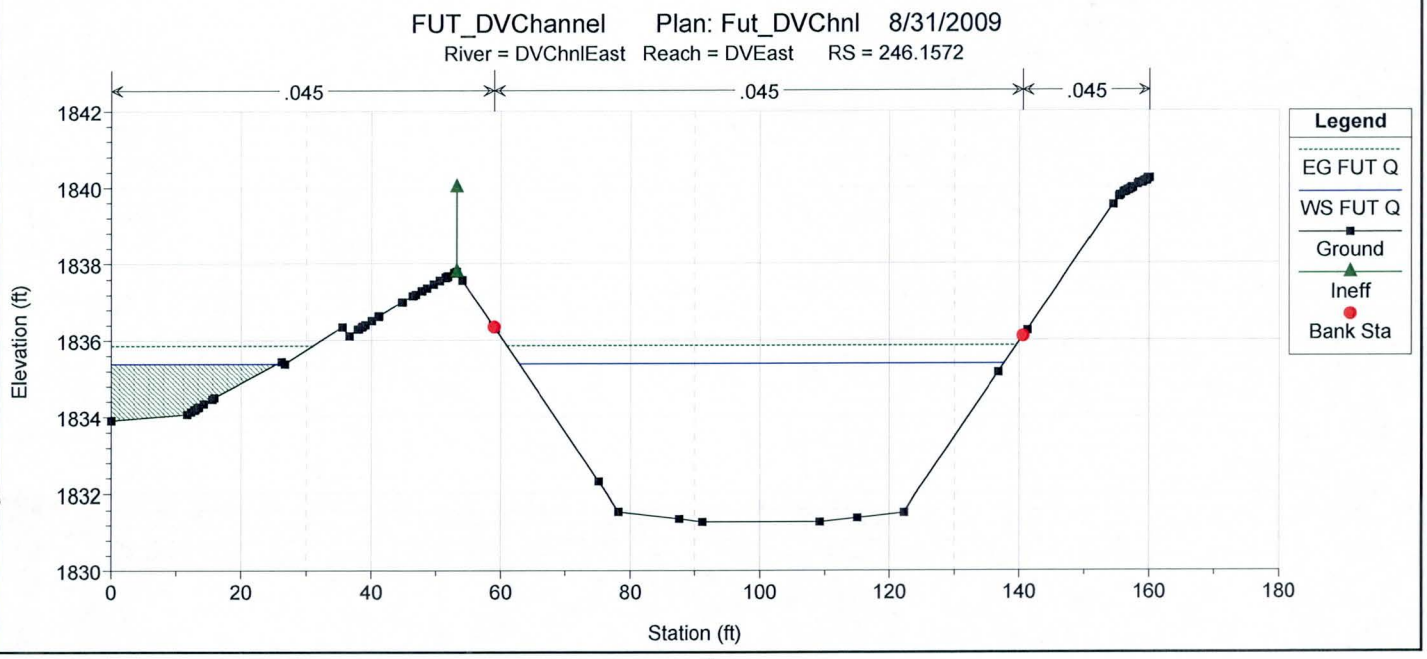

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 1176.460
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

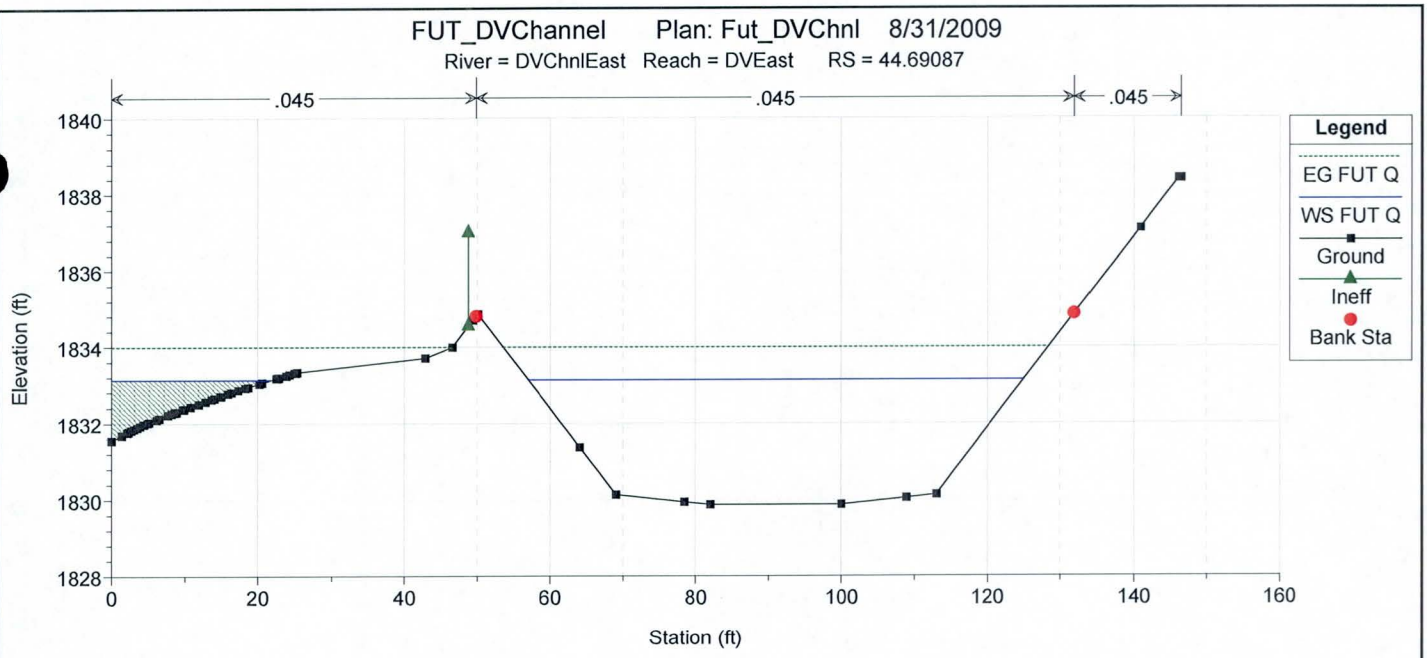

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 959.1246
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

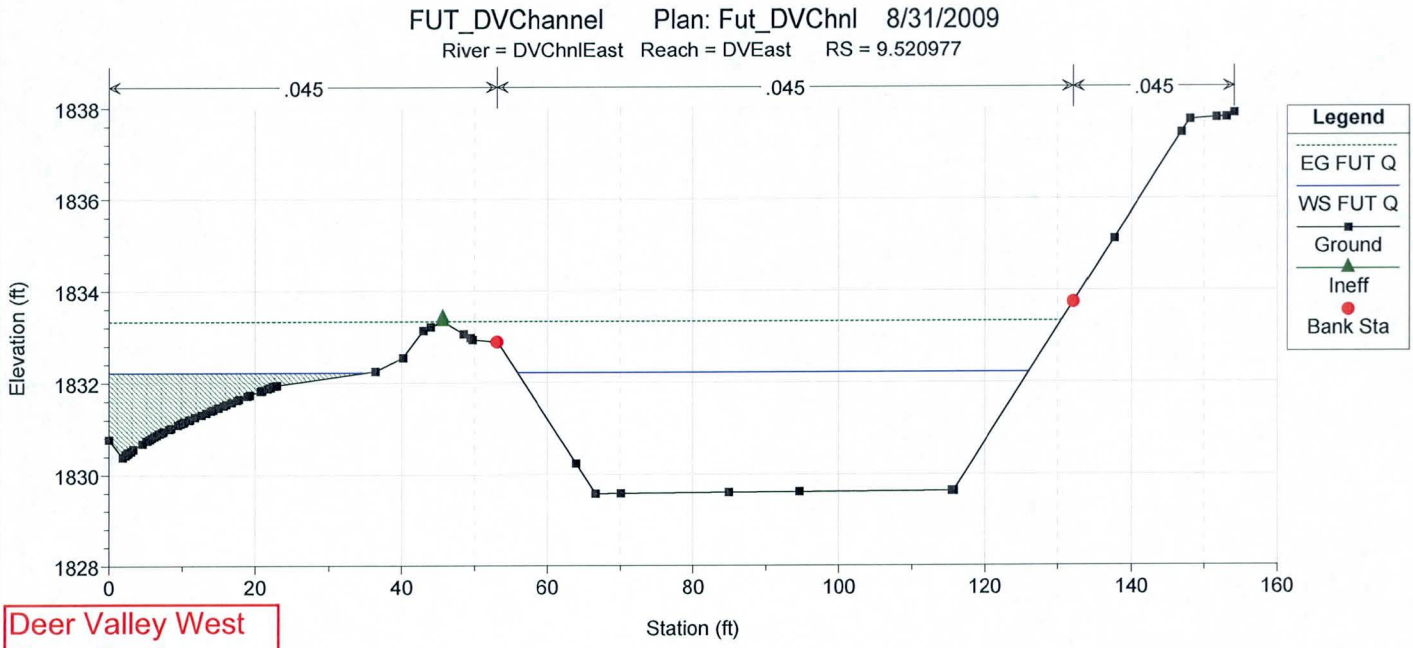

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 643.3254
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 471.4596
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

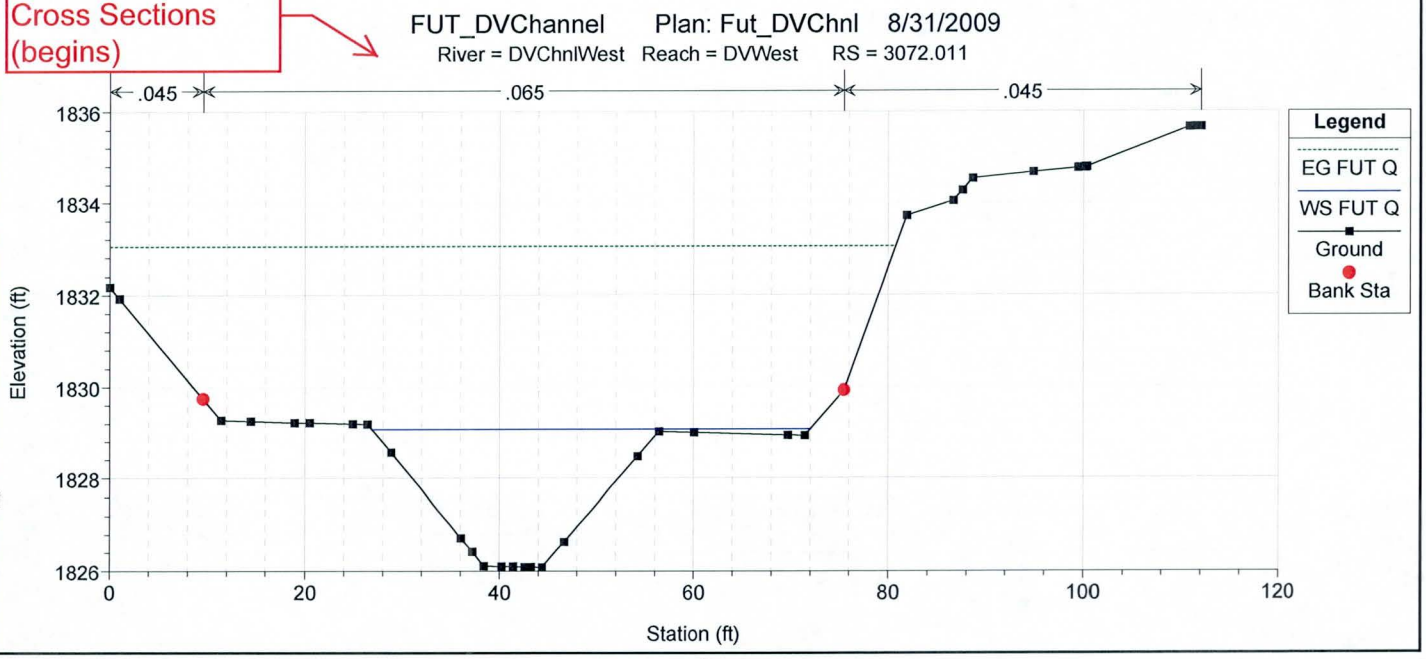

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 456.1793
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

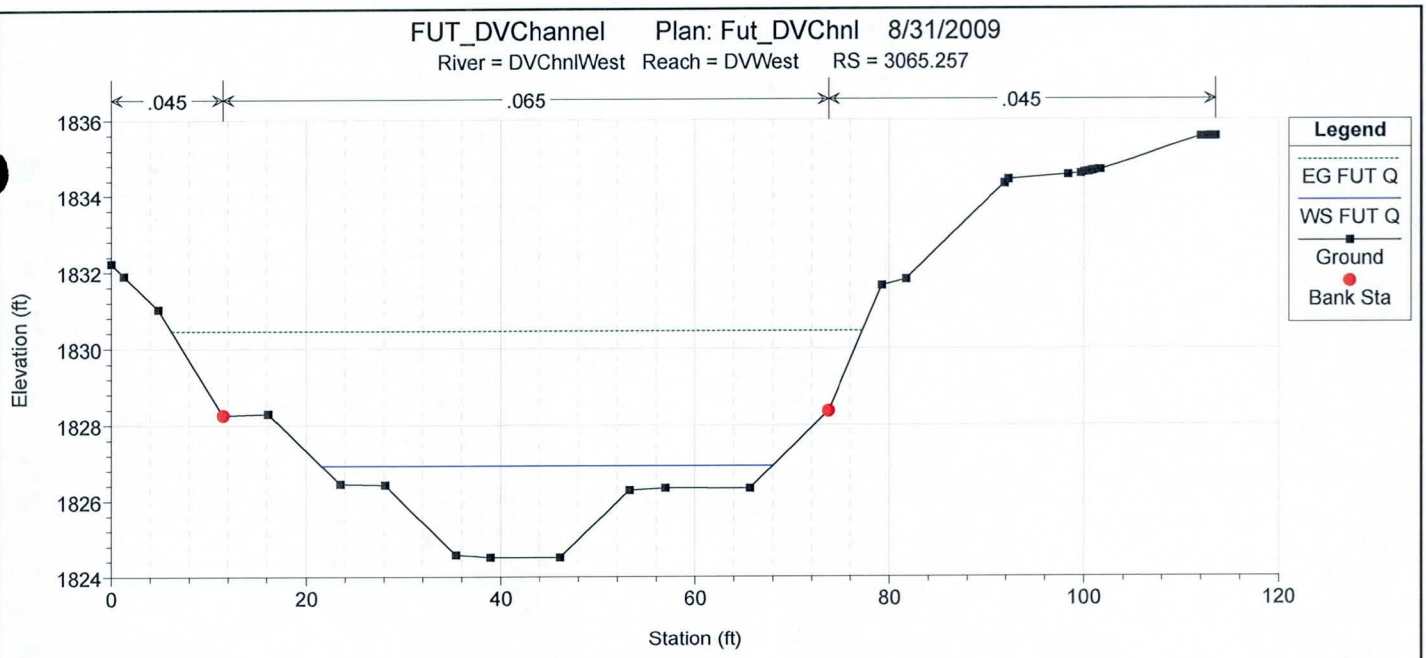

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlEast Reach = DVEast RS = 246.1572
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta

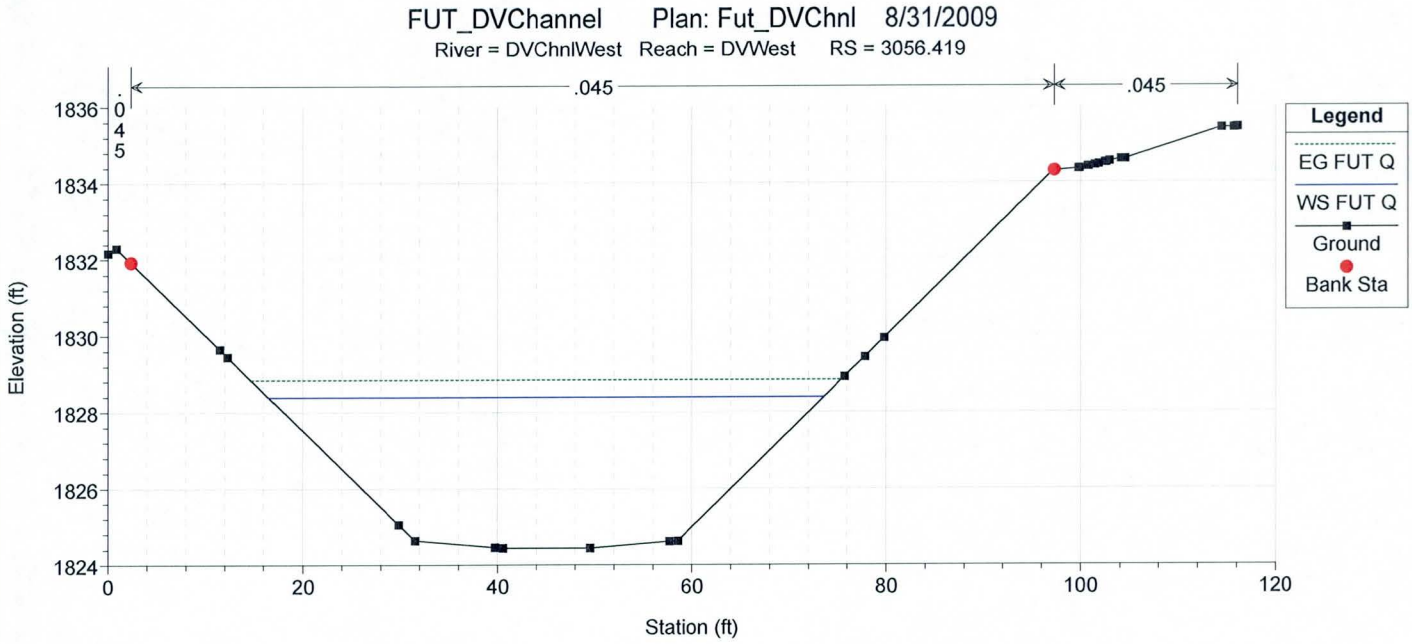


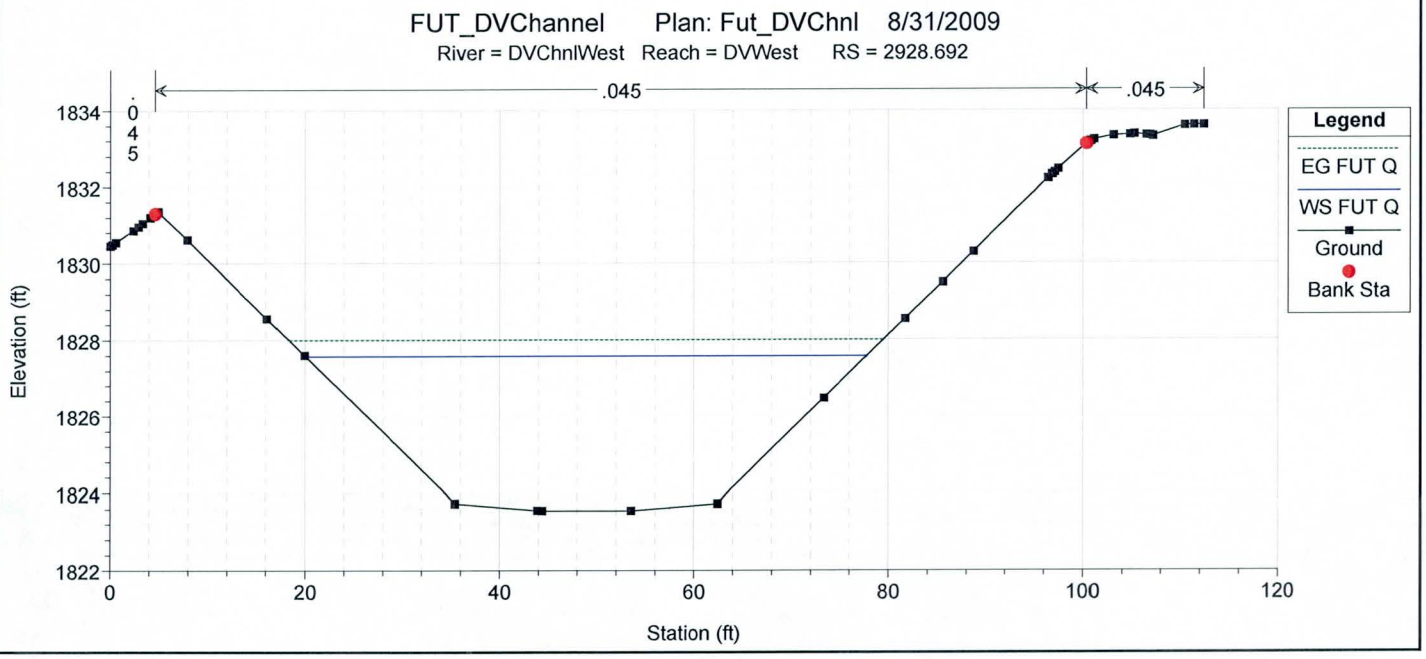


Deer Valley West Cross Sections (begins)



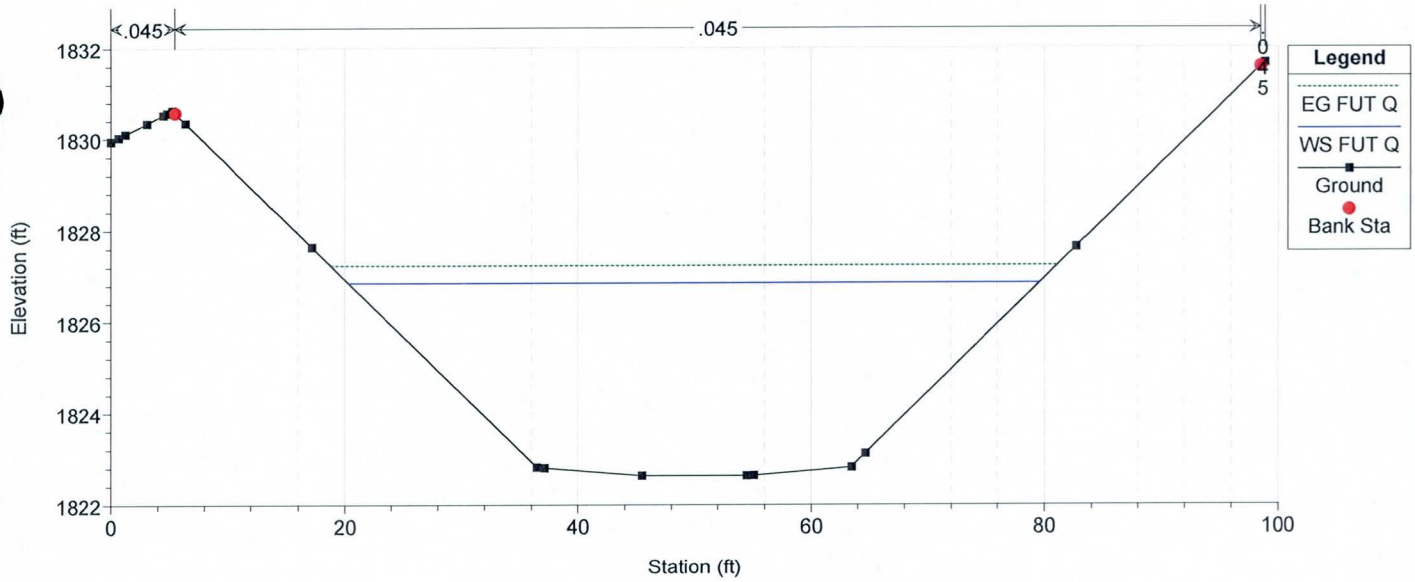

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 3065.257
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 3056.419
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2928.692
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

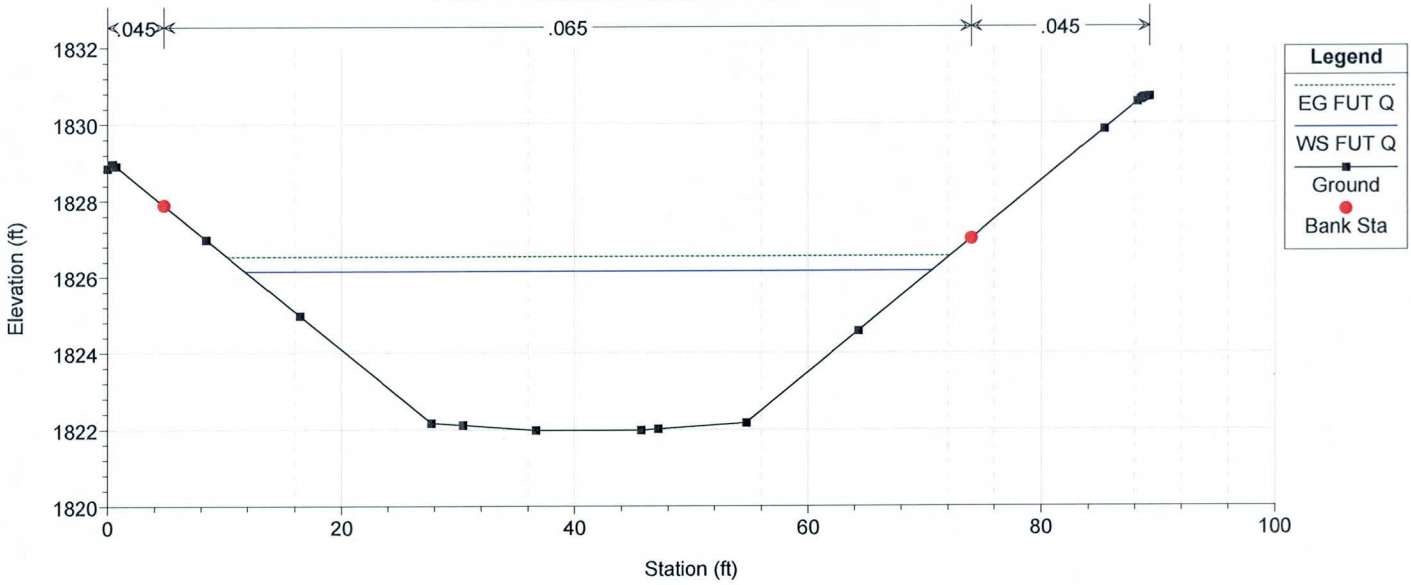
FUT_DVChannel Plan: Fut_DVChnl 8/31/2009

River = DVChnlWest Reach = DVWest RS = 2798.891



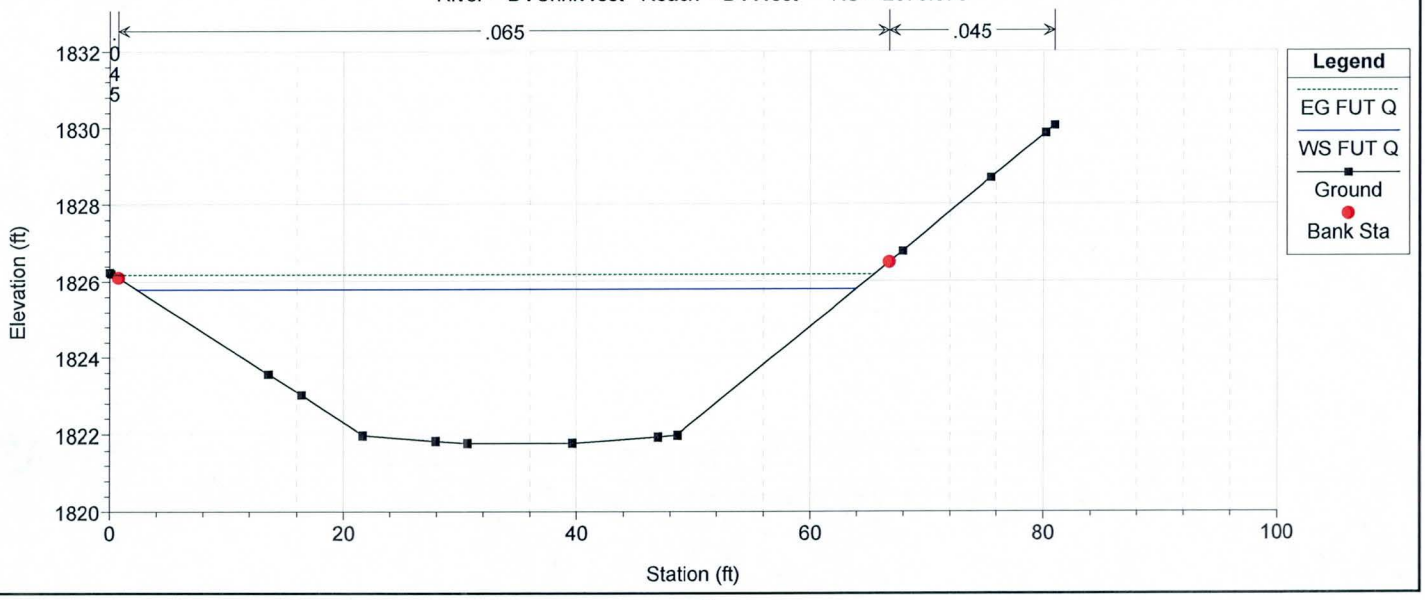
FUT_DVChannel Plan: Fut_DVChnl 8/31/2009

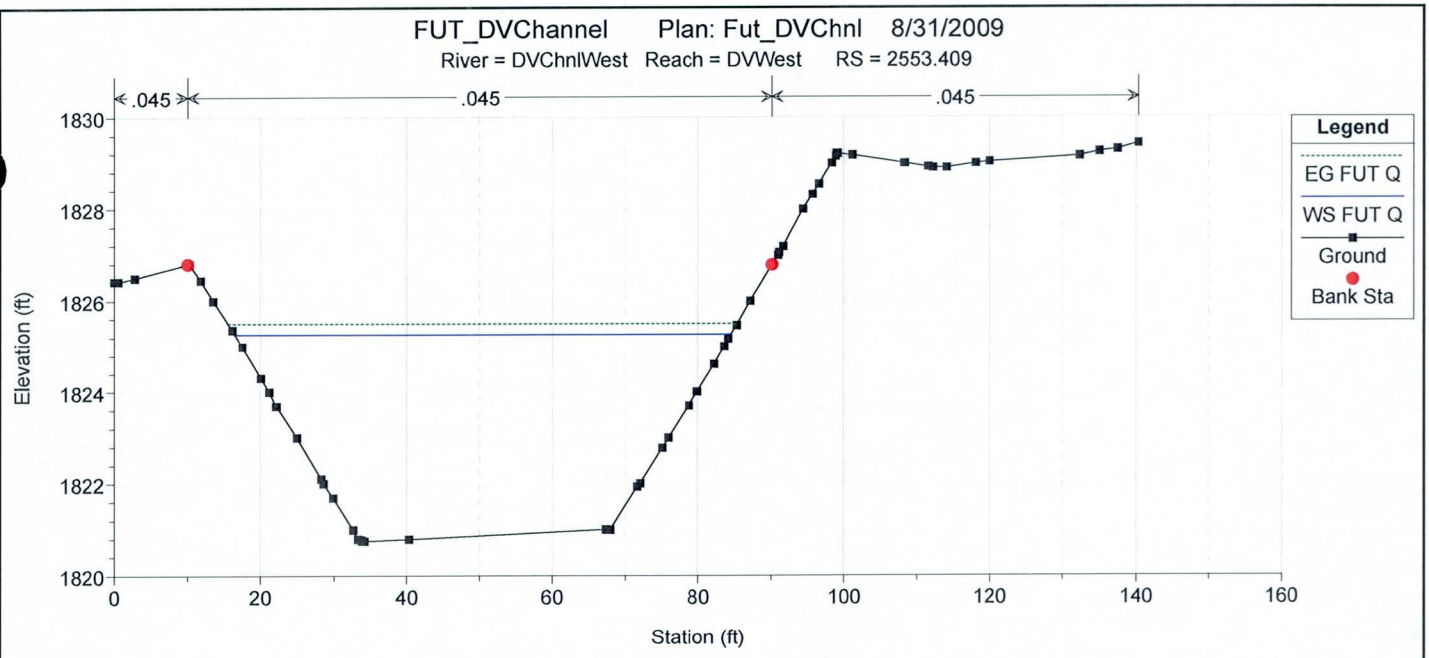
River = DVChnlWest Reach = DVWest RS = 2704.855

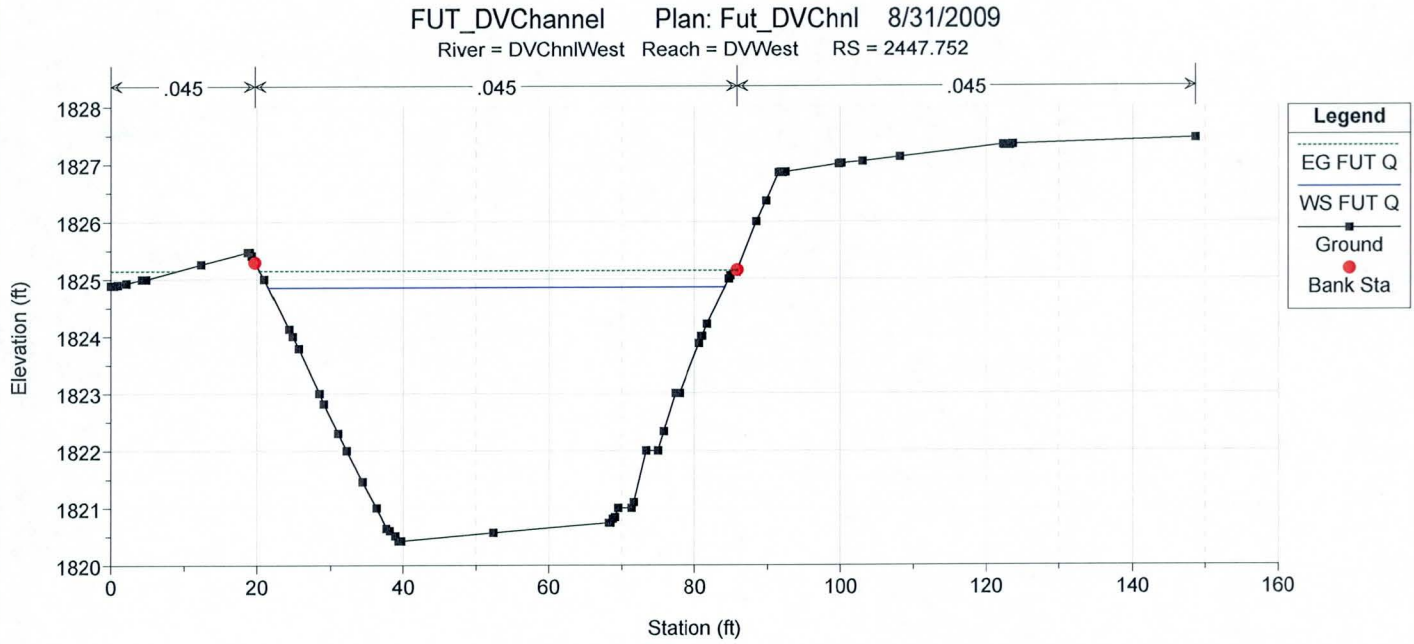


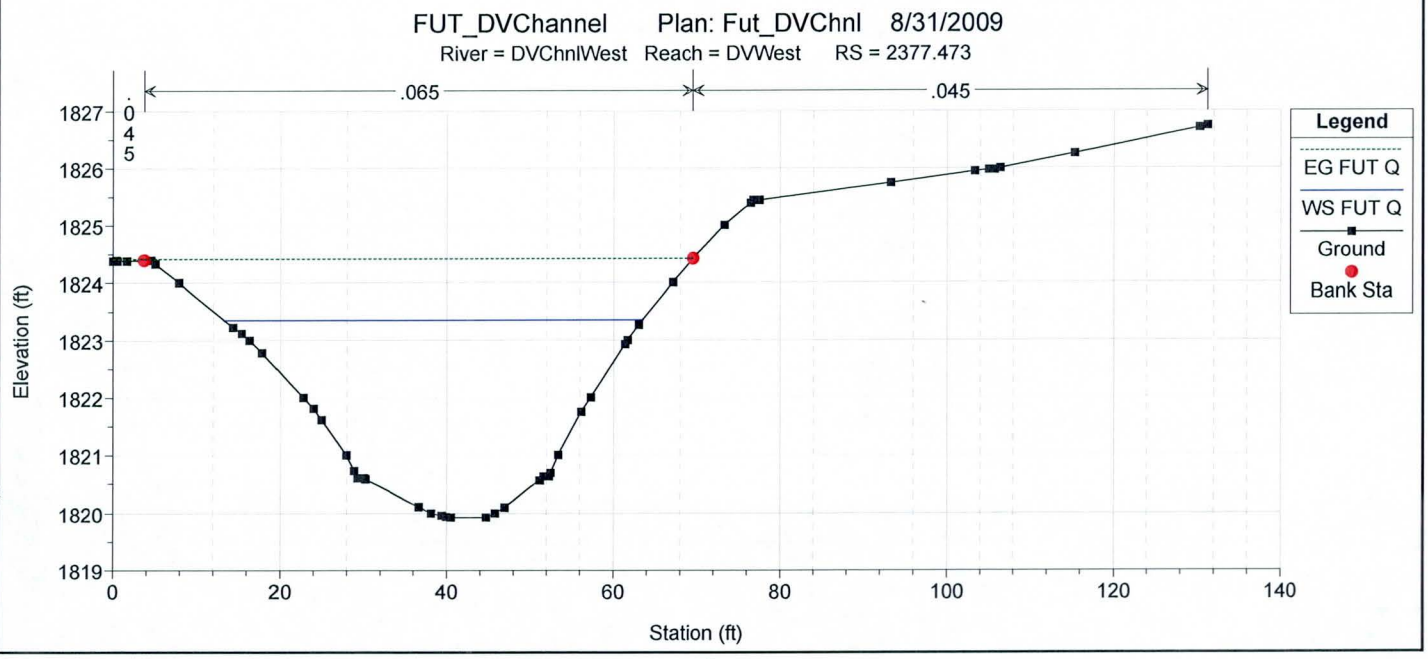
FUT_DVChannel Plan: Fut_DVChnl 8/31/2009

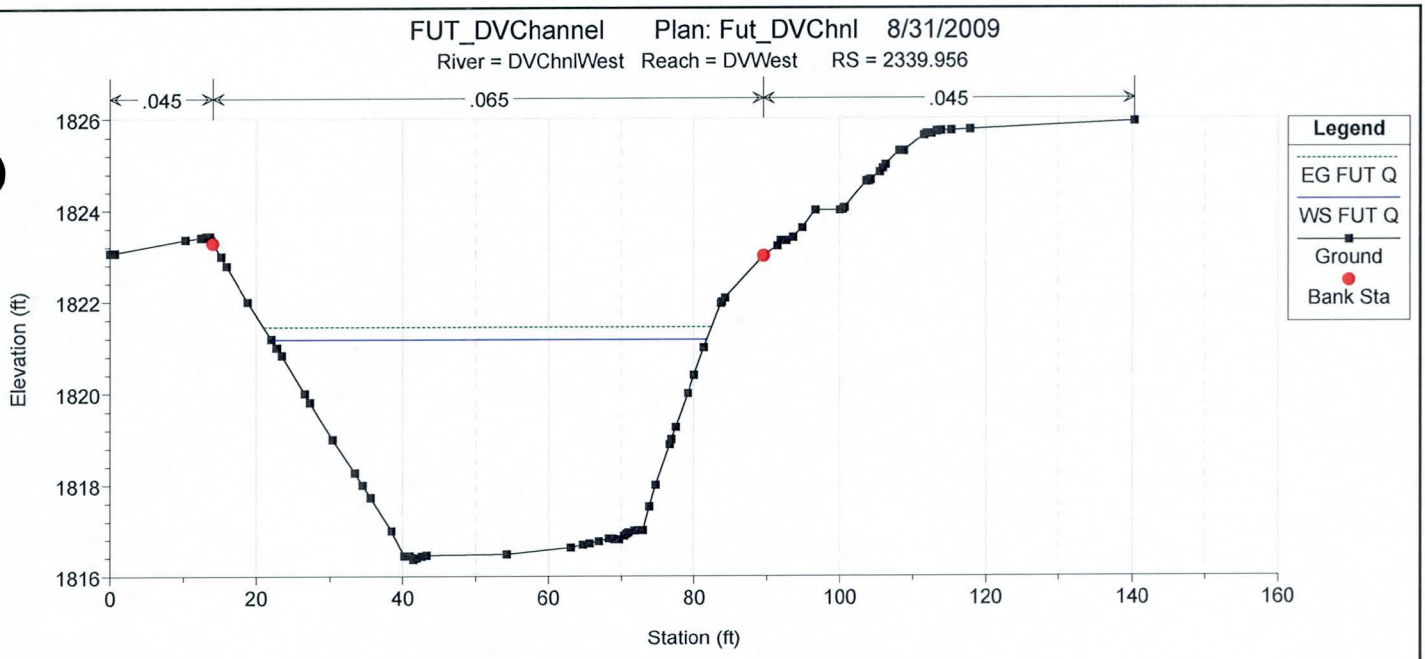
River = DVChnlWest Reach = DVWest RS = 2675.578

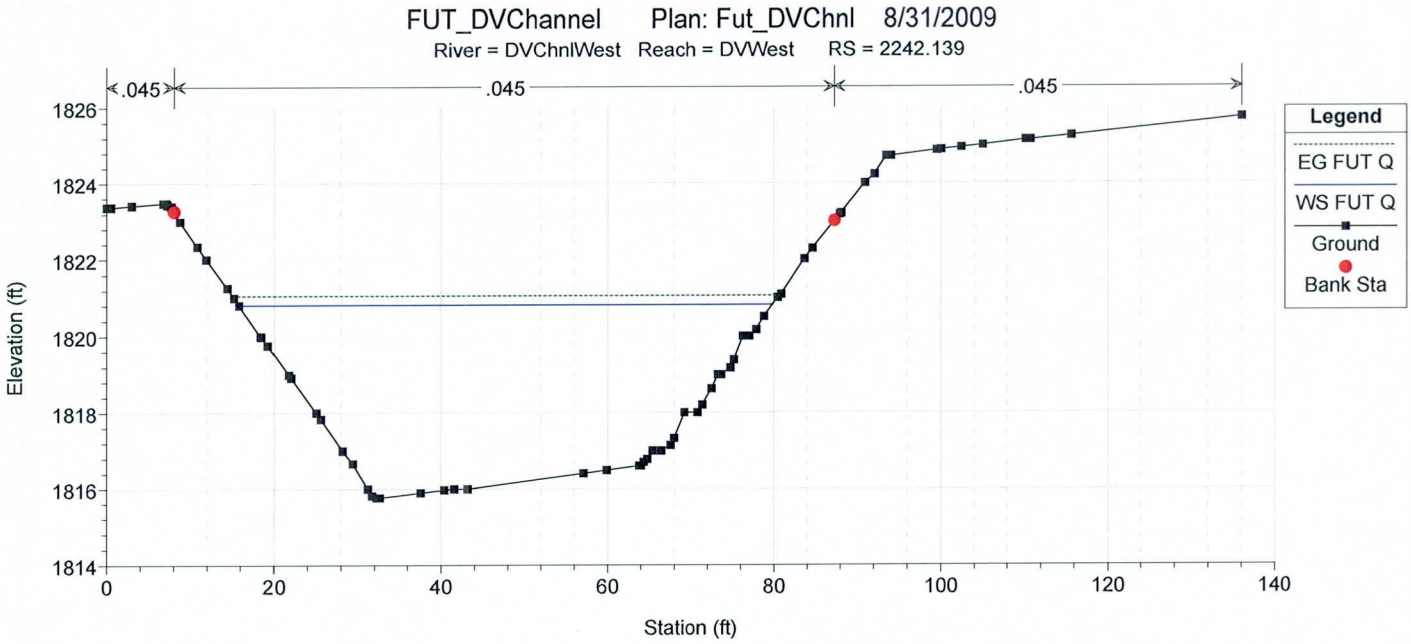


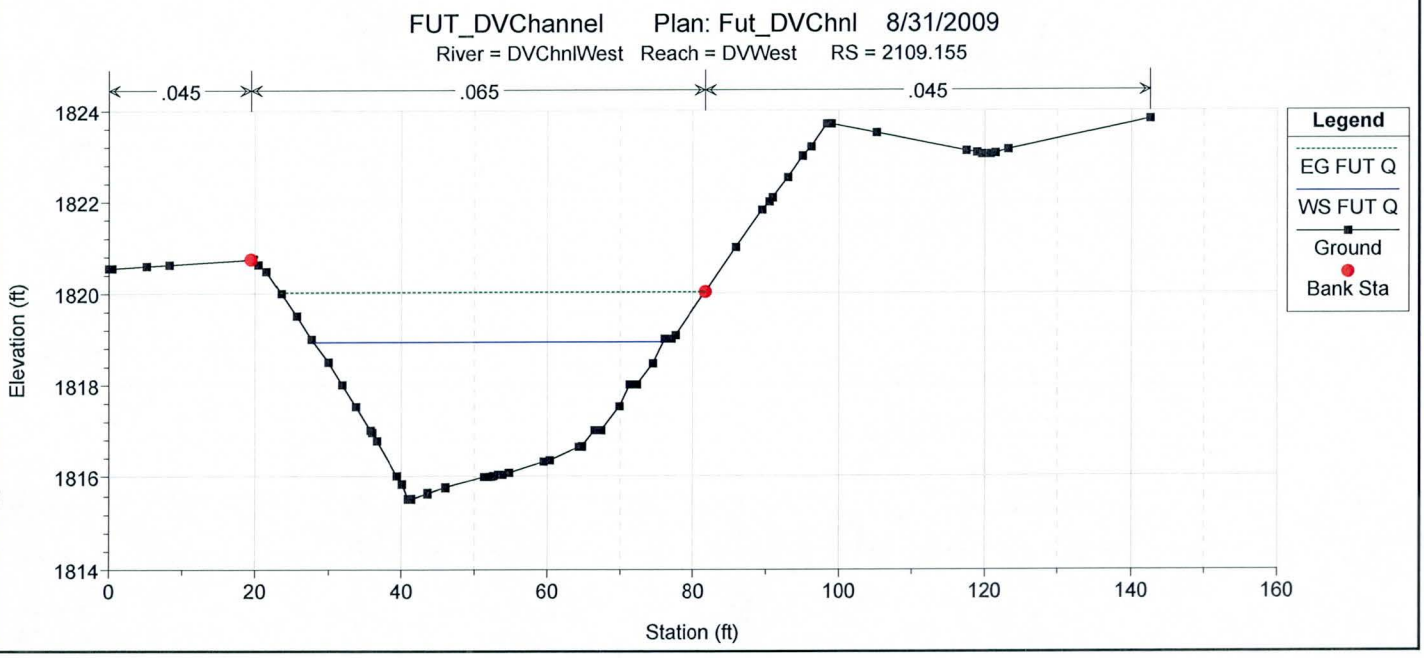

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2553.409
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

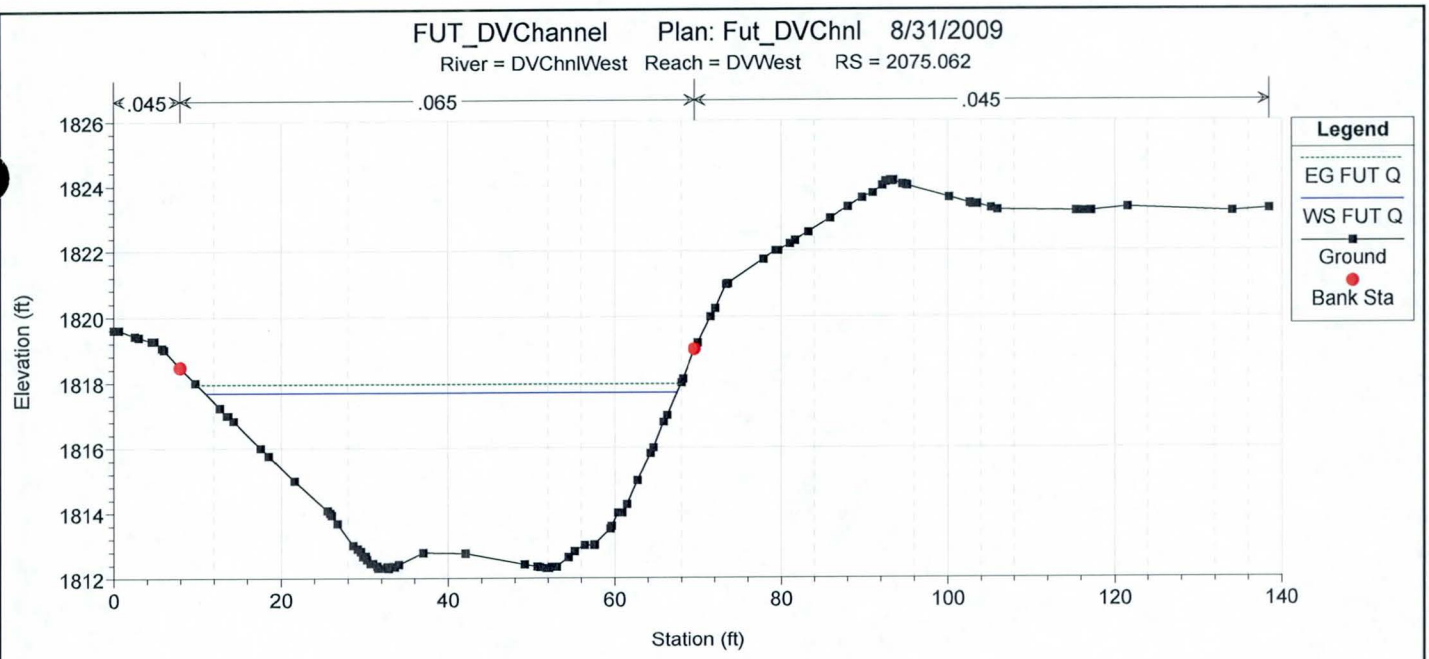

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2447.752
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

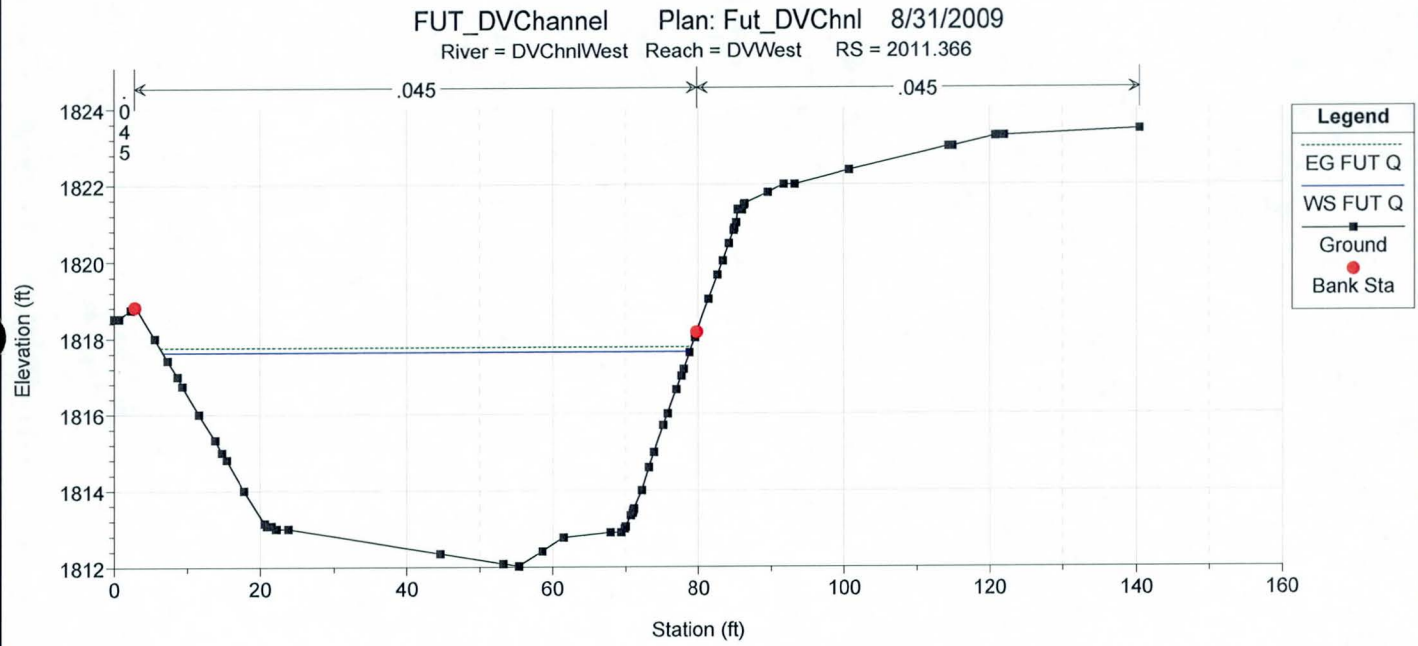

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2377.473
.065
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

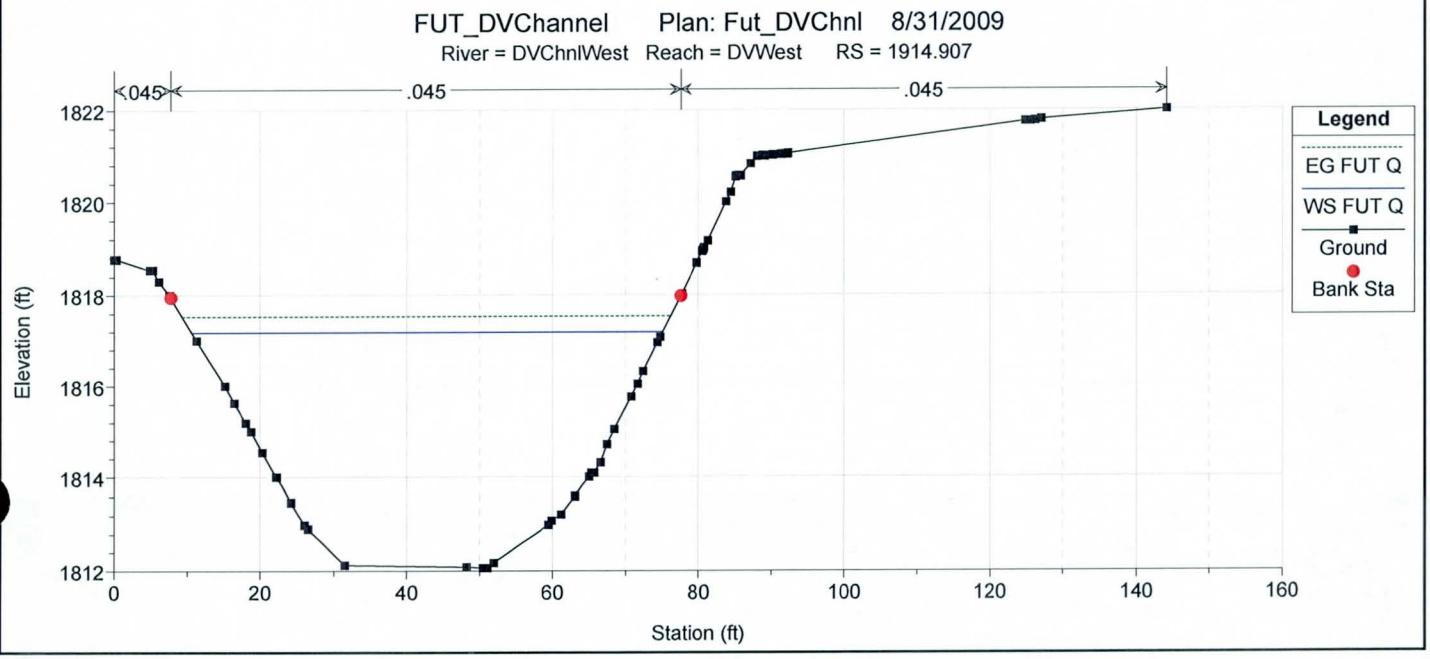

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2339.956
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta

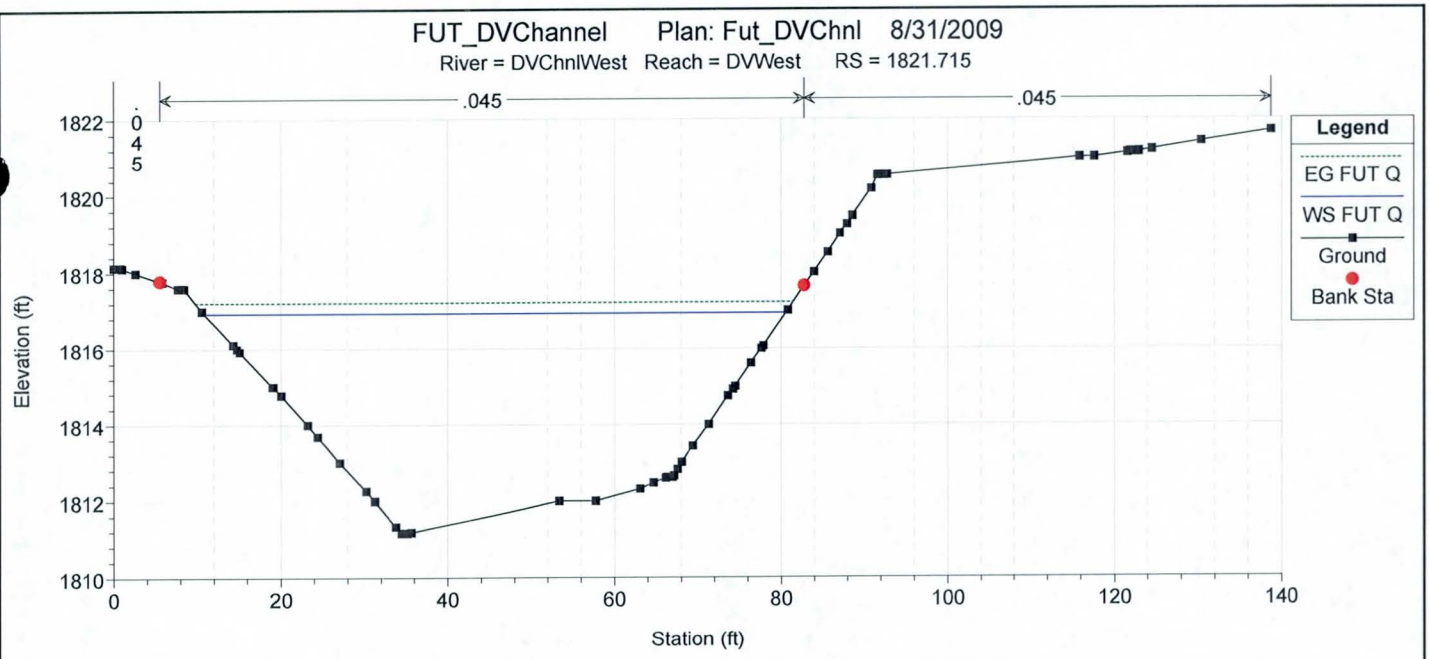

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2242.139
.045
.045
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta

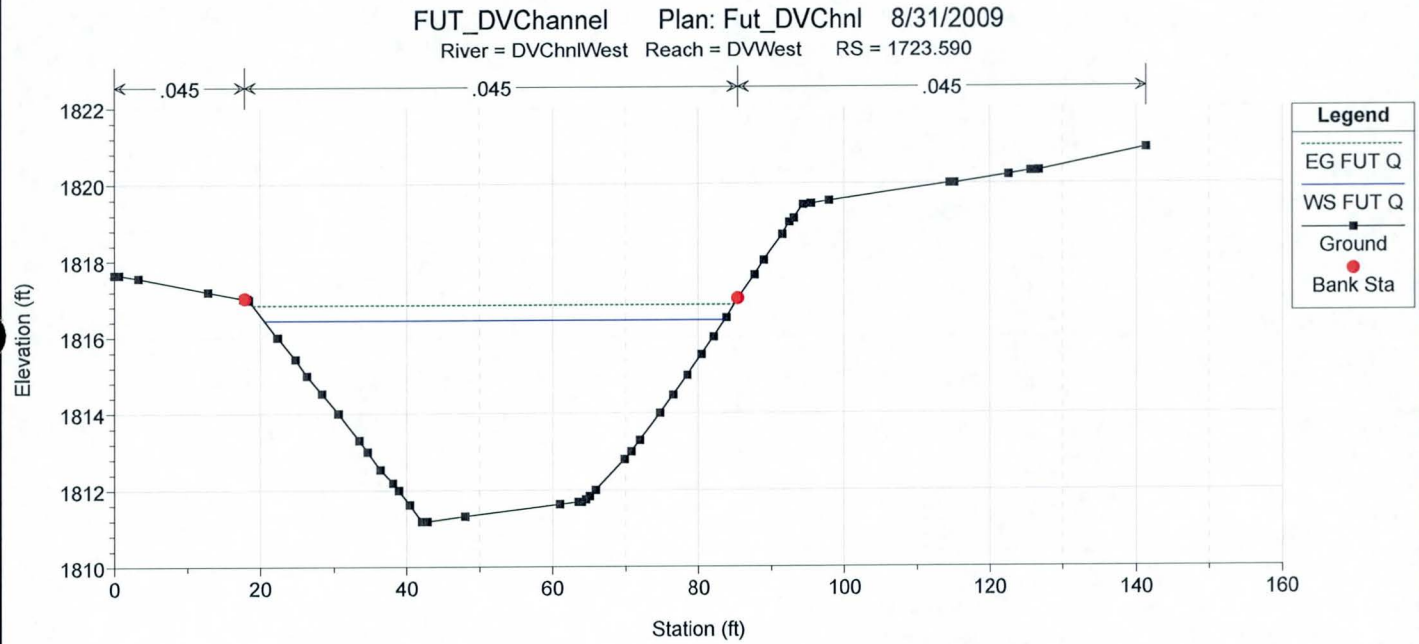

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2109.155
.045
.065
.045
Elevation (ft)
Station (ft)
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta

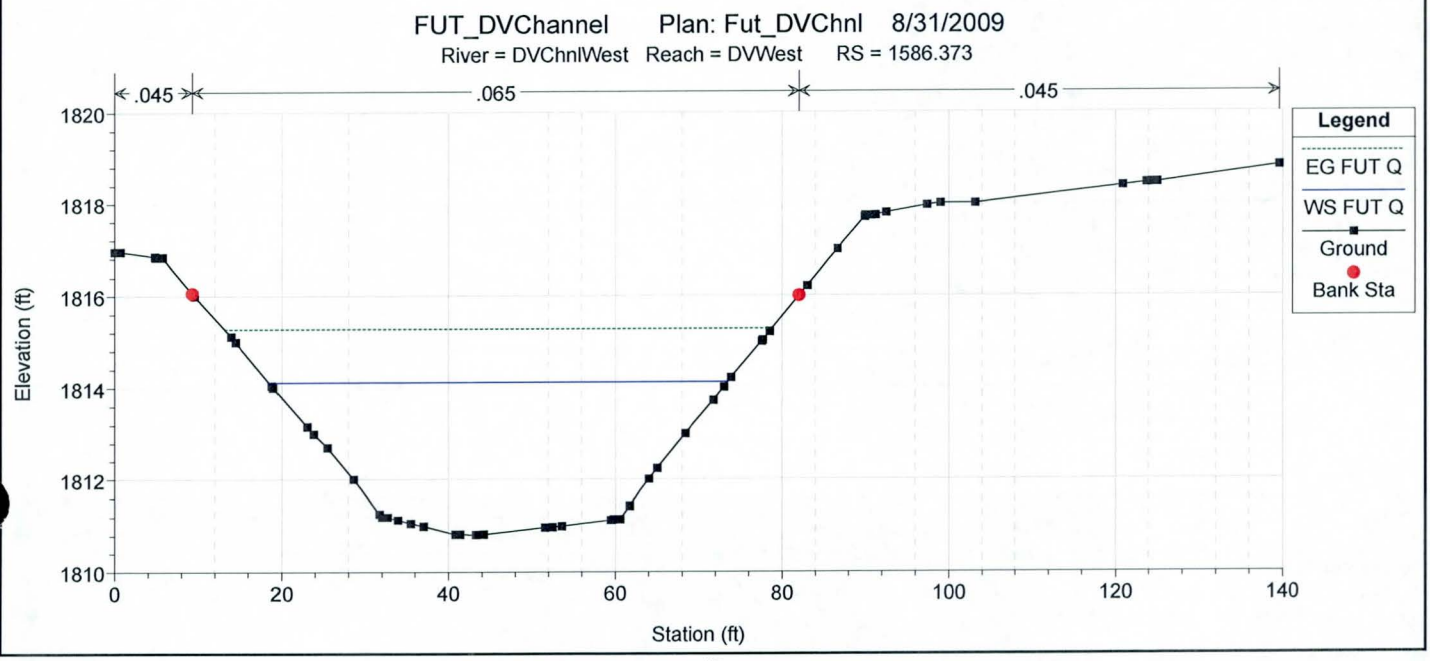

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2075.062
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

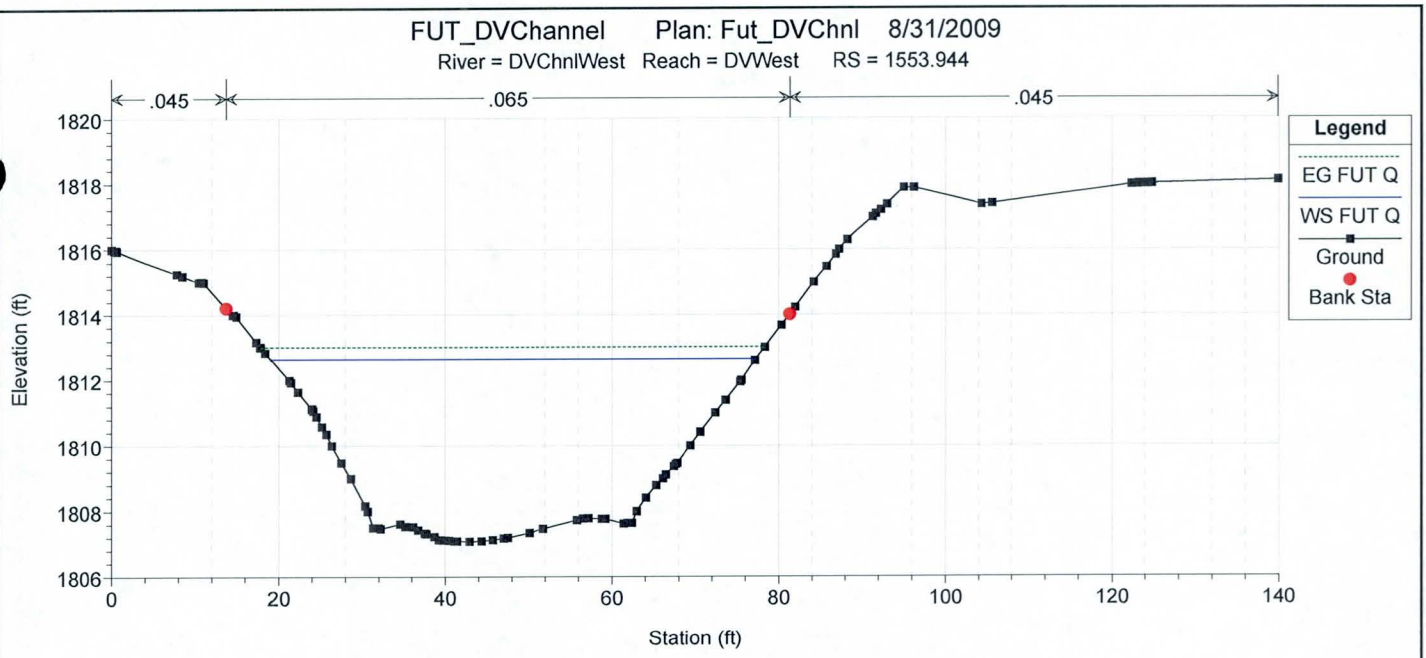

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 2011.366
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

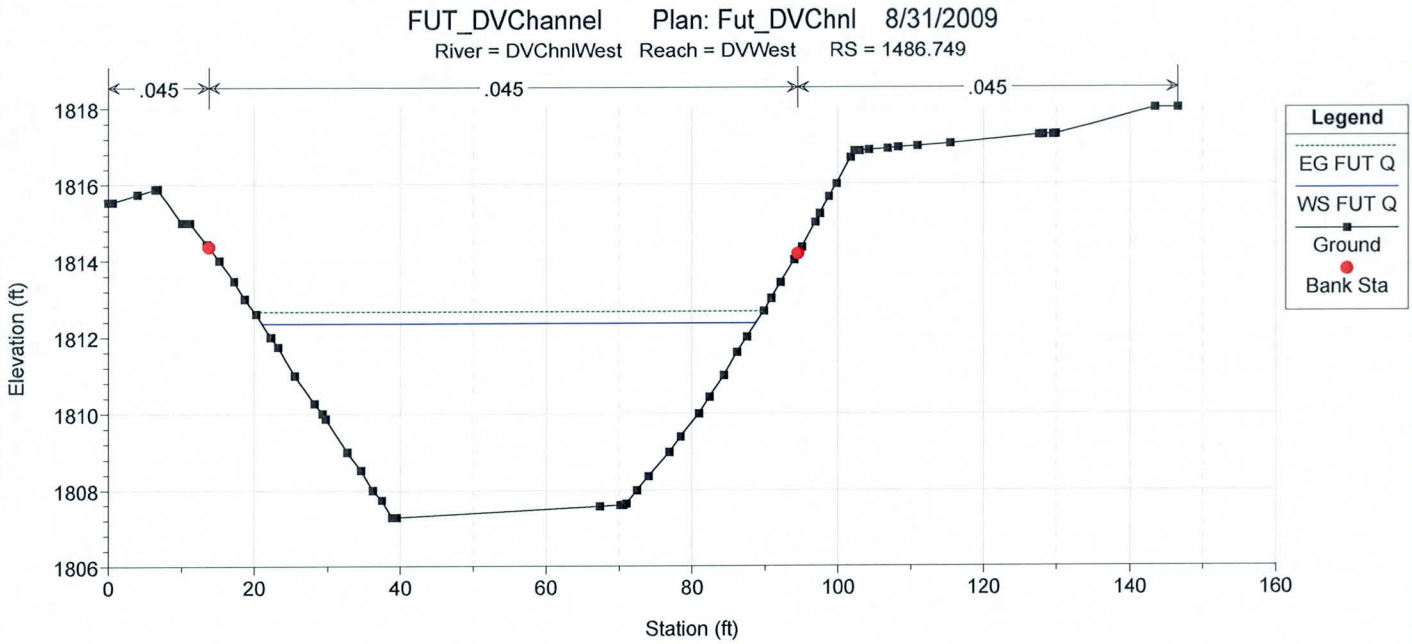

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1914.907
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

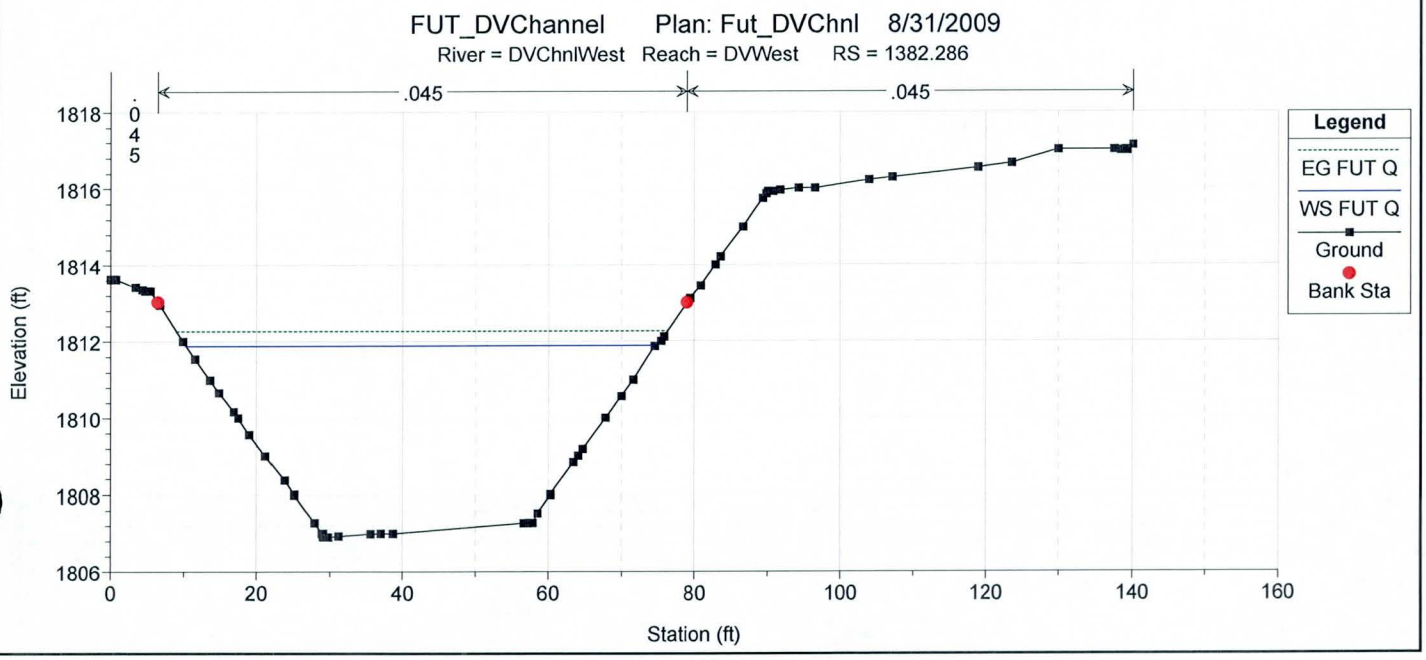

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1821.715
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

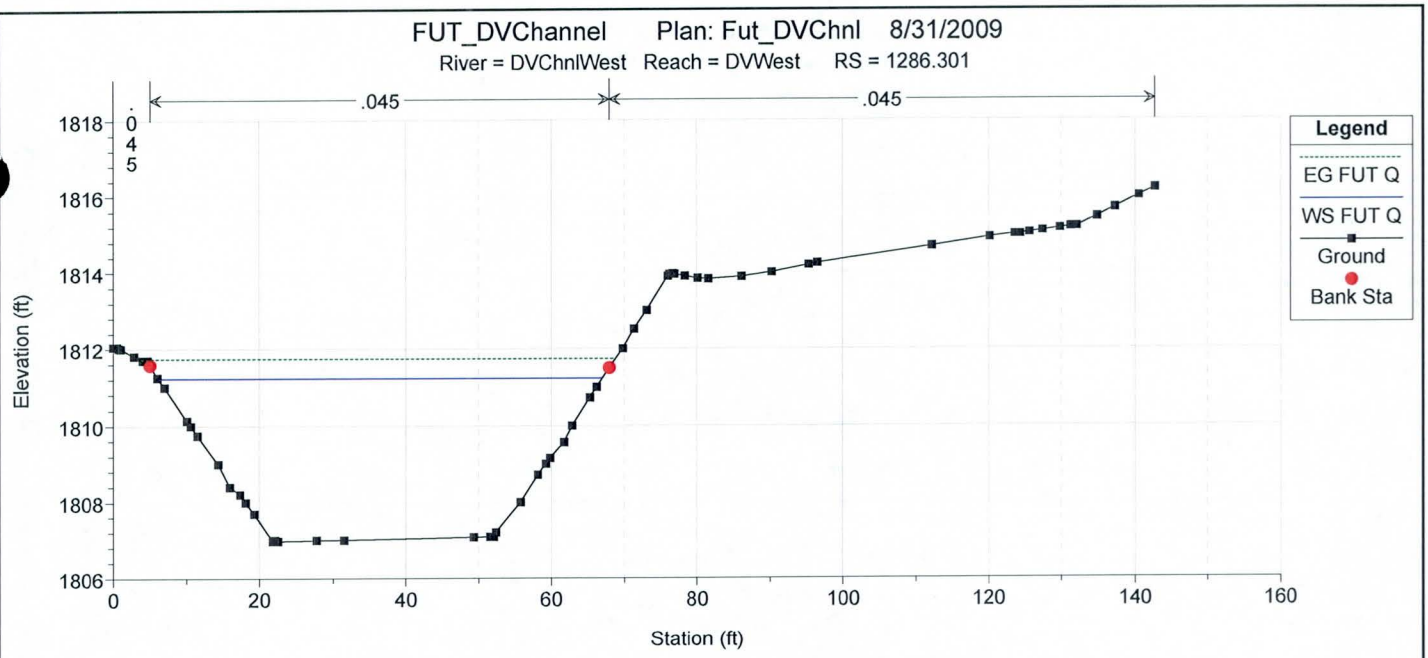

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1723.590
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

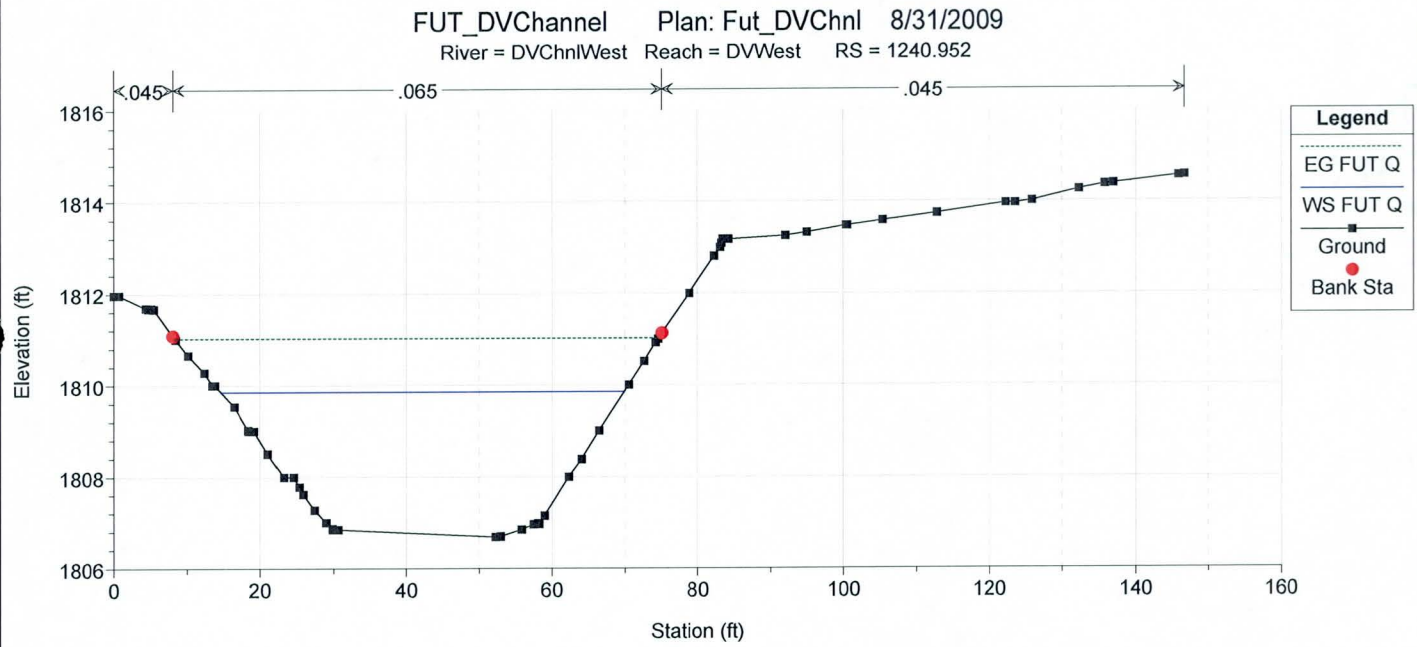

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1586.373
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

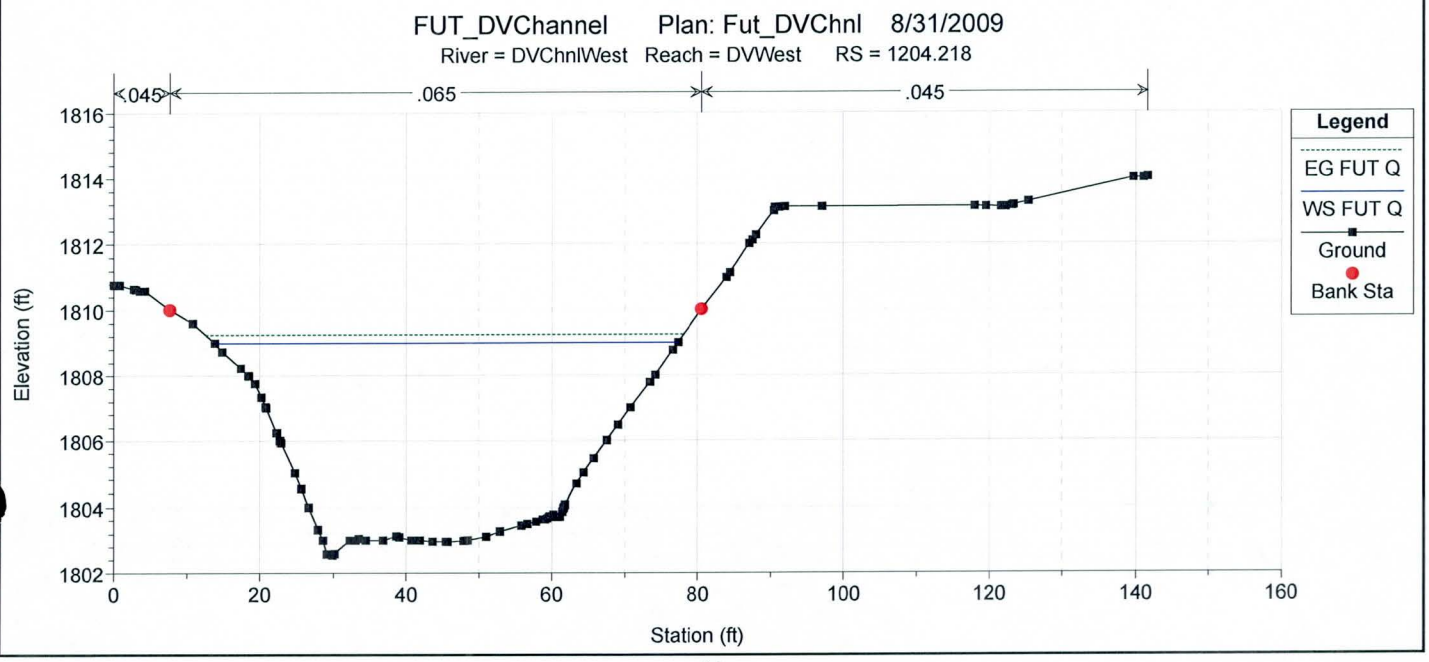

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1553.944
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

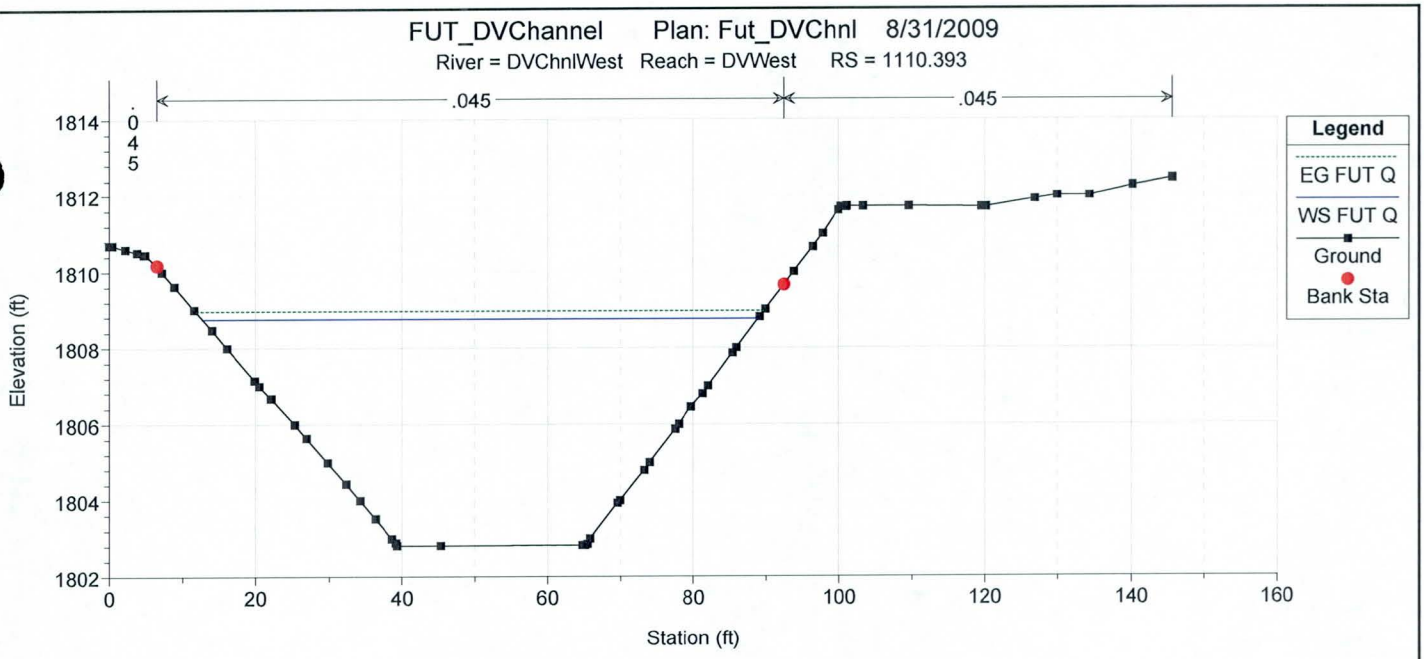

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1486.749
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

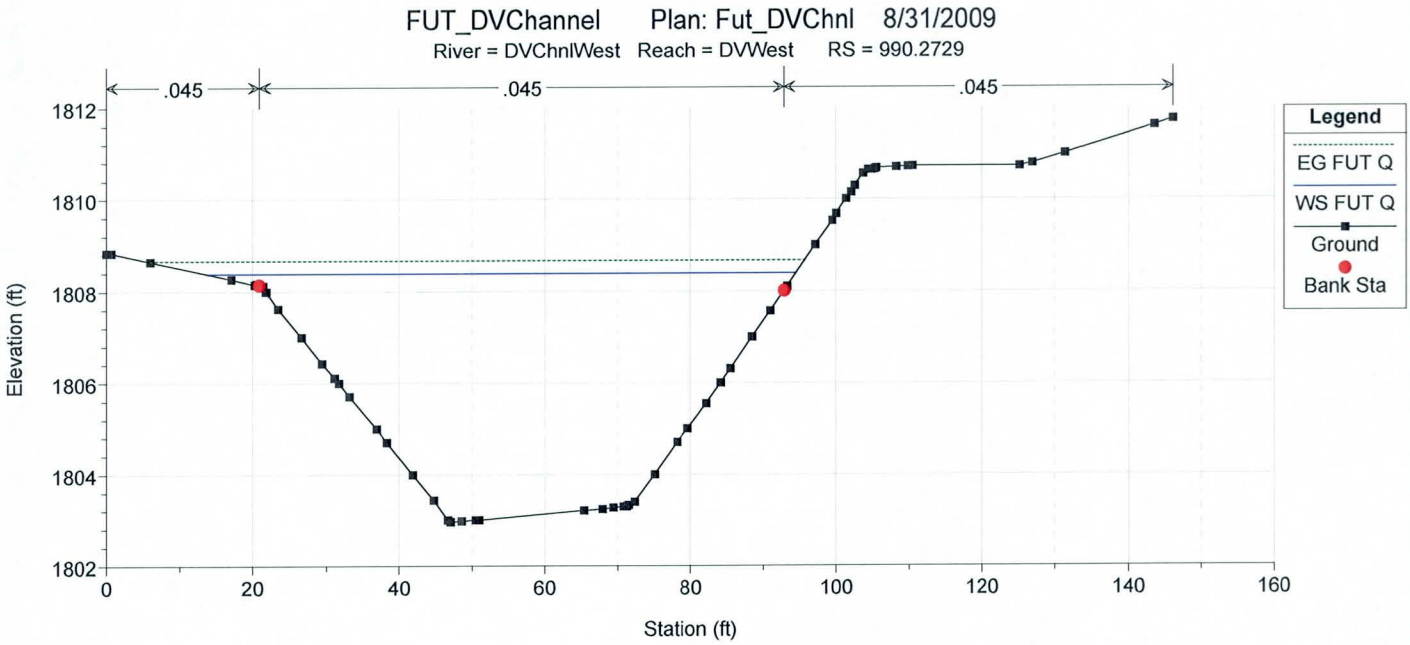

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1382.286
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

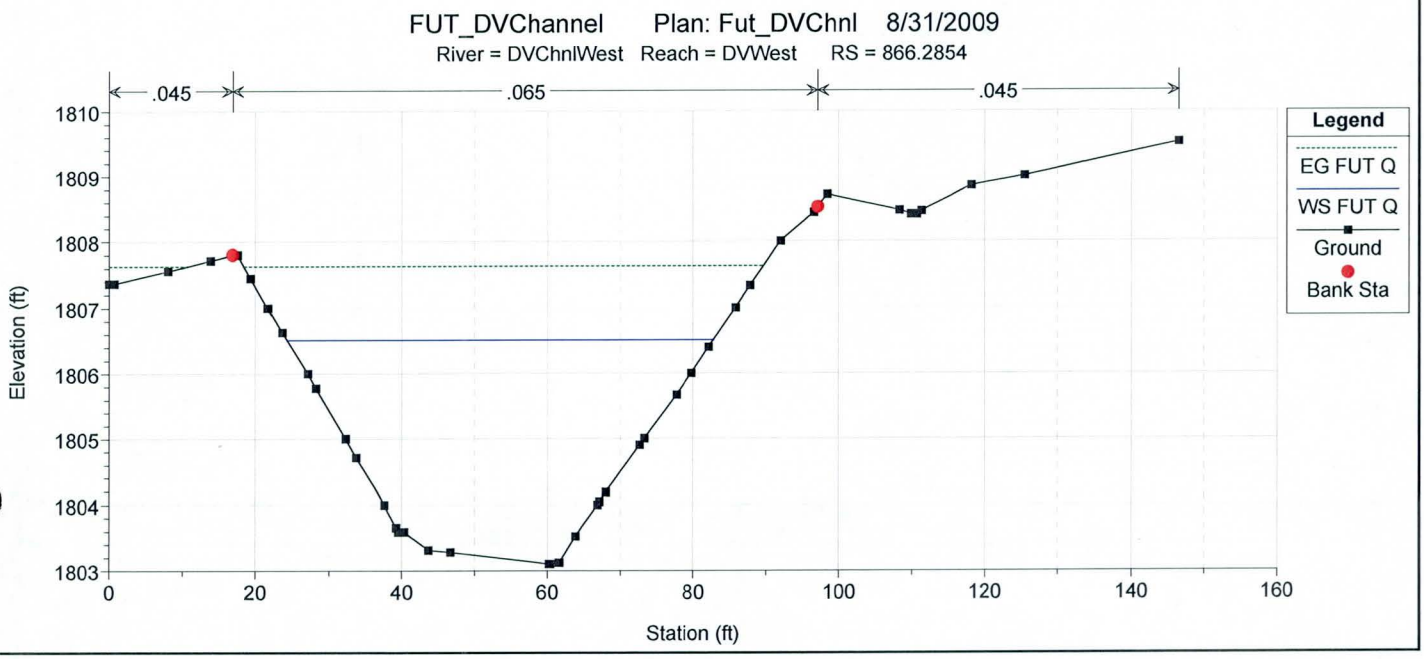

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1286.301
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

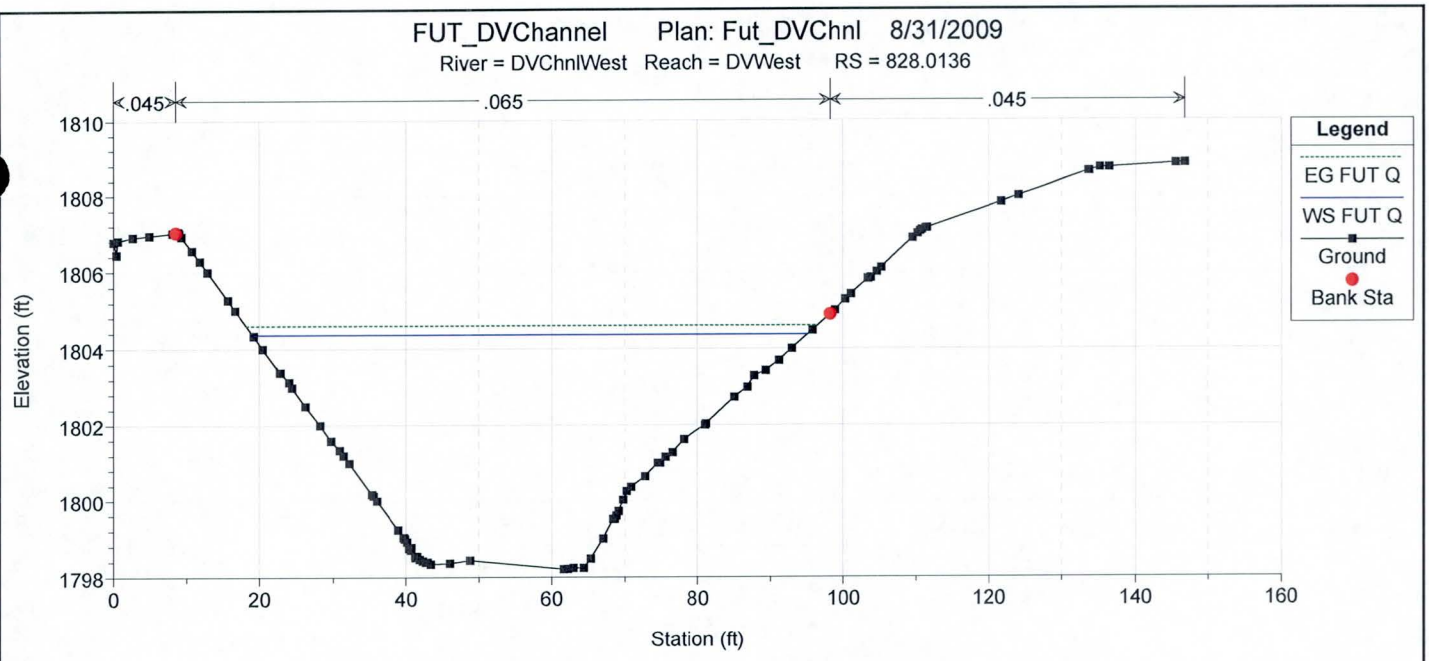

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1240.952
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

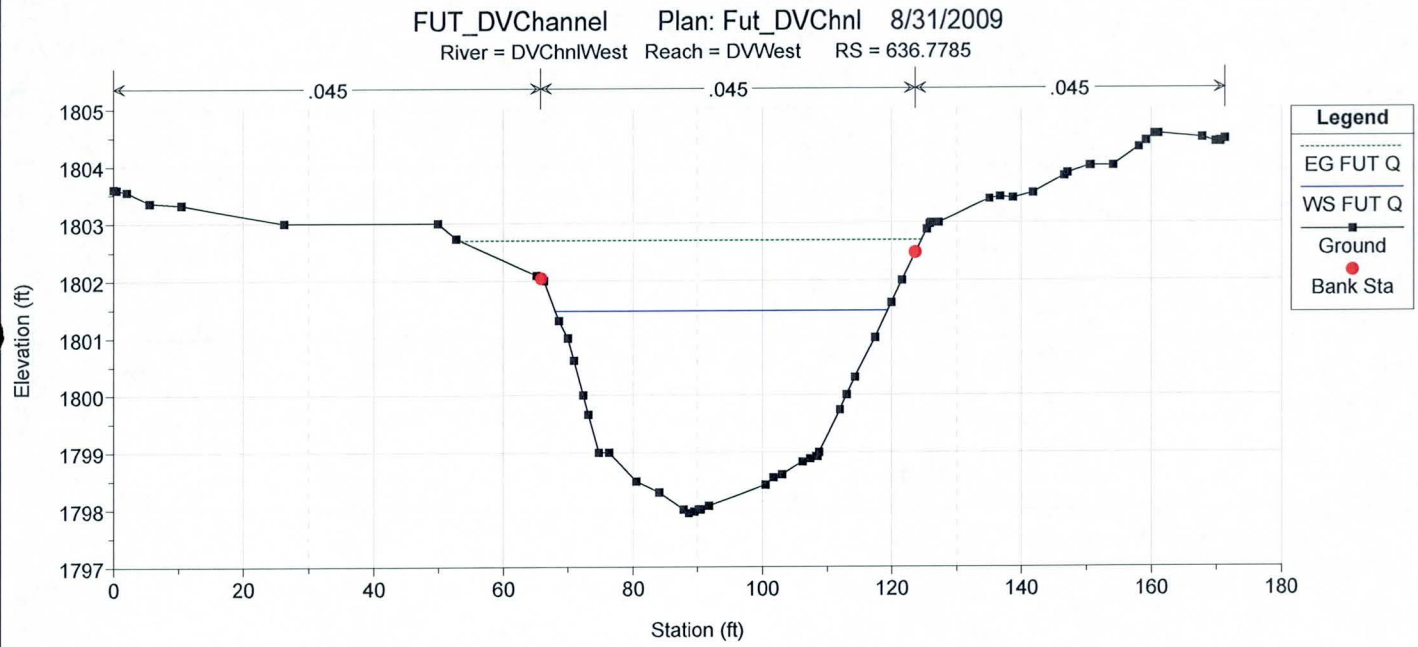

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1204.218
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

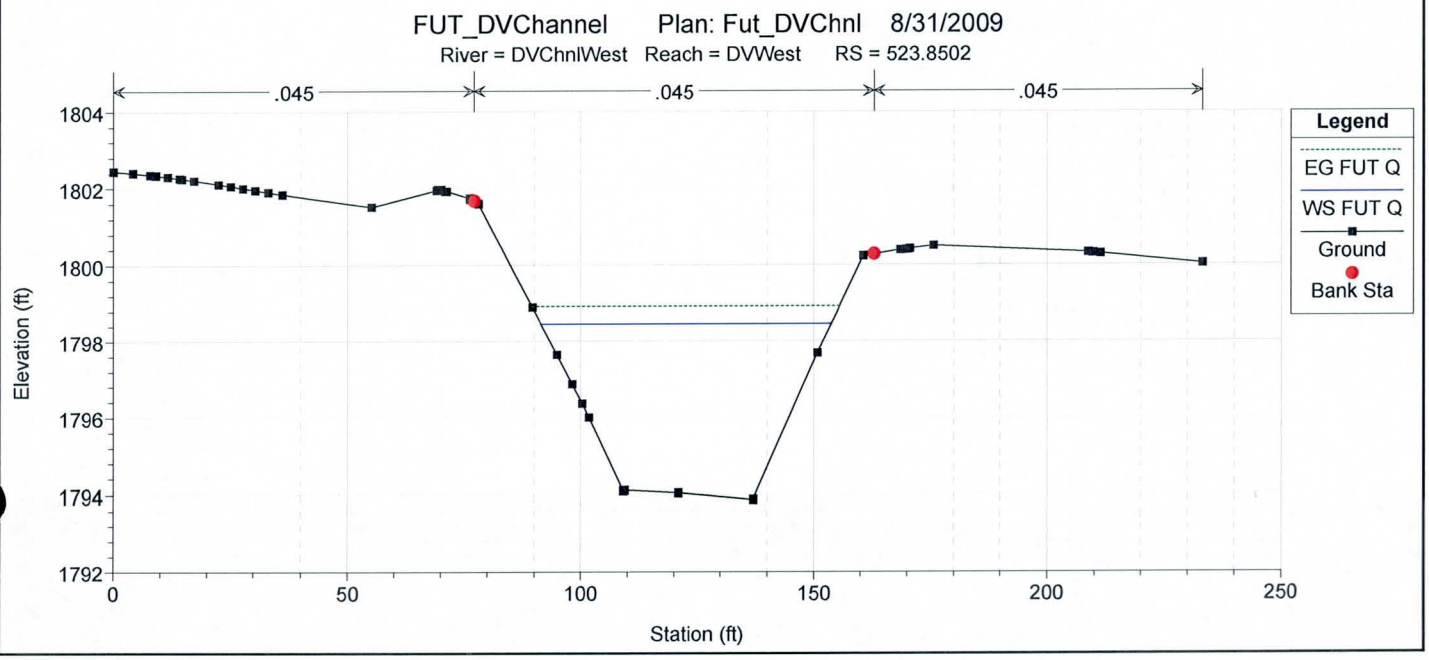

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 1110.393
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

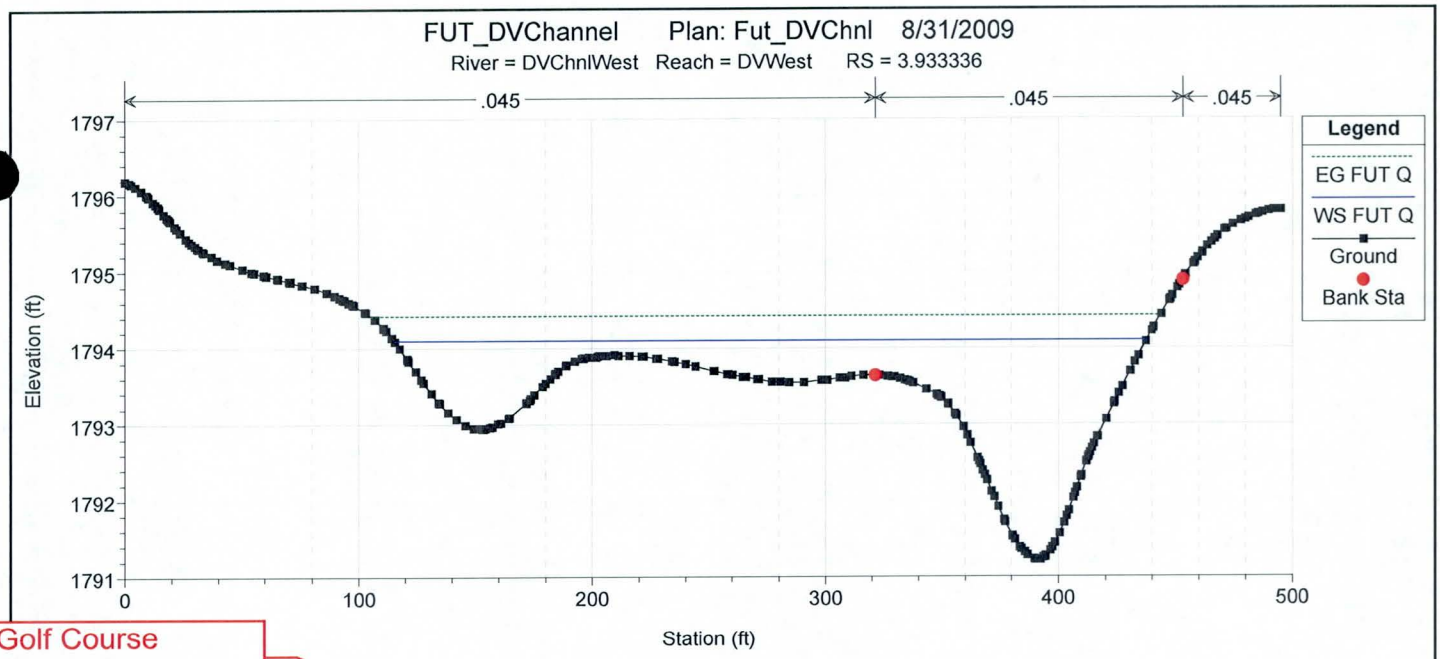

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 990.2729
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 866.2854
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

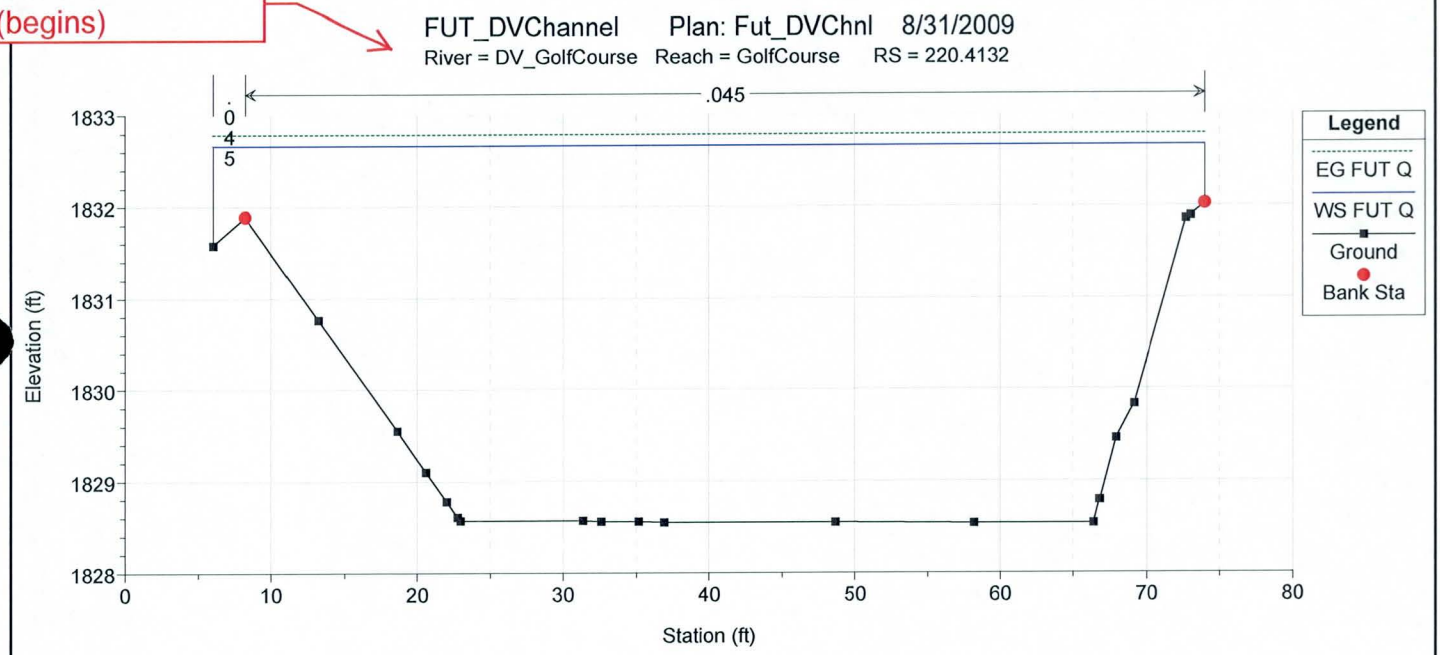

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 828.0136
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

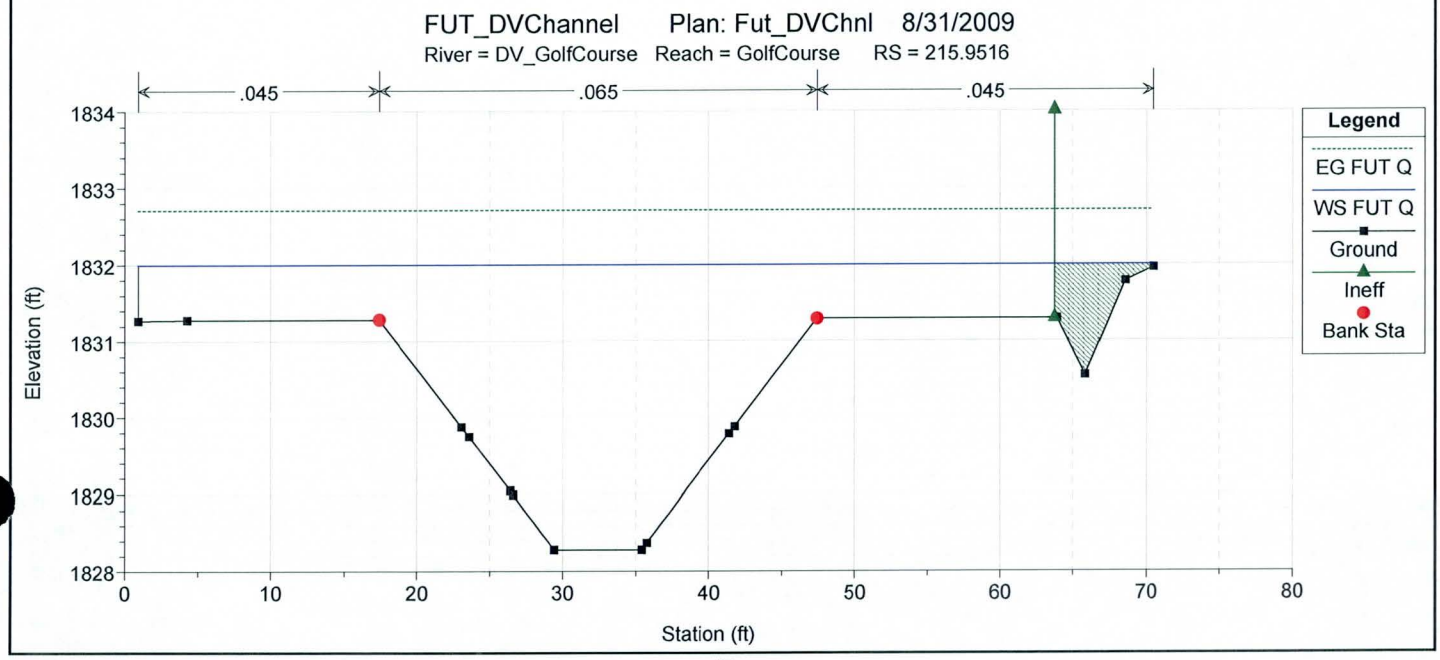

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 636.7785
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

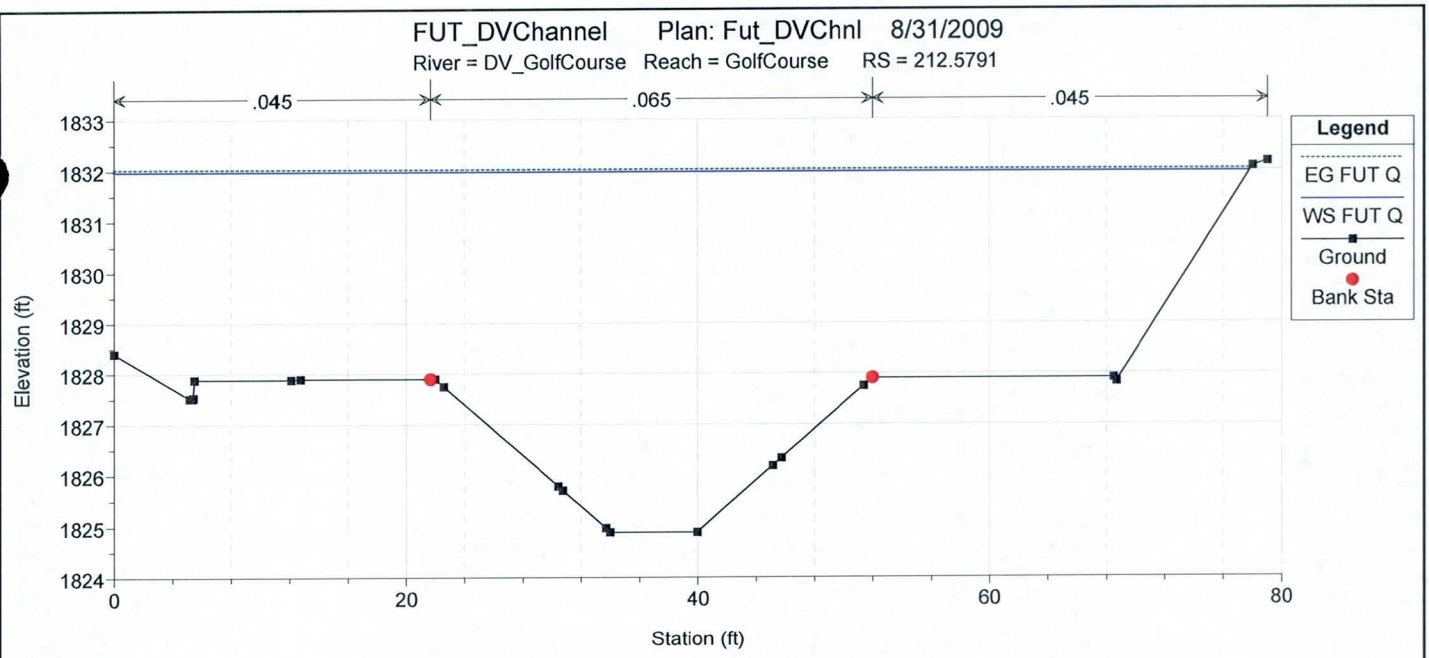

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DVChnlWest Reach = DVWest RS = 523.8502
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

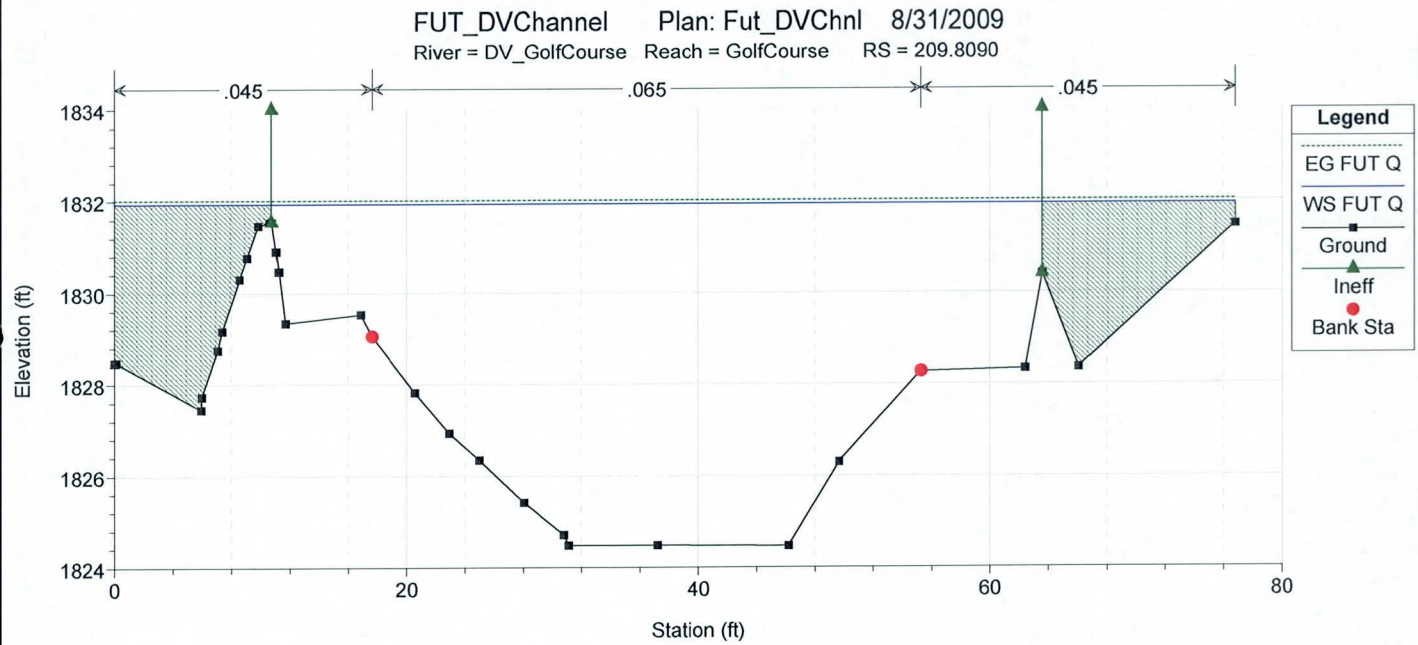


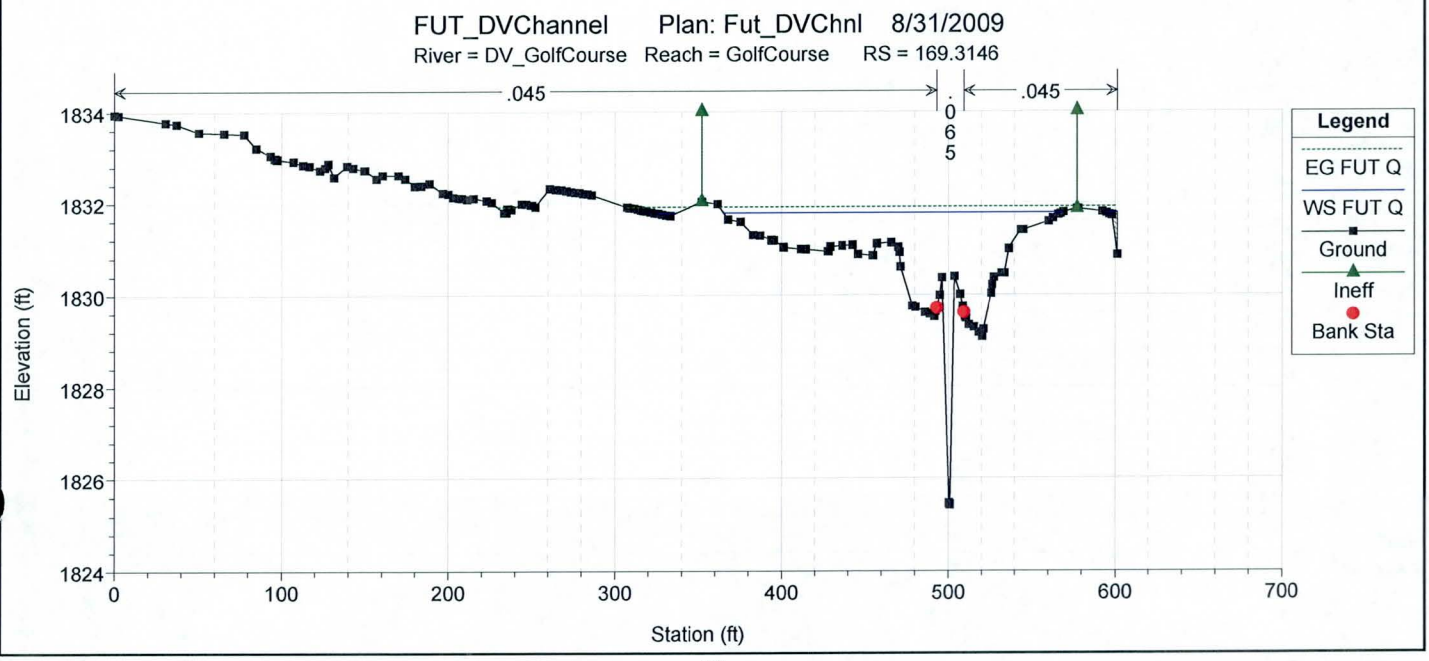
Golf Course (begins)

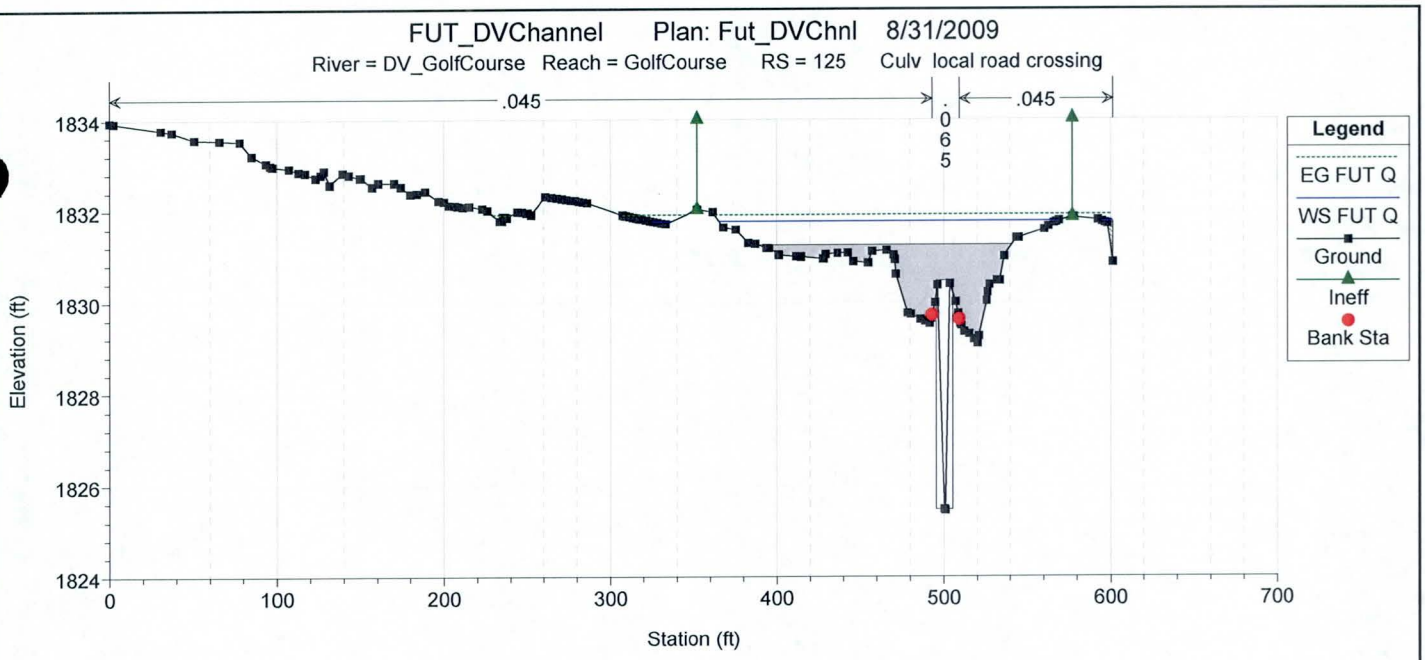


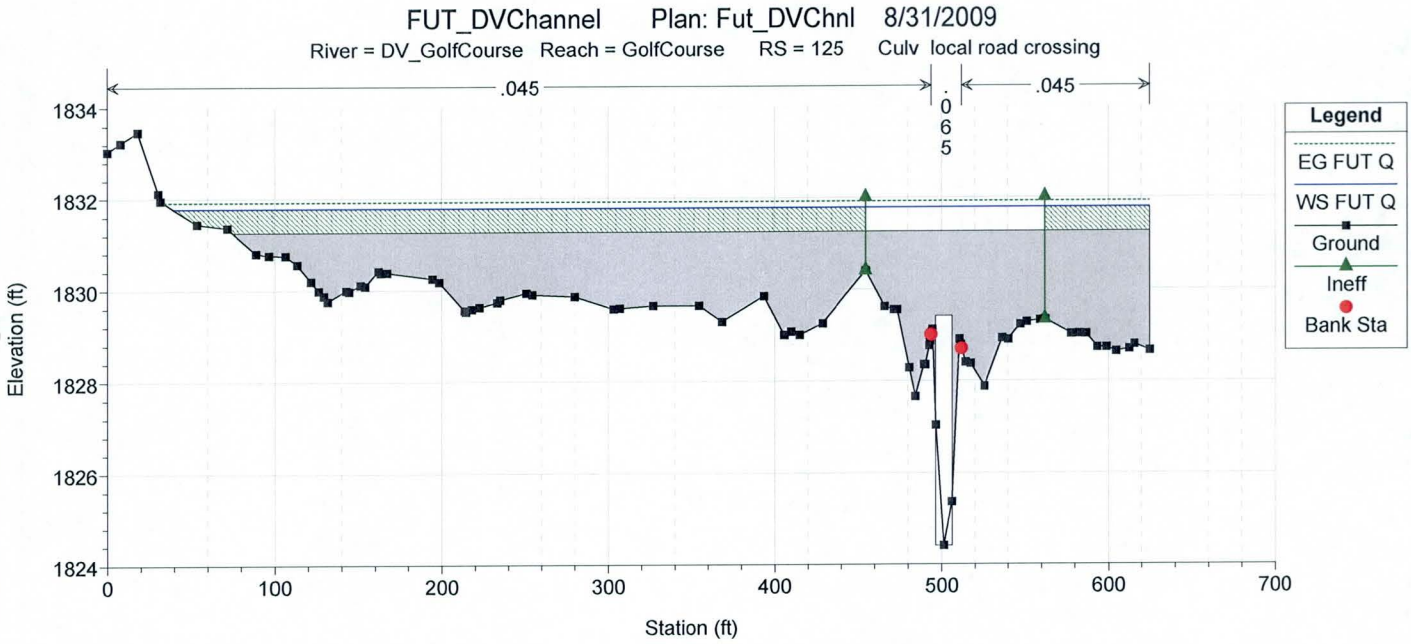


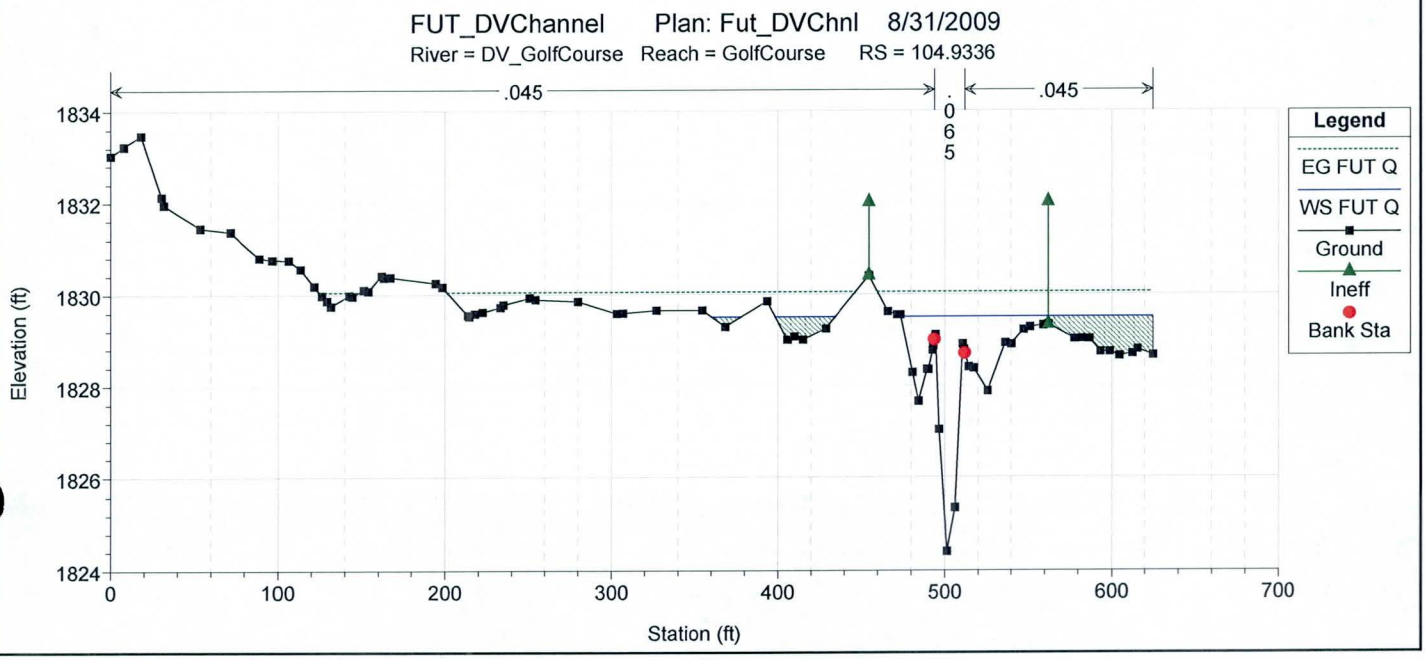

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DV_GolfCourse Reach = GolfCourse RS = 212.5791
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
Station (ft)

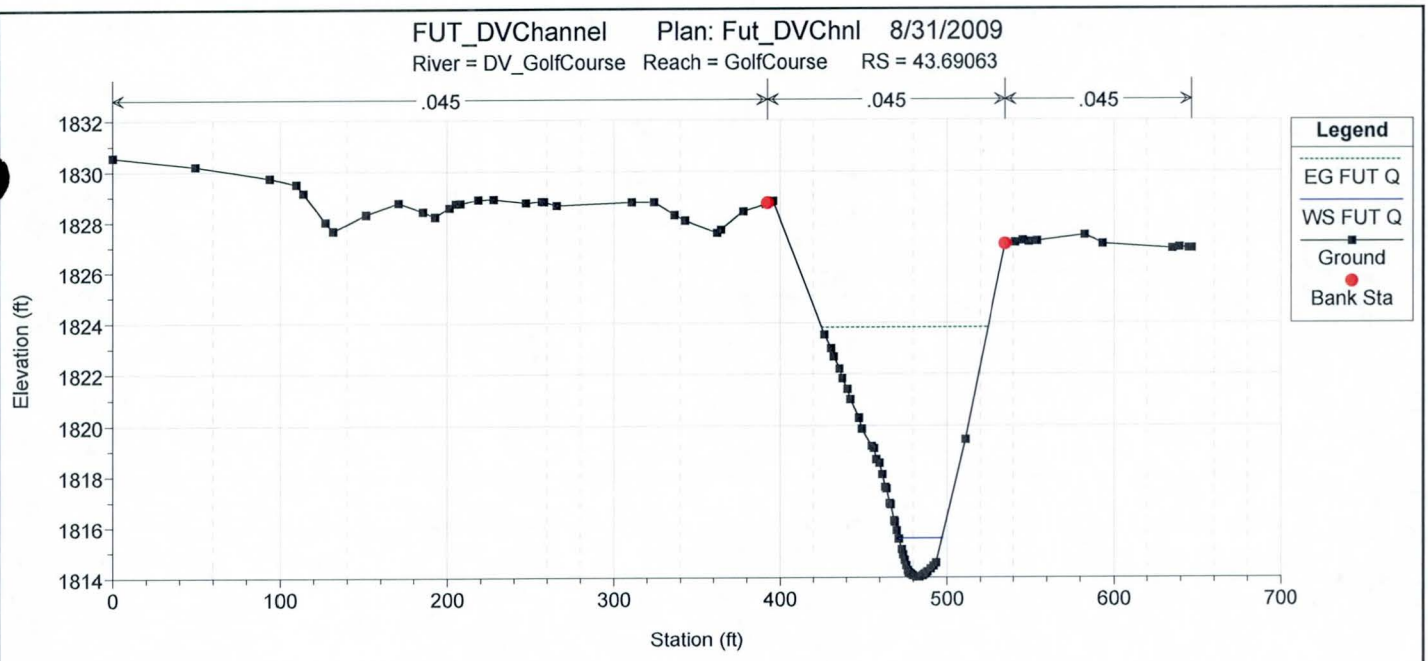

FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DV_GolfCourse Reach = GolfCourse RS = 209.8090
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DV_GolfCourse Reach = GolfCourse RS = 169.3146
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DV_GolfCourse Reach = GolfCourse RS = 125 Culv local road crossing
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DV_GolfCourse Reach = GolfCourse RS = 125 Culv local road crossing
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DV_GolfCourse Reach = GolfCourse RS = 104.9336
.045
.065
.045
Legend
EG FUT Q
WS FUT Q
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


FUT_DVChannel Plan: Fut_DVChnl 8/31/2009
River = DV_GolfCourse Reach = GolfCourse RS = 43.69063
.045
.045
.045
Legend
EG FUT Q
WS FUT Q
Ground
Bank Sta
Elevation (ft)
1832
1830
1828
1826
1824
1822
1820
1818
1816
1814
0
100
200
300
400
500
600
700
Station (ft)

Errors Warnings and Notes for Plan : FUT

Location:	River: DVChnlEast Reach: DVEast RS: 2059.096 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DVChnlEast Reach: DVEast RS: 1835.974 Profile: FUT Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlEast Reach: DVEast RS: 1618.294 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlEast Reach: DVEast RS: 1608.671 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: DVChnlEast Reach: DVEast RS: 1453.879 Profile: FUT Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlEast Reach: DVEast RS: 1299.008 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlEast Reach: DVEast RS: 1288.476 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for

	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: DVChnlEast Reach: DVEast RS: 1234.520 Profile: FUT Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlEast Reach: DVEast RS: 1185.977 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlEast Reach: DVEast RS: 1176.460 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: DVChnlEast Reach: DVEast RS: 959.1246 Profile: FUT Q
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlEast Reach: DVEast RS: 643.3254 Profile: FUT Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlEast Reach: DVEast RS: 471.4596 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlEast Reach: DVEast RS: 456.1793 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for

	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: DVChnlEast Reach: DVEast RS: 246.1572 Profile: FUT Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlEast Reach: DVEast RS: 44.69087 Profile: FUT Q
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlEast Reach: DVEast RS: 9.520977 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that
	had the least amount of error between computed and assumed values.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	A flow split was encountered. The program first calculated the momentum of both channels below the junction. An energy balance
	was performed across the junction from the stream with the highest momentum downstream to the section upstream.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DVChnlWest Reach: DVWest RS: 3072.011 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 3065.257 Profile: FUT Q
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 3056.419 Profile: FUT Q
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlWest Reach: DVWest RS: 2798.891 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 2675.578 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 2447.752 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 2377.473 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DVChnlWest Reach: DVWest RS: 2339.956 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlWest Reach: DVWest RS: 2242.139 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for

	additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 2109.155 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DVChnlWest Reach: DVWest RS: 2075.062 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlWest Reach: DVWest RS: 2011.366 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 1723.590 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 1586.373 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DVChnlWest Reach: DVWest RS: 1553.944 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlWest Reach: DVWest RS: 1286.301 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 1240.952 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DVChnlWest Reach: DVWest RS: 1204.218 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlWest Reach: DVWest RS: 990.2729 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Location:	River: DVChnlWest Reach: DVWest RS: 866.2854 Profile: FUT Q

Errors Warnings and Notes for Plan : FUT (Continued)

Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DVChnlWest Reach: DVWest RS: 828.0136 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DVChnlWest Reach: DVWest RS: 636.7785 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: DVChnlWest Reach: DVWest RS: 523.8502 Profile: FUT Q
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 220.4132 Profile: FUT Q
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 215.9516 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 212.5791 Profile: FUT Q
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 209.8090 Profile: FUT Q
Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 169.3146 Profile: FUT Q
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 125 Profile: FUT Q Culv: Culvert #1
Note:	During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 104.9336 Profile: FUT Q
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water
	surface and continued on with the calculations.
Warning:	Divided flow computed for this cross-section.
Warning:	The cross-section end points had to be extended vertically for the computed water surface.

Errors Warnings and Notes for Plan : FUT (Continued)

Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface
	came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: DV_GolfCourse Reach: GolfCourse RS: 43.69063 Profile: FUT Q
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may
	indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for
	additional cross sections.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Preliminary Cost Estimate
Alternative 1

8/31/2009

Item Number	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
1	Channel Excavation	18285	C.Y.	$ 6.00	$109,708
2	Channel Fill	3079	C.Y.	$ 6.50	$20,014
3A	Grade Control Structure (Section 1-A)	1	E.A.	$ 20,603.67	$20,604
3B	Grade Control Structure (Section 1-B)	4	E.A.	$ 13,550.00	$54,200
4	Rip-Rap Loose (24")	723	S.Y.	$ 32.00	$23,125
5	Remove Existing Wall	105	L.F.	$ 40.00	$4,200
6	Remove Existing Sidewalk	600	S.F.	$ 2.00	$1,200
7	Remove & Relocate Electric Line, Irrigation, Etc.	1	L.S.	$ 2,000.00	$2,000
8	Remove & Plug/Relocate Water Valve Vault	1	E.A.	$ 25,000.00	$25,000
9	Landscaping and Irrigation	1	L.S.	$ 17,332.80	$17,333
10	Channel Lining (Concrete)	0	S.F.	$ 6.00	$0
11	Clear & Grub	354349	S.F.	$ 0.50	$177,174
12	Mobilization	1	L.S.	$ 7,500.00	$7,500
13	Filter Fabric	723	S.Y.	$ 1.50	$1,084
	Subtotal				**$463,141**
	Contingency (25%)				**$115,785**
	TOTAL COST (Alternative 1)				**$578,927**

Preliminary Cost Estimate
Alternative 2

8/31/2009

Item Number	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
1	Channel Excavation	17024	C.Y.	$ 8.00	$136,192
2	Channel Fill	2830	C.Y.	$ 9.00	$25,470
3A	Grade Control Structure (Section 2-A)	1	E.A.	$ 20,433.13	$20,433
3B	Grade Control Structure (Section 2-B)	4	E.A.	$ 12,863.05	$51,452
4	Rip-Rap Loose (24")	3447	S.Y.	$ 30.65	$105,640
5	Remove Existing Wall	105	L.F.	$ 40.00	$4,200
6	Remove Existing Sidewalk	600	S.F.	$ 2.00	$1,200
7	Remove & Relocate Electric Line, Irrigation, Etc.	1	L.S.	$ 2,000.00	$2,000
8	Remove & Plug/Relocate Water Valve Vault	1	E.A.	$ 25,000.00	$25,000
9	Landscaping and Irrigation	1	L.S.	$ 17,490.25	$17,490
10	Channel Lining (Concrete)	0	S.F.	$ 6.00	$0
11	Clear & Grub	301112	S.F.	$ 0.50	$150,556
12	Mobilization	1	L.S.	$ 7,500.00	$7,500
13	Filter Fabric	3447	S.Y.	$ 1.10	$3,791
	Subtotal				**$550,925**
	Contingency (25%)				**$137,731**
	TOTAL COST (Alternative 2)				**$688,657**

Preliminary Cost Estimate
Alternative 3

8/31/2009

Item Number	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
1	Channel Excavation	9731	C.Y.	$ 8.00	$77,848
2	Channel Fill	1480	C.Y.	$ 9.00	$13,320
3A	Grade Control Structure (Section 3-A)	1	E.A.	$ 20,433.13	$20,433
3B	Grade Control Structure (Section 3-B)	5	E.A.	$ 7,478.52	$37,393
4	Rip-Rap Loose (24")	723	S.Y.	$ 30.65	$22,150
5	Remove Existing Wall	105	L.F.	$ 40.00	$4,200
6	Remove Existing Sidewalk	600	S.F.	$ 2.00	$1,200
7	Remove & Relocate Electric Line, Irrigation, Etc.	1	L.S.	$ 2,000.00	$2,000
8	Remove & Plug/Relocate Water Valve Vault	1	E.A.	$ 25,000.00	$25,000
9	Landscaping and Irrigation	1	L.S.	$ 15,186.15	$15,186
10	Channel Lining (Concrete)	129411	S.F.	$ 6.00	$776,466
11	Clear & Grub	129411	S.F.	$ 0.50	$64,706
12	Mobilization	1	L.S.	$ 7,500.00	$7,500
13	Filter Fabric	723	S.Y.	$ 1.10	$795
	Subtotal				**$1,068,196**
	Contingency (25%)				**$267,049**
	TOTAL COST (Alternative 3)				**$1,335,245**

Preliminary Cost Estimate
Alternative 4

8/31/2009

Item Number	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
1	Channel Excavation	18920	C.Y.	$ 8.00	$151,360
2	Channel Fill	1485	C.Y.	$ 9.00	$13,365
3A	Grade Control Structure (Section 4-A)	1	E.A.	$ 20,433.13	$20,433
3B	Grade Control Structure (Section 4-B)	4	E.A.	$ 13,461.33	$53,845
4	Rip-Rap Loose (24")	723	S.Y.	$ 30.65	$22,150
5	Remove Existing Wall	105	L.F.	$ 40.00	$4,200
6	Remove Existing Sidewalk	600	S.F.	$ 2.00	$1,200
7	Remove & Relocate Electric Line, Irrigation, Etc.	1	L.S.	$ 2,000.00	$2,000
8	Remove & Plug/Relocate Water Valve Vault	1	E.A.	$ 25,000.00	$25,000
9	Landscaping and Irrigation	1	L.S.	$ 10,852.13	$10,852
10	Channel Lining (Concrete)	0	S.F.	$ 6.00	$0
11	60" Concrete Pipe	2052	L.F.	$ 250.00	$513,000
12	Inlet Concrete Headwall for Storm Drain Pipe	1	E.A.	$ 2,500.00	$2,500
13	Outlet Concrete Headwall for Storm Drain Pipe	1	E.A.	$ 2,500.00	$2,500
14	Storm Drain Manhole	4	E.A.	$ 5,000.00	$20,000
15	Clear & Grub	158061	S.F.	$ 0.50	$79,031
16	Mobilization	1	L.S.	$ 7,500.00	$7,500
17	Filter Fabric	723	S.Y.	$ 1.10	$795
	Subtotal				**$929,731**
	Contingency (25%)				**$232,433**
	TOTAL COST (Alternative 4)				**$1,162,164**

APPENDIX K: COST ESTIMATES

KNOCHEL BROS., INC.

1441 E. Alameda
Phoenix, AZ 85024
(623) 581-9000

Contractor's License # A 084070

A

Item	Unit	Quantity	Unit Price	Total
Mobilization	LS	1	$ 3800	$ 3800
Export (Option A – hauled off-site within 5 miles)	CY	48627	$ 4.35	$ 211,527.45
Export (Option B – wasted on-site along top of bank within easement 10' wide each side without raising the top of bank more than 6" if possible)	CY	—	$ —	$ —
Filter Fabric (All faces where rip rap will be placed)	SY	25,900	$ 1.10	$ 28490 -
Type III D50 Loose Rip Rap (~~12"–24"~~) 30"	SY	25,900	$ 30.65	$ 793835 -
			Subtotal	$ 1,037,652.45
			Overhead & Profit	$
			Sales Tax 65% of 7.95%	$ 53620.69
			Total	$ 1,091,273.14

B

Item	Unit	Quantity	Unit Price	Total
Mobilization	LS	1	$ 7600	$ 7600
Export (Option A – hauled off-site within 5 miles)	CY	—	$ —	$ —
Export (Option B – wasted on-site along top of bank within easement 10' wide each side without raising the top of bank more than 6" if possible)	CY	48627	$ 1.95	$ 94,822.65
Filter Fabric (All faces where rip rap will be placed)	SY	25,900	$ 1.10	$ 28,490 -
Type III D50 Loose Rip Rap (~~12"–24"~~) 30"	SY	25,900	$ 30.65	$ 793835 -
			Subtotal	$ 924,747.65
			Overhead & Profit	$
			Sales Tax 65% of 7.95%	$ 47,786.33
			Total	$ 972,533.98

KNOCHEL BROS., INC.

1441 E. Alameda
Phoenix, AZ 85024
(623) 581-9000
Contractor's License # A 084070

Job Name: Scottsdale Channel - budget proposal

Date: 8/28/09

Quote to: Entellus **Attn: Mike Colland**

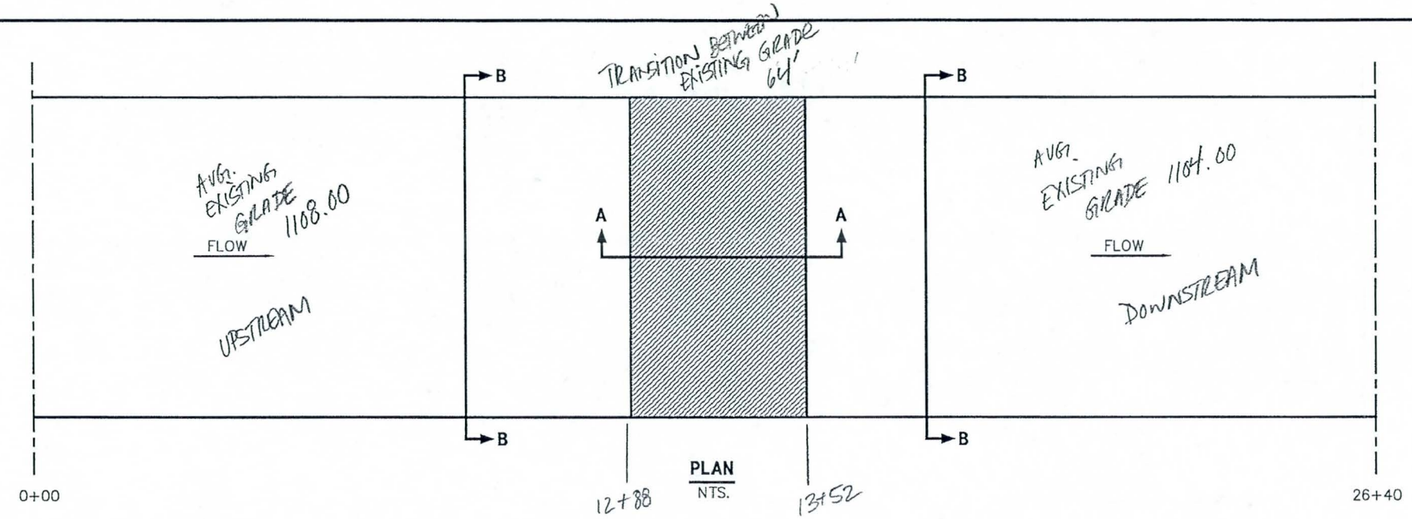
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
200	**OPTION A - HAUL OFF**				
203	MOBILIZATION	1.00	LS	3,800.00	3,800.00
206	SCRAPER HAUL AND TRUCK EXPORT	48,627.00	CY	4.35	211,527.45
400	FILTER FABRIC	25,900.00	SY	1.10	28,490.00
406	INSTALL RIPRAP (LOOSE) 30" THICK	25,900.00	SY	30.65	793,835.00
	TOTAL				**$1,037,652.45**
900	**OPTION B - LOSE MATERIAL ON SITE**				
901	MOBILIZATION	1.00	LS	7,600.00	7,600.00
903	SCRAPER HAUL - STOCKPILE ON SITE	48,627.00	CY	1.95	94,822.65
915	FILTER FABRIC	25,900.00	SY	1.10	28,490.00
917	INSTALL RIPRAP (LOOSE) 30" THICK	25,900.00	SY	30.65	793,835.00
	TOTAL				**$924,747.65**

NOTES:

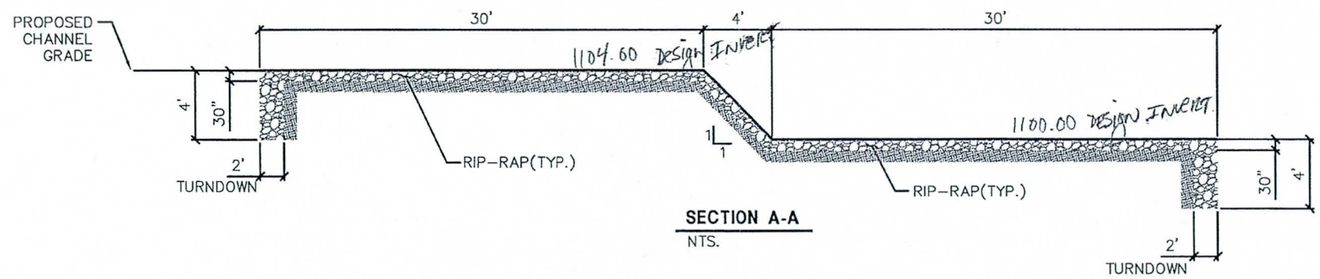
This proposal is for budgeting purposes only.
Water costs are included in the bid. Water must be available on the site in sufficient quantities.
This proposal based on Engineer's plans. Any revisions to plans shall be billed as extra work.
This proposal must be attached to contract as an exhibit.

Exclusions:
Upon certification, grading will be considered complete. KB does not include regrading (after other contractors).
Excludes permits, bonds, surveying, testing, hazardous material, and underground structures.
Excludes screening of onsite material.
Excludes NPDES, SWPP implementation/management.
Excluds traffic control.
Excludes sales tax.

Dennis Malone
Senior Estimator

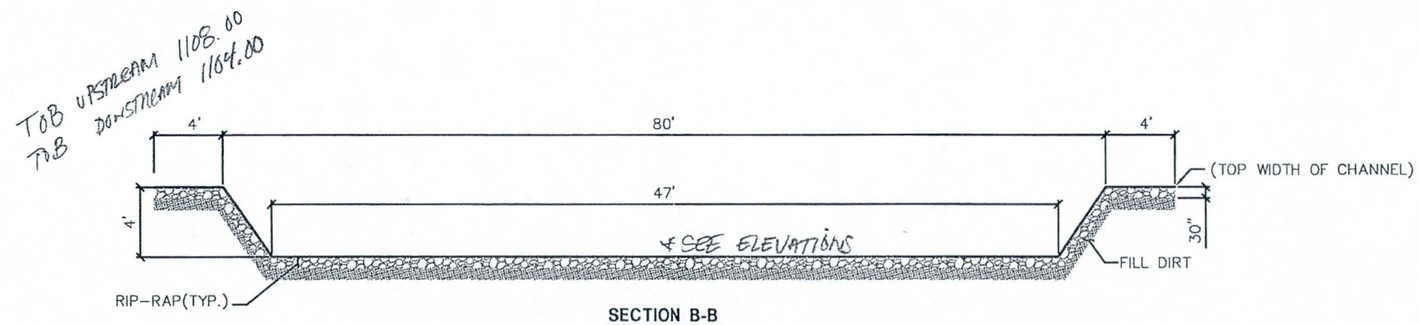


PLAN
NTS.



SECTION A-A
NTS.

NOTE: TYPE 3 D50 LOOSE RIP-RAP WITH FILTER FABRIC UNDERLAY



SECTION B-B
NTS.

DETAIL NO. 2

TYPICAL GRADE CONTROL STRUCTURE

SHT. of
SCALE NTS
Details
Exhibit A

FILE: U:\Jesus 2009\work improvement\cadd\Detail_Sheet.dwg DATE: Aug 25, 2009

APPENDIX L: CD